Appendix F
Biological Resources

APPENDIX F
TABLE OF CONTENTS

F.1 PROTOCOL SURVEYS FOR NESTING GOLDEN EAGLES (*AQUILA CHRYSAETOS*)

F.2 GOLDEN EAGLE SURVEY

F.3 SUMMARY OF BIOTIC RESOURCES

F.4 LATE SUMMER/EARLY FALL RARE PLANT SURVEYS

F.5 PROTOCOL-LEVEL DRY SEASON BRANCHIOPOD SURVEY RESULTS

F.6 PROTOCOL-LEVEL WET SEASON BRANCHIOPOD SURVEY RESULTS

F.7 NON-PROTOCOL BRANCHIOPOD SURVEY RESULTS

F.8 EARLY SPRING RARE PLANT SURVEYS

F.9 LATE SPRING RARE PLANT SURVEYS

F.10 2010 ADULT AND JUVENILE BNLL SURVEYS CONDUCTED ON SECTION 16 OF TOWNSHIP 15S, RANGE 10E

F.11 SILVER CREEK RANCH RECONNAISSANCE-LEVEL SURVEYS

F.12 GOLDEN EAGLE NON-BREEDING SEASON SURVEYS AND RAPTOR SURVEY

F.13 SUMMARY OF THE CONSERVATION STRATEGY FOR FEDERALLY AND STATE LISTED SPECIES FOR THE PANOCHE VALLEY SOLAR FARM

F.14 EARLY SEASON RARE PLANT SURVEYS OF PANOCHE SOLAR PROJECT FOOTPRINT

F.15 BIOLOGICAL ASSESSMENT FOR THE PANOCHE VALLEY SOLAR FACILITY

F.16 PANOCHE VALLEY SOLAR FARM WETLAND DELINEATION REPORT

F.17 RARE PLANT SURVEY

F.18 BNLL SURVEY REPORT

F.19 BNLL HATCHLING SEASON SURVEYS

F.1 Bloom Biological, Inc. 2010. Results of protocol surveys for nesting golden eagles (*Aquila chrysaetos*) conducted in association with the proposed Panoche Valley Solar Farm Project Located in the Panoche Valley, Unincorporated San Benito County, California. November 14, 2010.

F.2 Bloom Biological, Inc. 2014. Golden Eagle Survey. Panoche Valley Solar Farm Project.

F.3 Live Oak Associates. 2009a. Summary of Biotic Resources, Solargen Energy's Panoche Ranch Solar Farm. April 20, 2009.

F.4 ______. 2009b. Late Summer/Early Fall Rare Plant Surveys for the Panoche Valley Solar Farm Project in San Benito County, California (PN 1297-04). November 24, 2009.

F.5 ______. 2010a. Protocol-Level Dry Season Branchiopod Survey Results, 90-Day Report. Panoche Valley Solar Farm, San Benito County, California. January 14, 2010.

F.6 ______. 2010c. Protocol-Level Wet Season Branchiopod Survey Results 90-Day Report Panoche Valley Solar Farm. San Jose, California. August 13, 2010.

F.7 ______. 2010d. Non-Protocol Branchiopod Survey Results, Solargen Energy, Panoche Valley Mitigation Parcels. San Jose, California. August 2010.

F.8 ______. 2010e. Early Spring Rare Plant Surveys for the Panoche Valley Solar Farm Project in San Benito County, California (PN 1297-04b). June 17, 2010.

F.9 _____. 2010f. Late Spring Rare Plant Surveys for the Panoche Valley Solar Farm Project in San Benito County, California (PN 1297-04c). September 17, 2010.

F.10 ______. 2010g. Results of 2010 Adult and Juvenile BNLL Surveys Conducted on Section 16 of Township 15S, Range 10E for Solargen Energy's Panoche Valley Solar Farm. Prepared for Solargen Energy, Inc. September 22, 2010.

F.11 ______. 2010h. Data Request #8. Silver Creek Ranch Reconnaissance-Level Surveys. September 10, 2010.

F.12 ______. 2010i. Preliminary Write-Up of Golden Eagle Non-Breeding Season Surveys and Raptor Survey. Prepared for Solargen Energy, Inc. September 22, 2010.

F.13 ______. 2010j. Summary of the Conservation Strategy for Federally and State Listed Species for the Panoche Valley Solar Farm. April 27, 2010.

F.14 McCormick Biological, Inc. 2015a. Early season rare plant surveys of Panoche Solar Project Footprint. McCormick Biological, Inc.

F.15 Panoche Valley Solar. 2014. Biological Assessment for the Panoche Valley Solar Facility. April 2014.

F.16 Power Engineers. 2009a. Panoche Valley Solar Farm Wetland Delineation Report. Project Number 117257. November 12, 2009.

F.17 McCormick Biological, Inc. 2015b. Rare Plant Survey, Panoche Valley Solar Project Footprint and Telecommunications Route. October 2015.

F.18 Energy Renewal Partners and McCormick Biological, Inc. 2015. Blunt-nosed Leopard Lizard Survey Report. August 2015.

F.19 McCormick Biological, Inc. 2015c. BNLL hatchling season surveys – portions of Project Footprint, Valley Floor Conservation Lands and Telecom Sites. Memorandum. September 22, 2015.

RESULTS OF PROTOCOL SURVEYS FOR NESTING GOLDEN EAGLES (*AQUILA CHRYSAETOS*) CONDUCTED IN ASSOCIATION WITH THE PROPOSED PANOCHE VALLEY SOLAR FARM PROJECT LOCATED IN THE PANOCHE VALLEY, UNINCORPORATED SAN BENITO COUNTY, CALIFORNIA.

Bloom Biological, Incorporated
November 14, 2010

Bloom Biological, Incorporated (BBI) was retained by Solargen Energy, Incorporated (Solargen) in cooperation with Live Oak Associates, Inc. to conduct surveys for Golden Eagle (*Aquila chrysaetos*) nests in the vicinity of the proposed Panoche Valley Solar Farm Project (PVSF), located in the Panoche Valley in unincorporated San Benito County, California. This report discusses the BBI's survey methods, results and recommendations.

PROPOSED PROJECT DESCRIPTION

The 4,885-acre project site is located in eastern San Benito County in the Panoche Valley, approximately 15 miles west of Highway 5 and along Little Panoche Road (also known as West Shields Road). Specifically, the project is located in Township 15S, Range 10E, Sections 3-4, 8-11, and 13-16 and Township 15S, Range 11E, Section 19 of the USGS *Cerro Colorado*, *Llanada*, *Mercy Hot Springs*, and *Panoche* 7.5-minute topographic quadrangle maps.

The topography of the site descends gradually to the east-southeast with sloping gradients up to approximately 11 percent. The site elevation ranges from approximately 1,250 feet above mean sea level near the southeast end of the site to approximately 1,400 feet above mean sea level near the west end. The site is surrounded by rangeland and bordered to the west by the Gabilan Range and to the east by the Panoche Hills. Both Panoche Creek and Las Aguilas Creek traverse the project site. In addition, there are several unnamed washes located throughout the site.

There is no urban development within the project site or surrounding area. The nearest rural community is approximately 15 miles from the perimeter of the project site. Previously, much of the project site was used for crop production; however, for approximately the past forty years, the project site and the surrounding area have been used for grazing. Vegetation is low-lying and sparse and primarily consists of annual nonnative grass species.

Like much of California, the site and surroundings experience a Mediterranean climate with dry hot summers and cool wet winters. However, this region does not experience heavy rainfall, and is characterized as high desert. Annual precipitation in the general vicinity of the site ranges between 9 and 13 inches, almost 85 percent of which falls between October and March. Nearly all precipitation falls in the form of rain. Stormwater runoff readily infiltrates the sites' soils; when field capacity has been reached, gravita-tional water flows into the creeks and drainages.

REASON FOR SURVEYS

The Golden Eagle is an uncommon permanent resident and migrant throughout most of California's foothills, mountains, sage-juniper flats and deserts (CDFG 2008), and is protected under the federal Bald and Golden Eagle Protection Act and by the California Department of Fish & Game as a Fully Protected Species. Golden Eagle status studies completed as recently as 1989 suggested a stable population for much of the western United States (Harlow and Bloom 1989), however, recent evidence suggest that eagle numbers in the western United States are now declining. As a result, the U.S. Fish and Wildlife Service (Service) is recommending focused surveys in nesting habitat within ten miles of proposed projects that might cause anthropogenic disturbances to eagles. Future recommendations regarding Golden Eagle wintering and migratory habitat use are being developed.

METHODS

The Service has recently recommended (Pagel et al. 2010) the following four tasks to determine the likely effects of a project or activity on eagles:

A. Collection and synthesis of biological data.
B. Identifying activities that are likely to result in take.
C. Avoidance and minimization measures.
D. Quantifying the anticipated take.

BBI's typical survey approach follows recommendations made in the U.S. Fish and Wildlife Service's (Service) Interim Golden Eagle inventory and monitoring protocols (Pagel et al. 2010), which recommend two surveys for eagle nests by helicopter. The first (Phase 1) is normally conducted in March and the second (Phase 2) in late April/early May. The Service notes that helicopter surveys are an accepted and efficient means to monitor large areas of habitat, to inventory potential habitat, and monitor known territories (Pagel et al. 2010), as eagles nest on cliffs or large trees in open areas and build a large platform nest often initially 10 feet across and 3 feet high of sticks, twigs and greenery (CDFG 2008). Because of their large size, these nests, particularly when active, are easy to spot at a great distance from the air and in California can be distinguished from Red-tailed Hawk (*Buteo jamaicensis*), Common Raven (*Corvus corax*) and Bald Eagle (*Haliaeetus leucocephalus*) by biologists experienced with the nests of those species. The Phase 2 survey can be conducted on foot if feasible. The purpose of the surveys is to record and report occupancy (Phase 1) and productivity (Phase 2) of resident golden eagles including, but not limited to, the following:

- individual activities,
- nests and territories on and surrounding the subject solar farm project, and within an approximate 4- to 10-mile radius of the proposed project (assumed Service requirement).

The Golden Eagle surveys conducted in 2010 for the PVSF were conducted outside of the survey window recommended in the Service's guidelines, however, the specific surveys conducted by BBI were approved by the Service with the caveat that spring surveys would likely still be recommended and that any Golden Eagle nest trees or nest cliffs found may need to be climbed to verify species and nest success. The potential survey area included the project site and all lands within a ten mile radius surrounding the project site, with a particular emphasis on topographic features and large power line rights-of-way where Golden Eagles are likely to be located.

Because of the late date that surveys were being conducted, BBI gathered as much data as possible about Golden Eagle locations and use of the area over the course of two days of helicopter surveys conducted on August 6 and 7, 2010. Flight times were nine and five hours, respectively. Both surveys followed the helicopter survey methodology described in Section VII.b Aerial Surveys of Pagel et al. (2010). Surveys were conducted by BBI biologists Peter H. Bloom (seated in the front of the helicopter) and Scott Thomas (seated in the rear). Two GPS units, 1 primary and 1 backup, were used to document geographic locations of importance and the routes taken. The survey duration was adequate to cover the entire area and examine detectable large stick nests for the presence of inactive and active Golden Eagle nests. Nests of all raptor species and corvids that could be detected were documented.

SURVEY LIMITATIONS

The western 50% of the survey area contained highly variable hilly topography and was cloaked in oak woodlands and oak savannah that include at least Blue Oaks (*Quercus douglassiana*) and Valley Oaks (*Q. lobata*), both common nesting substrates for Golden Eagles and Red-tailed Hawks (*Buteo jamaicensis*) in this region (Bloom unpub. & Tietje et al. 1998). Both tree species are deciduous. But because nesting surveys were performed in August, essentially all live trees were fully leafed out and only a moderate percentage could be accurately surveyed.

The survey accuracy was also weakened because all nesting pairs of Golden Eagles and Red-tailed Hawks in this region had fledged their young by August 1. As a result, the identity of nest ownership could not be precisely known in the case of some nests because no chicks, incubating or brooding adults or other important nest identifiers could be used. However, the summer 2010 preliminary results are unequivocal; there is a high density of nesting Golden Eagles and other raptors and ravens surrounding Panoche Valley but relatively few actually on the valley floor.

RESULTS

A total of 169 large bird (raptor or corvid) nests were detected during the survey, including 15 Golden Eagle nests (see Table II, end of document). Of the 15 Golden Eagle nests, nine were determined to have been active in 2010. Based on the location and distribution of these nests, BBI estimates that these 15 nests represent at least nine active Golden Eagle territories within ten miles of the PVSF. Based upon the quantity and quality of oak woodland and oak savannah habitat in the western half of the study area, it is likely that several more Golden Eagle nesting territories and their nests have yet to be discovered.

Also detected during the survey were 111 Common Raven nests, 1 Turkey Vulture nest, 1 Barn Owl nest, 1 Great Horned Owl nest, 16 Prairie Falcon nests and 24 Red-tailed Hawk nests. A complete list of wildlife observed in the survey area is shown below in Table I.

Table I. Wildlife Species Observed During the Survey

Species	Scientific Name	Notes
Birds		
Golden Eagle	*Aquila chrysaetos*	(2) Panoche Valley (3) Valley de Aquila
Red-tailed Hawk	*Buteo jamaicensis*	
Prairie Falcon	*Falco mexicanus*	
Barn Owl	*Tyto alba*	
Great Horned Owl	*Bubo virginiaus*	
American Kestrel	*Falco sparverius*	Abundant in cliffs
Road Runner	*Geococcyx californicus*	
Common Raven	*Corvus corax*	
Chukar	*Alectoris chukar*	
Mourning Dove	*Zenaida macroura*	
Rock Dove	*Columbia livia*	
Mammals		
Bobcat	*Lynx rufus*	
Mule Deer	*Odocoileus hemionus*	

Coyote	*Canus larans*
Gray Fox	*Urocyon cinereorgenteus*
Black-tailed Jack Rabbit	*Lepus californicus*
Audubon's Cottontail	*Sylvilagus audubonii*
California Ground Squirrel	*Spermophilus beecheyi*

DISCUSSION

Natural History

Kochert *et al.* (2002) provided a thorough description of the natural history of the Golden Eagle, noting that the species is found in numerous habitats located in a wide range of latitudes throughout the Northern Hemisphere. In North America, Golden Eagles are most common in the western half of the continent near open spaces that provide hunting habitat, and generally with cliffs present for nesting sites. While northern populations of the species are migratory, often making trips of thousands of miles to the wintering grounds; southern populations (including those in southern California) tend to be resident year-round.

While Golden Eagles are capable of killing large prey such as cranes, wild ungulates, and domestic livestock, they primarily subsist on rabbits, hares, ground squirrels, and prairie dogs (Bloom and Hawks 1982, Olendorff 1976). Golden Eagles typically reach sexual maturity, form territories and begin nesting at about five years of age. Pairs generally stay within the limits of their territory, which can measure 10–30 square kilometers, and within that territory can be as many as 14 nests (Bloom pers. obs.) which a pair maintains and repairs as part of their courtship. Over the course of a decade several of these nests will be used and will produce young, others may only be added to with fresh sticks. Most alternate nests are important in the successful reproduction of a pair of eagles. Kochert et al. (2002) also noted that the nesting season is prolonged, extending more than 6 months from the time the 1-3 eggs are laid until the young reach independence. A typical Golden Eagle raises an average of only 1 young per year and up to 15 young over its lifetime. Pairs commonly refrain from laying eggs in some years, particularly when prey is scarce. The number of young that Golden Eagles produce each year depends on a combination of weather and prey conditions. The black-tailed jackrabbit is a key prey species throughout much of the range, and eagle reproductive rates fluctuate with jackrabbit population cycles.

Adverse Effects of Energy Projects

While there is currently an effort to build a larger "sustainable" energy infrastructure in the United States and abroad with expected fewer overall environmental effects than the existing hydrocarbon-based infrastructure, conservation biologists are still in the process of establishing what effects alternative energy plants might have on the environment at the local level. It is well-established that Golden Eagles and other raptors are vulnerable to mortality through collision with wind turbines (Orloff and Flannery 1992, PBRG 1997, Madders and Walker 2002). For solar facilities, potential effects on wildlife are in the early stages of investigation, but it is expected that raptors and other species could suffer adverse effects due to reduced foraging habitat, electrocution from distribution lines and potentially, a reduction in the prey base also caused by habitat loss for prey species. In the case of the proposed PVSF, the project has the potential to have the following effects on Golden Eagles:

- **Direct Mortality -** Long-term surveys of Golden Eagle populations have shown declines in nesting populations throughout the western United States (Kochert and Steenhof 2002). Franson et al. (1995) found that humans cause >70% of recorded deaths, with the leading causes being accidental trauma (collisions with vehicles, power lines, or other structures, 27%), electrocution

(25%), gunshot (15%), and poisoning (6%). Lead poisoning in California has also been identified as an important mortality factor with > 30% of a population having elevated levels (Bloom et al. 1989, Pattee et al. 1990).

Electrocution is a particular risk potentially posed by the PVSF. Golden Eagles are vulnerable to electrocution when landing or taking off from power poles, when defecating from power poles, or when two eagles perch on the same pole, with the risk increasing when inclement weather hampers flight or when wet feathers increase conductivity (Avian Power Line Interaction Committee 1996). Harness and Wilson (2001) reported that ≥272 Golden Eagle electrocution deaths occurred in western North America From 1986 to 1996. In areas lacking natural perches such as the area surrounding the PVSF; poles with cross arms diagonal or parallel to prevailing winds are most lethal (Benson 1981, Harness and Wilson 2001).

- **Nest Failures -** Golden Eagles may desert nests in early incubation if disturbed by humans (Bloom 1974, Thelander 1974), and potential desertion may not be noticed early through behavioral cues as Golden Eagles are not aggressive toward humans in the nest vicinity and will simply leave and not return to the area for hours (Camenzind 1969), if ever. While it is unlikely that project development would cause such an effect directly given the location of most nests relative to the proposed project site, project implementation could contribute to cumulative or growth-inducing impacts, ultimately causing additional anthropogenic disturbance in the area over time. Fifteen Golden Eagle nests were detected during the survey at distances of 3.1 to 10 miles from the proposed project's boundary (see Table II). Increased recreation including the use of dirt roads, off-road vehicle use, rock climbing, and target shooting are all linked to nest failures and over the long-term, complete nest territory abandonment.

- **Indirect Mortality –** Management of healthy eagle populations requires maintaining prey habitat in foraging areas (Kochert et al. 2002) as the availability of food and nesting sites is the primary factor determining nesting density of Golden Eagles (Hunt et al. 1995) and reproductive rates of Golden Eagles often fluctuate with prey densities (Smith and Murphy 1979, Tjernberg 1983, Bates and Moretti 1994, Steenhof et al. 1997, McIntyre and Adams 1999). In southwestern Idaho, Marzluff et al. (1997) have found that behavior and demography of Golden Eagles are closely associated with the abundance of black-tailed jackrabbits (*Lepus californicus*), which are themselves dependent on stands of sagebrush/rabbitbrush interspersed with grassland (Knick and Dyer 1997). Bloom and Hawks (1982), working in the Great Basin Desert of northeast California and northwest Nevada found that 91% of the biomass and 85% of the frequency of prey found in nests were attributed to lagomorphs. Patch sizes of this habitat were found to be an essential feature of Golden Eagle home ranges (Marzluff et al. 1997). Both rabbitbrush and black-tailed jackrabbits are present in the study area, and could potentially be adversely affected by construction of the PVSF within the project's footprint, and perhaps further from the site due to increased anthropogenic disturbance to the surrounding area.

Mitigating Potential Adverse Project Effects

It is BBI's opinion that as several Golden Eagle nests exist within 2.0 miles of the Panoche Valley floor that the habitat quality is relatively high. The project's impacts on nesting Golden Eagles may be moderately high. However, given the potential for impacts caused by the project to this or other future Golden Eagle pairs, it is highly recommended that mitigation be incorporated into the project to reduce the potential for project-initiated direct and indirect mortality or nest failure. BBI recommends the following measures be taken into consideration:

- Permanent conservation of land surrounding certain nest sites to ensure future development or other land uses directly or indirectly caused by the project do not impact vulnerable eagle nest locations.

- Lead bullets, lead bullet fragments, and lead pellets from hunting cause unnecessary deaths of Golden Eagles, Bald Eagles, California Condors and other raptors. Support regional as well as the State-wide ban of the use of lead bullets for hunting in California.

- Permanent conservation of on-site and/or off-site natural foraging habitat.

- Many hundreds of acres of lowland non-native grasslands cover the valley floors with little or no native shrub species used for foraging and cover by lagomorphs. Investigate the potential for habitat improvement (native shrub restoration) of keystone prey species preyed upon by Golden Eagles.

- Large numbers of raptorial birds, including Golden Eagles are electrocuted annually. Replace existing dangerous utility lines with raptor-safe designs within the 10 mile radius survey area and ensure that all new lines be raptor-safe or underground (Avian Power Line Interaction Committee 1996).

- The lack of knowledge of nesting Golden Eagle populations is hampering efforts to strategically locate energy projects; hence more data is needed on productivity, natal dispersal, home-range size, and habitat use of Golden Eagles in coastal California. BBI proposes annual productivity monitoring for the nests of the approximately nine known Golden Eagle pairs and banding of all young produced. This work should occur during the remaining pre-construction period and 10 years post-construction.

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Table II. Survey Results

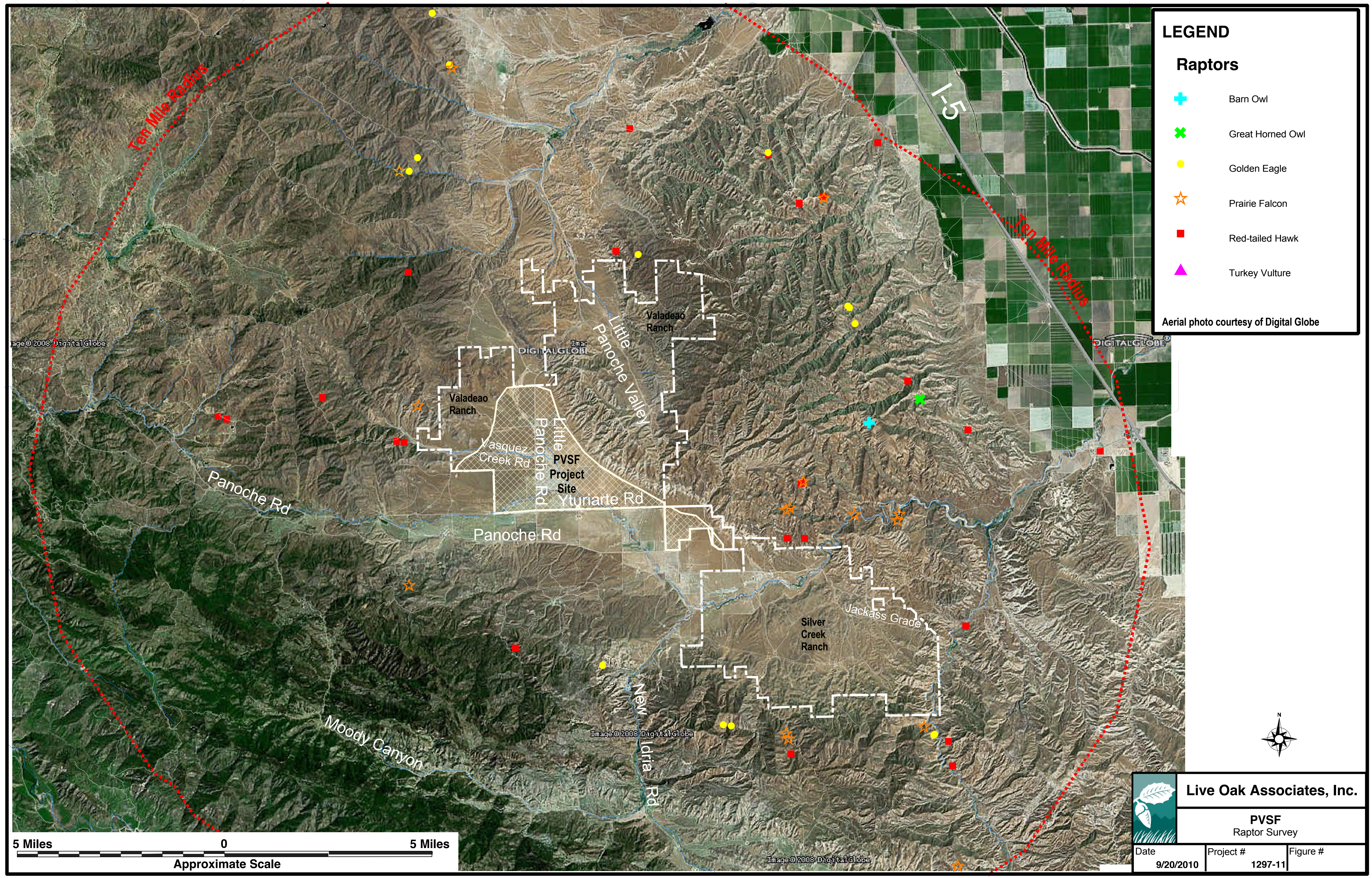
The following table shows the full results of BBI's survey. Nests are listed in order by distance from the site boundary. Distance was calculated using the ST_Distance spatial query function in PostGIS and converted to miles.

Species	Point	Easting	Northing	Substrate	Status	Notes	Distance From Site
Common Raven	39	688871	4056213	Power Tower	Active		0
Common Raven	35	693728	4054673	Power Tower	Active		0
Common Raven	36	693064	4054891	Power Tower	Active		0
Common Raven	37	692631	4055012	Power Tower	Active		0
Common Raven	38	689203	4056102	Power Tower	Inactive		0
Common Raven	41	687559	4056651	Power Tower	Active		0
Common Raven	40	687907	4056543	Power Tower	Active		0
Common Raven	34	695043	4054255	Power Tower	Active		0
Common Raven	33	696774	4053788	Power Tower	Inactive		0.13
Common Raven	42	687200	4056752	Power Tower	Active		0.14
Common Raven	183	696418	4054891	Cliff	Active		0.47
Common Raven	43	686473	4056931	Power Tower	Active		0.51
Common Raven	169	697367	4052220	Tamarisk	Active		0.58
Common Raven	44	686106	4056965	Power Tower	Active		0.69
Common Raven	32	698204	4053569	Power Tower	Inactive		0.81
Common Raven	45	685832	4056998	Power Tower	Inactive		0.84
Common Raven	184	696971	4055418	Cliff	Inactive		0.94
Common Raven	168	692322	4052926	Power Pole	Active		1.03
Common Raven	31	698623	4053519	Power Tower	Active		1.06
Red-tailed Hawk	46	684890	4057086	Power Tower	Active		1.38
Red-tailed Hawk	30	699365	4053469	Power Tower	Active		1.51
Red-tailed Hawk	47	684609	4057118	Power Tower	Active		1.55
Prairie Falcon	181	685412	4058501	Cliff	Active	Built on an old eagle nest	1.67
Prairie Falcon	185	699331	4054545	Cliff	Active	May be a duplicate	1.69
Prairie Falcon	106	699470	4054645	Cliff	Active	Barn Owl active on same cliff	1.8
Red-tailed Hawk	29	700027	4053450	Power Tower	Active		1.92
Common Raven	105	699652	4054959	Cliff	Inactive		1.99
Red-tailed Hawk	107	699894	4055536	Cliff	Inactive		2.32
Prairie Falcon	108	699974	4055640	Cliff	Active	On top of old Common Raven nest	2.4
Prairie Falcon	188	685074	4051709	Cliff	Active		2.63
Common Raven	191	688859	4049498	Cliff	Inactive		3.07
Golden Eagle	198	692387	4048663	Cliff	Active	Fledged young in 2010	3.09
Prairie Falcon	117	701901	4054384	Cliff	Active		3.16
Red-tailed Hawk	190	689089	4049317	Cliff	Active		3.19
Common Raven	196	694130	4047790	Cliff	Inactive		3.27
Common Raven	52	692975	4063678	Cliff	Active	Built on an old eagle nest	3.29
Common Raven	200	692333	4048249	Cliff	Active		3.33
Common Raven	54	693135	4063689	Cliff	Inactive		3.35
Common Raven	55	692757	4063984	Cliff	Inactive		3.4
Common Raven	197	693563	4047553	Cliff	Active		3.48

Species	Point	Easting	Northing	Substrate	Status	Notes	Distance From Site
Red-tailed Hawk	182	681810	4058771	Blue Oak	Active	Large enough that it could be a Golden Eagle nest	3.56
Red-tailed Hawk	180	685046	4063501	Cliff	Active	Fledged young in 2010 – Large enough to be a Golden Eagle nest	3.57
Red-tailed Hawk	56	692890	4064296	Cliff	Active	May be a Red-tailed Hawk or Golden Eagle	3.61
Golden Eagle	53	693736	4064176	Cliff	Old	May be a Red-tailed Hawk or Golden Eagle	3.8
Common Raven	189	689836	4048170	Cliff	Inactive		3.94
Golden Eagle	120	696951	4046424	Cliff	Inactive		4.12
Prairie Falcon	109	703509	4054159	Cliff	N/A	Roost location only	4.12
Common Raven	114	703260	4055283	Cliff	Inactive		4.13
Golden Eagle	121	697251	4046384	Cliff	Active	Fledged young in 2010	4.15
Prairie Falcon	110	703593	4054396	Cliff	Active		4.19
Common Raven	122	697518	4046337	Cliff	Inactive		4.19
Common Raven	125	699082	4046628	Cliff	Active		4.21
Common Raven	124	697580	4046261	Cliff	Inactive		4.24
Common Raven	113	703713	4054666	Cliff	Inactive		4.3
Common Raven	115	702487	4057702	Cliff	Inactive		4.42
Barn Owl	116	702461	4057828	Cliff	Active		4.46
Prairie Falcon	126	699328	4046136	Cliff	Inactive		4.55
Prairie Falcon	127	699403	4045918	Cliff	Active		4.69
Common Raven	128	699467	4045893	Cliff	Active		4.72
Common Raven	192	688324	4046715	Cliff	Inactive		4.78
Common Raven	111	703939	4056476	Cliff	Active		4.79
Common Raven	112	703899	4056958	Cliff	Inactive		4.9
Common Raven	129	699772	4045643	Cliff	Active		4.93
Red-tailed Hawk	130	699510	4045316	Cliff	Active		5.07
Red-tailed Hawk	48	678196	4057954	Power Tower	Active		5.51
Golden Eagle	177	685080	4067308	Cliff	Inactive		5.58
Common Raven	178	684870	4067237	Cliff	Inactive		5.59
Common Raven	101	697224	4065076	Cliff	Inactive		5.66
Prairie Falcon	179	684706	4067346	Cliff	Active		5.7
Red-tailed Hawk	49	677862	4058063	Power Tower	Active	Inactive Common Raven on same tower	5.72
Great Horned Owl	93	704389	4058705	Cliff	Active		5.74
Red-tailed Hawk	96	703911	4059398	Cliff	Active		5.78
Golden Eagle	176	685397	4067819	Cliff	Active	3 Golden Eagle nests on same face - 1 Active	5.8
Golden Eagle	98	701925	4061559	Cliff	Inactive	2 Inactive Golden Eagle nests 50 feet apart	5.84
Red-tailed Hawk	167	706109	4050149	Cliff	Active		5.98
Common Raven	28	706489	4054862	Power Tower	Active		6.02
Golden Eagle	99	701721	4062161	Cliff	Active		6.06
Golden Eagle	100	701658	4062219	Cliff	Active	Probably same pair as 099	6.07
Common Raven	148	703193	4045429	Cliff	Active		6.13
Common Raven	149	703446	4045525	Cliff	Inactive		6.18
Prairie Falcon	150	704534	4046371	Cliff	Active		6.29
Red-tailed Hawk	95	706197	4057552	Cliff	Inactive		6.35
Common Raven	94	706251	4057529	Cliff	Inactive		6.37

Species	Point	Easting	Northing	Substrate	Status	Notes	Distance From Site
Common Raven	165	704817	4046505	Cliff	Inactive		6.37
Common Raven	187	678902	4049482	Cliff	Inactive		6.39
Red-tailed Hawk	103	693419	4068923	Eucalyptus	Active		6.42
Common Raven	166	705217	4046831	Cliff	Active		6.43
Common Raven	164	705000	4046372	Cliff	Inactive		6.51
Golden Eagle	152	704906	4046035	Cliff	Active		6.6
Golden Eagle	151	704940	4046075	Cliff	Inactive		6.6
Common Raven	102	694520	4069158	Eucalyptus	Inactive		6.79
Common Raven	153	705126	4045728	Cliff	Active	Barn Owl active on same cliff	6.83
Common Raven	163	705268	4045775	Cliff	Active		6.87
Common Raven	162	705497	4045981	Cliff	Active		6.9
Common Raven	161	705539	4045909	Cliff	Active		6.95
Red-tailed Hawk	160	705463	4045797	Cliff	Inactive		6.96
Common Raven	104	693691	4069783	Cliff	Inactive		6.98
Common Raven	50	675894	4058585	Power Tower	Inactive		6.99
Common Raven	159	705294	4045169	Cliff	Active		7.14
Common Raven	50	675526	4058678	Power Tower	Inactive		7.23
Common Raven	87	699929	4065879	Cliff	Active		7.28
Red-tailed Hawk	88	699829	4066095	Cliff	Active		7.31
Common Raven	89	699569	4066533	Cliff	Inactive		7.35
Common Raven	173	687269	4070933	Cliff	Active		7.39
Red-tailed Hawk	158	705621	4044871	Cliff	Active		7.41
Red-tailed Hawk	85	698653	4067936	Cliff	Active		7.54
Common Raven	154	705645	4044580	Cliff	Active		7.55
Golden Eagle	86	698641	4068022	Cliff	Active		7.57
Prairie Falcon	171	686705	4071232	Cliff	Active		7.63
Common Raven	172	686705	4071239	Eucalyptus	Active		7.64
Common Raven	64	708344	4057912	Power Tower	Inactive		7.66
Golden Eagle	170	686600	4071318	Cliff	Active		7.7
Common Raven	65	707206	4060337	Power Tower	Inactive		7.76
Common Raven	66	706855	4061014	Power Tower	Inactive		7.83
Common Raven	90	700796	4066261	Cliff	Inactive		7.86
Prairie Falcon	91	700750	4066331	Cliff	Inactive		7.86
Red-tailed Hawk	92	700723	4066361	Cliff	Active		7.86
Common Raven	146	709599	4054229	Cliff	Inactive		7.89
Common Raven	67	706624	4061486	Power Tower	Inactive		7.9
Common Raven	68	706182	4062259	Power Tower	Inactive		7.99
Common Raven	145	709785	4053854	Cliff	Inactive		7.99
Common Raven	147	709752	4054497	Cliff	Inactive		8
Common Raven	69	705960	4062667	Power Tower	Inactive		8.06
Common Raven	70	705759	4063048	Power Tower	Active		8.13
Common Raven	71	705552	4063404	Power Tower	Active		8.2
Common Raven	72	705321	4063807	Power Tower	Inactive		8.29
Common Raven	73	705199	4064163	Power Tower	Inactive		8.4
Common Raven	74	705013	4064639	Power Tower	Inactive		8.55
Common Raven	155	706504	4042952	Cliff	Active		8.65
Common Raven	135	710786	4055198	Power Tower	Inactive		8.69
Common Raven	75	704848	4065093	Power Tower	Active		8.7

Species	Point	Easting	Northing	Substrate	Status	Notes	Distance From Site
Common Raven	174	685981	4072937	Cliff	Active		8.76
Common Raven	136	711213	4054523	Power Tower	Inactive		8.91
Golden Eagle	175	685953	4073276	Cliff	Active	Fledged young in 2010	8.97
Common Raven	137	711378	4054258	Power Tower	Active		9
Red-tailed Hawk	27	711189	4056753	Power Tower	Active		9.12
Common Raven	76	703932	4066820	Power Tower	Inactive		9.23
Common Raven	84	700505	4070153	Power Tower	Active		9.33
Common Raven	62	699788	4070833	Power Tower	Inactive		9.36
Common Raven	63	700231	4070475	Power Tower	Active		9.37
Common Raven	138	712028	4053286	Power Tower	Inactive		9.38
Common Raven	83	701045	4069744	Power Tower	Active		9.38
Common Raven	60	698885	4071592	Power Tower	Inactive		9.41
Common Raven	61	699232	4071335	Power Tower	Inactive		9.41
Common Raven	186	675911	4067213	Cliff	Inactive		9.43
Common Raven	82	701698	4069225	Power Tower	Active		9.45
Common Raven	77	703429	4067556	Power Tower	Inactive		9.46
Common Raven	81	702065	4068941	Power Tower	Inactive		9.5
Common Raven	59	697778	4072457	Power Tower	Inactive		9.51
Common Raven	139	712236	4052980	Power Tower	Active		9.51
Common Raven	58	697525	4072656	Power Tower	Inactive		9.55
Common Raven	78	703253	4067841	Power Tower	Inactive		9.56
Common Raven	156	706127	4040723	Cliff	Inactive	Built on an old eagle nest	9.56
Prairie Falcon	157	706102	4040702	Cliff	Active		9.56
Common Raven	80	702439	4068647	Power Tower	Inactive		9.57
Common Raven	140	712384	4052740	Power Tower	Inactive		9.6
Common Raven	57	697223	4072914	Cliff	Active		9.61
Red-tailed Hawk	79	702787	4068386	Power Tower	Active		9.64
Common Raven	195	686725	4038865	Cliff	Inactive		9.72
Common Raven	141	712936	4052059	Power Tower	Active		9.96
Golden Eagle	194	686565	4038457	Cliff	Inactive	Historic nest site	9.98
Common Raven	193	686649	4038178	Cliff	Inactive		10.15
Common Raven	142	713867	4051092	Power Tower	Inactive		10.59
Common Raven	143	714018	4050918	Power Tower	Active		10.7
Common Raven	144	714404	4050508	Power Tower	Active		10.97
Red-tailed Hawk	134	710636	4036047	Cliff	Inactive		13.58
Common Raven	133	711135	4036423	Cliff	Inactive		13.59
Prairie Falcon	132	711910	4033670	Cliff	Active		15.23
Turkey Vulture	131	713083	4033127	Cliff	Active		15.94



LEGEND
Raptors
Barn Owl
Great Horned Owl
Golden Eagle
Prairie Falcon
Red-tailed Hawk
Turkey Vulture
Aerial photo courtesy of Digital Globe
Ten Mile Radius
Ten Mile Radius
I-5
Valadeao Ranch
Valadeao Ranch
Little Panoche Valley
Little Panoche Rd
Vasquez Creek Rd
PVSF Project Site
Yturiarte Rd
Panoche Rd
Panoche Rd
Jackass Grade
Silver Creek Ranch
New Idria Rd
Moody Canyon
5 Miles
0
5 Miles
Approximate Scale
N
Live Oak Associates, Inc.
PVSF
Raptor Survey
Date
9/20/2010
Project #
1297-11
Figure #

Panoche Valley Solar Facility

2014 Final Golden Eagle Nesting Survey Report

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BBI

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ABOUT BLOOM BIOLOGICAL, INC.

For more than 35 years, Bloom Biological, Inc. (BBI) has provided biological consulting services for large and small clients. Our resume of services includes raptor and endangered species research, biological monitoring, impact assessment, permitting, conservation planning and geospatial analysis. Our innovative approach has provided solutions to complex problems for clients and projects throughout a range of industries including alternative energy, residential development and the public sector. Collectively, the management and staff of BBI hold permits or memoranda of understanding for participating in the conservation and recovery of more than a dozen endangered or threatened species, as well as a number of other special-status species, in California and the western United States. Over the years, BBI has established an impeccable relationship with the resource agencies, project proponents, and environmental organizations by skillfully balancing the needs and objectives of land planning, resource conservation, and the public interest. In addition to our work in California and the western United States, BBI biologists have worked in Alaska, Central and South America, Europe, Southern Asia, and the western Pacific. BBI is a certified Small Business Enterprise.

TABLE OF CONTENTS

1.0 Introduction 1
2.0 Natural History 1
3.0 Regulatory Status 1
4.0 Study Area Description 2
5.0 Methods 3
5.1 Nest Determination 4
5.1.1 Species Identification 4
5.1.2 Nest Status 5
6.0 Results & Discussion 6
7.0 Literature Cited 11

Tables

Table 1. Field Survey Dates, Times, and Weather Conditions 3
Table 2. Golden Eagle Nests Discovered During Surveys 8
Table 3. Golden Eagle and California Condor Observations Made During Surveys 10

Figures

Figure 1. Study area location 2

Exhibits

Exhibit 1. 2014 Golden Eagle Nesting Survey Results 7

Appendices

A. Photographs of Golden Eagle Nests
B. Non-Golden Eagle Survey Results
C. Species Lists
D. Resumes

1.0 INTRODUCTION

Bloom Biological, Inc. (BBI) was retained by Duke Energy for Panoche Valley Solar, LLC (the Applicants) to conduct nesting surveys for Golden Eagle (*Aquila chrysateos*) associated with the Panoche Valley Solar Facility (Project), an approximately 399 megawatt solar photovoltaic energy generating facility proposed for construction in San Benito County, California. BBI previously conducted surveys for the proposed Project, documenting 15 potential Golden Eagle nests within ten miles of the proposed Project, 8 of which were designated as having been active in the 2010 breeding season (BBI 2010). The report authors noted however, that the survey was conducted late in the season and that a more complete survey should be conducted during the breeding season and prior to leaf-on of deciduous trees, when nests would be easier to detect. To augment the 2010 nest survey effort, the U.S. Fish and Wildlife Service (Service) recommended that the Applicants conduct "Stage 2" aerial surveys of the Project area nesting population during a January-February time frame before leaf-on. BBI conducted aerial surveys for Golden Eagle with ten miles of the proposed project in January and April 2014, resulting in the documentation of 46 Golden Eagle nests and an estimated 30 Golden Eagle territories, with nine of them active, though none were located within three miles of the limits of the proposed Project. This report presents BBI's detailed survey methods and results, identifying the location and status of all nests, and the distance from each nest to the Project.

2.0 NATURAL HISTORY

The Golden Eagle is found throughout most of the north Temperate Zone. In North America it ranges from arctic Canada and Alaska south through the western United States to central Mexico. Northern populations are migratory; however, most populations south of Canada are residents or short-distant migrants.

Kochert et al. (2002) provided a thorough description of the natural history of the Golden Eagle, noting that the species is found in a variety of habitats located in a wide range of latitudes throughout the Northern Hemisphere. In North America, Golden Eagles are most common in the western half of the continent near open spaces that provide habitat for foraging, and generally with cliffs present for nesting sites. While northern populations of the species are migratory, often making trips of thousands of miles to the wintering grounds; southern populations (including those in southern California) tend to be resident year-round.

While Golden Eagles are capable of killing large prey such as cranes, wild ungulates, and domestic livestock, they primarily subsist on rabbits, hares, ground squirrels, and prairie dogs (Bloom and Hawks 1982, Olendorff 1976). Golden Eagles are thought to typically reach sexual maturity, form territories and begin nesting at four years of age. Pairs are generally thought to stay within the limits of their territory, which can measure well over 20 square kilometers and may contain as many as 14 nests (Kochert et al. 2012, Bloom pers. obs.). The pair maintains and repairs one or more of these nests as part of its courtship. Over the course of a decade several of these nests will be used and will produce young, while others may only receive occasional fresh sticks. Most alternate nests are important in the successful reproduction of a pair of eagles. Kochert et al. (2002) also noted that the nesting season is prolonged, extending more than 6 months from the time the 1-3 eggs are laid until the young reach independence. A typical Golden Eagle raises an average of only 1 young per year and up to 15 young over its lifetime. Pairs commonly refrain from laying eggs in some years, particularly when prey is scarce. The number of young that Golden Eagles produce each year depends on a combination of weather and prey conditions.

3.0 REGULATORY STATUS

Regulatory protections for Golden Eagles include thorough surveys to determine the status of Golden Eagles for projects occurring within their range and habitat. The intent is to determine the extent of potential direct, indirect and cumulative effects projects may have on eagles, avoid and or minimize these effects, assess the potential for incidental take during project operation, and monitor eagle populations. These measures are predominantly driven by the Bald and Golden Eagle Protection Act.

The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

For purposes of the guidelines, "disturb" means: "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment.

4.0 STUDY AREA DESCRIPTION

The Study Area includes all areas inside of, and within a 10-mile (16-kilometer) radius of the Project boundary (Figure 1, Exhibit 1), and encompasses approximately 305,004 acres (123,431 hectares). The Study Area is southeast of the City of Los Banos, California, and portions lie within San Benito, Fresno, and Merced Counties.

Terrain is variable throughout the Study Area, and includes relatively flat, largely agricultural fields in the extreme east, bordered by rolling arid grasslands that occupy the central portion. Most of the western half of the Study Area lies within the Diablo Range and includes more rugged hills and mountains with rocky outcroppings and cliff faces. The predominant land-use within the Study Area is ranching. Vegetative cover includes grasslands and agriculture in the east, chaparral at low elevations in the mountains, with Gray Pine (*Pinus sabineana*) occurring at higher elevations in the mountains, and various oak species, including the deciduous Blue Oak (*Quercus douglasii*), and evergreen Valley Oak (*Quercus lobata*) and Canyon Live Oak (*Quercus chrysolepis*). Elevation within the Study Area ranges from approximately 600 feet above mean sea level (amsl) in the southeast to approximately 4,000 feet amsl in the west.

Figure 1. Study area location

5.0 METHODS

As per guidance provided by the Service, an initial round of helicopter surveys was performed over a 10-day period during the early breeding season, from January 15-24, 2014. A second round of surveys was conducted over a 7-day period from April 2-8, 2014, when active nests were expected to contain eggs or young nestlings. The first round of surveys was conducted early enough that deciduous trees such as California Sycamore (*Platanus racemosa*), Valley Oak and particularly Blue Oak, which were very abundant in parts of the study area, had not yet leafed out, making it easier to detect large nests within their canopies.

All surveys were conducted by BBI biologist Peter H. Bloom, Ph.D. (lead observer), who was accompanied by one of three assistant observers, including Scott Thomas, Karyn Sernka and Michael J. Kuehn, Ph.D. The helicopter (Bell Jet Ranger 206) was owned and operated by a pilot experienced in conducting aerial Golden Eagle nesting surveys. Survey methodology described in Section VII.b of Aerial Surveys of Pagel et al. (2010) was followed to the extent possible. The biologists conducted an aerial examination of all appropriate nesting habitat inside the pre-defined Study Area described above (Section 4.0). During aerial surveys, BBI biologists searched for large stick nests of Golden Eagles and other raptors on cliff faces, rocky outcrops, trees, transmission towers, and other suitable nesting substrates.

GPS units (one primary and one backup) were used to mark locations of nest sites. The following information was recorded for each raptor or Common Raven (*Corvus corax*) nest found during surveys:

- Name of observer(s)
- Date/Time/Weather conditions
- Species of nest owner
- Location (GPS coordinates)
- Nest status (active, inactive, or unknown)
- Nest contents (empty, eggs, nestlings)
- Nest condition
- Nest substrate
- Nest description (or other indications of breeding behavior)
- Other pertinent descriptive information

Photographs were taken of Golden Eagle nests when feasible, and are presented in Appendix A of this report. Survey dates, times, and weather conditions are summarized in Table 1.

Table 1. Field Survey Dates, Times, and Weather Conditions

Date	Time	Weather	Biologists
1/15/2014	1300-1545h	Start: 62°F, 0% Cloud Cover, Breeze out of the SW End: 56°F, 0% Cloud Cover, Breeze out of the SW No Rain, No Fog, No Snow	Peter Bloom Scott Thomas
1/16/2014	0830-1700h	Start: 45°F, 0% Cloud Cover, Calm out of the SW End: 63°F, 0% Cloud Cover, Breeze out of the SW No Rain, No Fog, No Snow	Peter Bloom Scott Thomas
1/17/2014	0800-1630h	Start: 38°F, 0% Cloud Cover, Calm out of the N End: 58°F, 0% Cloud Cover, Light Wind out of the NW No Rain, No Fog, No Snow	Peter Bloom Karyn Sernka
1/18/2014	0830-1645h	Start: 41°F, 0% Cloud Cover, Calm out of the N End: 62°F, 0% Cloud Cover, Calm out of the N No Rain, No Fog, No Snow	Peter Bloom Karyn Sernka
1/19/2014	0830-1645h	Start: 40°F, 0% Cloud Cover, Light Wind out of the NE End: 65°F, 0% Cloud Cover, Calm out of the N No Rain, No Fog, No Snow	Peter Bloom Karyn Sernka

Date	Time	Weather	Biologists
1/20/2014	0800-1630h	Start: 39°F, 0% Cloud Cover, Calm out of the N End: 61°F, 0% Cloud Cover, Calm out of the N No Rain, No Fog, No Snow	Peter Bloom Karyn Sernka
1/21/2014	0800-1645h	Start: 38°F, 50% Cloud Cover, Light Wind out of the NW End: 60°F, 0% Cloud Cover, Light Wind out of the NE No Rain, No Fog, No Snow	Peter Bloom Karyn Sernka
1/22/2014	0840-1700h	Start: 41°F, 0% Cloud Cover, Calm out of the N End: 63°F, 0% Cloud Cover, Calm out of the N No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
1/23/2014	0900-1700h	Start: 46°F, 0% Cloud Cover, Calm out of the N End: 64°F, 0% Cloud Cover, Calm out of the N No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
1/24/2014	0850-1200h	Start: 51°F, 40% Cloud Cover, Calm out of the N End: 60°F, 100% Cloud Cover, Calm out of the N No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
4/2/2014	1200-1800h	Start: 62°F, 50% Cloud Cover, Light Wind out of the NE End: 60°F, 40% Cloud Cover, Light Wind out of the NE No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
4/3/2014	0730-1715h	Start: 43°F, 0% Cloud Cover, Calm out of the N End: 58°F, 0% Cloud Cover, Light Wind out of the NW No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
4/4/2014	0745-1730h	Start: 50°F, 0% Cloud Cover, Calm out of the N End: 58°F, 0% Cloud Cover, Breeze out of the W No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
4/5/2014	0730-1730h	Start: 48°F, 0% Cloud Cover, Breeze out of the W End: 67°F, 0% Cloud Cover, Light Wind out of the NW No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
4/6/2014	0730-1715h	Start: 46°F, 30% Cloud Cover, Calm out of the N End: 71°F, 20% Cloud Cover, Light Wind out of the N No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
4/7/2014	0715-1730h	Start: 51°F, 20% Cloud Cover, Calm out of the N End: 78°F, 0% Cloud Cover, Breeze out of the NW No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn
4/8/2014	0700-1245h	Start: 54°F, 10% Cloud Cover, Calm out of the N End: 81°F, 30% Cloud Cover, Calm out of the N No Rain, No Fog, No Snow	Peter Bloom Michael Kuehn

5.1 Nest Determination

5.1.1 Species Identification

Biologists determined the species that built or occupied all large stick nests discovered during surveys by observing defending or incubating adults, the size of the nest, stick size, eggs and chicks, volume and height of excrement, and anthropogenic material if present. These distinctions were based upon the experience of the principal investigator (Dr. Bloom), which includes the entry and inspection of thousands of California raptor nests of 22 raptorial species including Golden Eagle, and the four raptor species that might utilize Golden Eagle nests in this region; Red-tailed Hawk (*Buteo jamaicensis*), Peregrine Falcon (*Falco peregrinus*), Prairie Falcon (*Falco mexicanus*) and Great Horned Owl (*Bubo virginianus*).

Within the Study Area, the Red-tailed Hawk is the predominant raptor species that builds large nests constructed of sticks, which may overlap in size with Golden Eagle nests. Common Ravens are non-raptors that also construct reasonably large stick nests in this region. Of these three species, Red-tailed Hawk and Common Raven nests are the most abundant by a large factor. Fortunately, there are often predictable cues that can be used to differentiate among the nests of these species, beyond the direct observation of adults, young or eggs in the nest.

Common Ravens tend to have the smallest nests of the three species, followed by Red-tailed Hawks and finally, Golden Eagles, which may build nests 15 feet tall and 6 feet wide.

Though Red-tailed Hawk and Common Raven nests are sometimes difficult to distinguish from one another, Common Ravens are unique in that they often bring trash to their nest sites situated near civilization, and their nests tend to be very tightly structured. However, many Common Raven nests, and particularly those in very remote locations, do not incorporate anthropogenic materials into their nests.

Golden Eagle and Red-tailed Hawk nests can also be difficult to separate from each other without ample experience. The two species often use each other's nests for reproduction, though Red-tailed Hawks more commonly usurp Golden Eagle nests than the other way around. This may be because Golden Eagles often have more alternate nests than do Red-tailed Hawks and because the larger Golden Eagle nests tend to survive longer. Newly created, first year Golden Eagle nests are typically 6-10 inches thick and as small as 4 feet wide and may overlap in size with Red-tailed Hawk nests. At the other end of the size spectrum, Golden Eagles may build large tower nests that exceed 15 feet in thickness and 4-6 feet in width.

We considered nests greater than 5 feet wide and 3 feet thick to be definitive eagle nests. The size of the sticks, both in diameter and length also provides clues as to what species carried them and added them to the nest, with eagle nests containing much larger sticks than Red-tailed Hawks would generally bring to their nests.

5.1.2 Nest Status

A nest was considered *active* if any of the following three conditions was met: (1) fresh (live or dead) sticks had been added during the current nesting season, (2) the nest was found to contain eggs or young (dead or alive), or (3) an adult was observed on the nest in an incubating (or brooding) posture. Nests without any of these signs were considered *inactive*. A *failed* nest was an active nest that did not successfully fledge young. The newness (fresh sticks) of nest sticks can often be determined by their color and condition if they were recently collected from live plants and trees, however bleaching by the desert sun can sometimes make new sticks appear old quickly. The placement, compaction or lack of compaction of sticks can be a more accurate determination of the newness, such as the fresh sticks seen on the top of a recently active Golden Eagle nest compared with the compacted old sticks in the inactive nest. A *successful* nest was one that fledged at least one young (typically assumed if young were greater than eight weeks old during an observation). Active nests found at the end of the nesting cycle with considerable excrement in and around the nest, surrounding boulders or alternate nests were considered to have fledged.

Determining the activity status of nests during the breeding season is often unequivocal because in some instances there will be an adult eagle incubating eggs or brooding nestlings and/or visible eggs or nestlings. However, nest status can often be inferred even if a nest is visited outside of the actual nesting period (e.g., prior to egg laying or after fledging). Under these circumstances, more emphasis is placed on the condition of the nest and presence or absence of sign. Prior to egg laying, a typical active Golden Eagle nest will be relatively level on top, will have visibly newer sticks several inches thick arranged on the top of the nest, may have fresh greenery, and may have fresh feathers. Following fledging, the biologists primarily consider the condition of the nest and the amount (or lack of) and relative age of white-wash, which in the case of Golden Eagles should occur in significant amounts forming a broad splatter pattern composed of long, large broken streaks often referred to as slices. At some locations with recently fledged multiple young, it may appear as if it snowed below the nest edge.

Although there may be no definitive determination of whether nestling(s) fledged there will be strong indicators if the nest was active and at least contained chicks of more than a few weeks old. White wash sprays and slices behind the nest are not commonly deposited by adults. Significant accumulation of fresh white wash behind, around, directly below, and approximately level with the nest are indicators that nestling(s) were present.

Other factors considered include the nearby presence or absence of adult and/or fledgling eagles, active nearby perch sites with fresh sign and active alternative nests within close proximity to the nest in question.

6.0 RESULTS & DISCUSSION

A total of 492 nests was documented by BBI within the Study Area, including 46 Golden Eagle nests. All Golden Eagle nests are listed in Table 2 below, and their locations are mapped in Exhibit 1. Photographs of all Golden Eagle nests that could safely be photographed are presented in Appendix A. All nests classified as belonging to species other than Golden Eagles are listed in Appendix B, including nests of 226 Common Ravens, 146 Red-tailed Hawks, 62 Prairie Falcons, 8 Barn Owls (*Tyto alba)*, 3 Great Horned Owls, and 1 Turkey Vulture (*Cathartes aura*).

Dr. Bloom estimates that the 46 Golden Eagle nests discovered during this survey effort comprise approximately 30 breeding territories, some of which contain one or more alternate nests. The actual number of territories could be slightly higher or lower than 30, and the exact number of territories depends, in part, on how alternate nests of a single territory are defined. In most cases, nests that were on the same cliff faces, or at least very close together could be safely designated as alternate nests within the same breeding territory. For example, nest IDs 266 and 278 were separated by less than 330 yards (300 meters) and were in the same watershed, and were attributed to the same breeding territory. In other cases, it was less clear if different nests were part of a single territory or not. Golden Eagle nesting density (and territory size) is driven primarily by habitat quality, with higher nesting density in better quality habitat. Given that habitat quality in the Study Area varies from quite high (in the northwestern quadrant, where most nests were located), to quite low, in extreme eastern portions, it would not be surprising for nests in some areas to be located as close together as 1 mile (1.6 kilometers), or even rarely 0.5 miles (0.8 kilometers), particularly in the areas of better quality habitat. Golden Eagle nests 251 and 252, in the northwestern quadrant, were separated by only 0.6 miles (1 kilometer), and this is a prime example of two nests that could comprise two breeding territories, but likely represent one.

In total, nine Golden Eagle nests were classified as active in the 2014 season, each representing a separate territory. Thus, active nesting occurred in almost one-third (9 of about 30) of the territories identified in this survey. Of these nine nests, eggs are presumed to have been laid in at least four. Adults were observed on nests in incubating posture, in April, at nest IDs 246 and 251, and two un-incubated eggs were observed in (presumed failed) nest ID 276 in April. Finally, two chicks were observed being tended to by a female Golden Eagle at nest ID 266 in early April. Of the remaining five Golden Eagle nests that were identified as active in 2014, none was known to contain eggs or nestlings as of April 8th. Given that Golden Eagles in this region normally lay eggs on or before this date, it is very unlikely that any of these nests went on to successfully fledge young during the 2014 nesting season.

No Golden Eagle nests were identified within 3 miles (5 kilometers) of the Project (Table 2), though four nests (IDs 244, 264, 273 and 279), comprising four breeding territories were located within four miles of the Project boundary. Two of these four nests (IDs 244 and 273) were active in 2014, though neither nest was ever found to contain eggs or nestlings. The next closest active Golden Eagle nest to the Project in 2014 was nest ID 269, located 5.79 miles (9.34 kilometers) north-northwest of the Project.

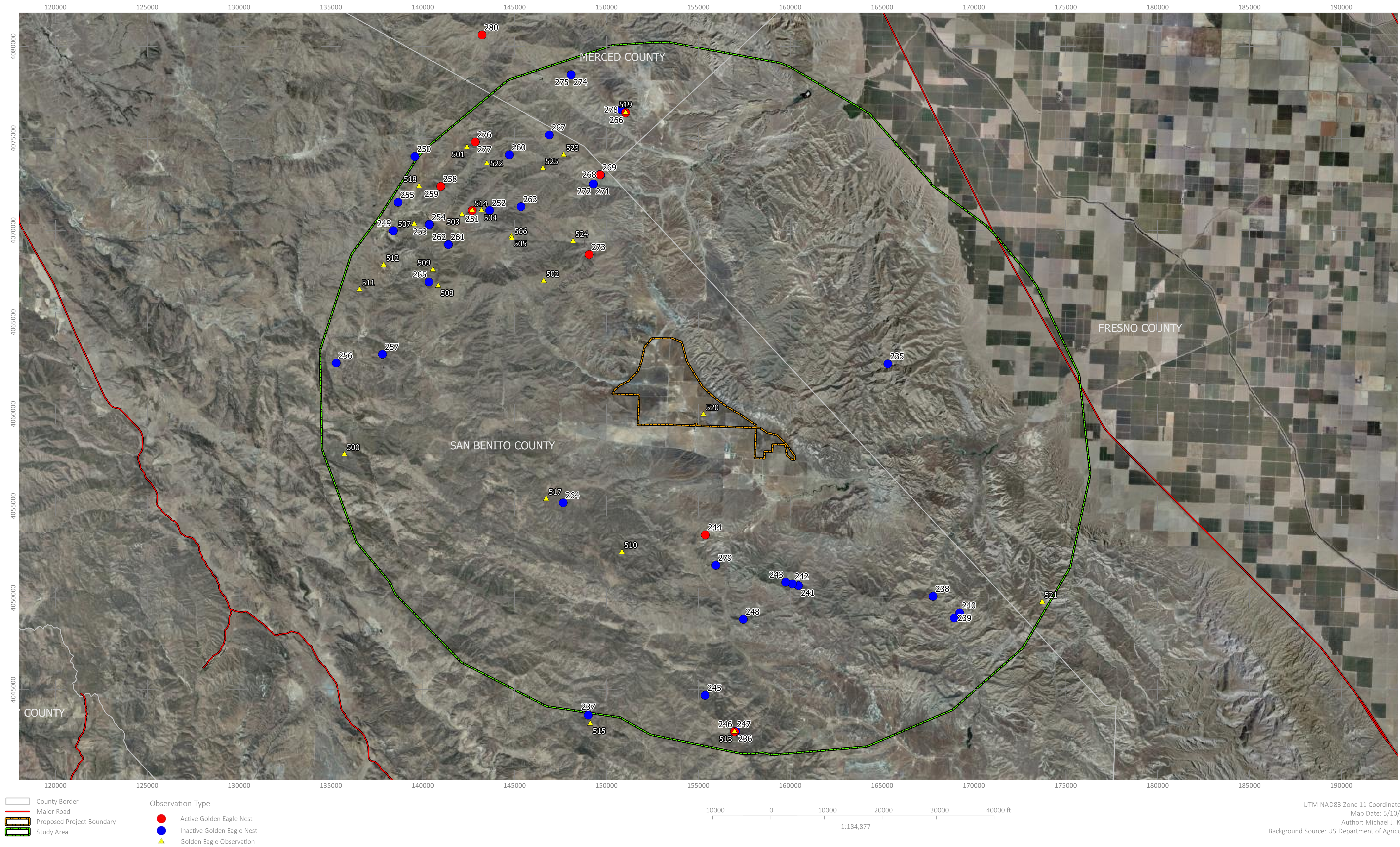

EXHIBIT 1. 2014 Golden Eagle Nesting Survey Results

Panoche Valley Solar Project | Merced, Fresno and San Benito Counties, California

Although it cannot be ruled out that some Golden Eagle nests within the Study Area could have gone undetected, the 10-day effort in late January represented a massive and comprehensive survey, during a period when deciduous trees such as Blue and Valley Oaks had not yet leafed out. This effort was followed by an 8-day effort in April, when special attention was paid to surveying areas where adult Golden Eagles had been observed, but no nests had been found; or where only inactive nests had been found and additional effort was dedicated to surveying for active nests that may have been missed.

Table 2. Golden Eagle Nests Discovered During Surveys

The following table lists the identification number (ID) of all 46 Golden Eagle nests discovered during surveys conducted in January and April of 2014. Each nest ID number is accompanied by the following information: (1) substrate supporting nest (Substrate), (2) estimated nest height in feet (Est. Height [ft.], (3) nest contents (Contents), (4) quantity of nest contents (Quan.), (5) nest status (Status), (6) distance in miles from nest to the proposed Project (Project Dist. [mi.]), and (7) relevant notes (Notes).

ID	Substrate	Est. Height (ft.)	Contents	Quan.	Status	Project Dist. (mi.)	Notes
235	Cliff	50	Empty	0	Inactive	4.37	
236	Cliff	50	Empty	0	Inactive	9.24	Fledged young in 2013
237	Cliff	50	Empty	0	Inactive	9.93	
238	Cliff	150	Empty	0	Inactive	6.56	
239	Cliff	85	Empty	0	Inactive	7.58	Two nests on east face, one nest on west face
240	Cliff	85	Empty	0	Inactive	7.59	
241	Cliff	75	Empty	0	Inactive	4.25	Very old
242	Cliff	100	Empty	0	Inactive	4.19	Fledged young in 2013
243	Cliff	60	Empty	0	Inactive	4.14	Sticks below nest
244	Cliff	70	Empty	0	Active	3.09	Nest freshly rebuilt in January, but unattended, empty, and looked worn and inactive in April
245	Cliff	50	Empty	0	Inactive	8.18	On same cliff face as two inactive Common Raven nests
246	Cliff	50	Unknown	N.A.	Active	9.26	Nest with fresh greenery on Jan. 21. adult sitting tight, presumably on eggs, on nest on Apr. 2
247	Cliff	50	Empty	0	Inactive	9.26	Old nests near active Golden Eagle nest
248	Gray Pine	50	Empty	0	Inactive	5.46	
249	Valley Oak	80	Empty	0	Inactive	9.20	
250	Valley Oak	60	Empty	0	Inactive	10.07	Nest on mistletoe
251	Blue Oak	55	Unknown	N.A.	Active	7.42	Active and empty on Jan. 19. Adult sitting on nest in incubation posture Apr. 3.
252	Blue Oak	65	Empty	0	Inactive	6.97	Falling, only remnants remain in tree. Some whitewash. Not photographed
253	Blue Oak	70	Empty	0	Inactive	8.36	Near another nest in tree with bare branches
254	Blue Oak	70	Empty	0	Inactive	8.35	near another nest in tree with live (leaved) branches

ID	Substrate	Est. Height (ft.)	Contents	Quan.	Status	Project Dist. (mi.)	Notes
255	Valley Oak	70	Empty	0	Inactive	9.65	
256	Gray Pine	65	Empty	0	Inactive	9.38	Smaller nest above main nest in same tree
257	Gray Pine	55	Empty	0	Inactive	7.87	
258	Blue Oak	60	Empty	0	Active	8.76	Adults present near nest on Jan. 19 and Apr. 3, fresh greenery in bowl. Eggs never observed. Second, inactive nest 50 meters away.
259	Blue Oak	60	Empty	0	Inactive	8.76	50 meters from second, active Golden Eagle nest
260	Blue Oak	55	Empty	0	Inactive	7.84	
261	Blue Oak	55	Empty	0	Inactive	7.45	Two nests in same tree. Lower nest is smaller, older. Pair of adult Golden Eagles near
262	Blue Oak	60	Empty	0	Inactive	7.45	Two nests in same tree. Higher nest is larger, newer. Pair of adult Golden Eagles near
263	Blue Oak	65	Empty	0	Inactive	6.27	Very large nest; two adults and one 2nd-year bird nearby
264	Gray Pine	60	Empty	0	Inactive	3.64	
265	Blue Oak	55	Empty	0	Inactive	7.24	Yellow-billed Magpie nest in top of tree
266	Cliff	100	Nestlings	2	Active	7.67	Nest inactive on Jan. 15. An adult and 2 nestlings in nest on Apr. 4
267	Cliff	50	Empty	0	Inactive	7.69	
268	Cliff	150	Empty	0	Inactive	5.80	
269	Cliff	80	Empty	0	Active	5.79	Built on this season.
270	Cliff	50	Empty	0	Inactive	5.78	Used recently in a previous season
271	Cliff	60	Empty	0	Inactive	5.57	Old nest located above Red-tailed Hawk nest
272	Cliff	35	Empty	0	Inactive	5.57	Very old, located below and west of another old eagle nest
273	Cliff	50	Empty	0	Active	3.53	Two nests next to each other on same rock face; Inactive on Jan. 20, but significantly built on by Apr. 4. No eggs ever observed.
274	Cliff	50	Empty	0	Inactive	9.30	On west face
275	Cliff	60	Empty	0	Inactive	9.30	On east face
276	Blue Oak	40	Eggs	2	Active	8.91	Lower of two nests in same tree. Adult near on Jan. 23, but nest inactive. On Apr. 3, contained two un-incubated eggs, though two adult eagles were nearby. Eggs still not being incubated on Apr. 4.
277	Blue Oak	45	Empty	0	Inactive	8.91	Upper of two nests in same tree.
278	Cliff	70	Empty	0	Inactive	7.79	Inactive. More than 100 yards of ribbon with colored flagging strewn across vegetation above cliff with nest

ID	Substrate	Est. Height (ft.)	Contents	Quan.	Status	Project Dist. (mi.)	Notes
279	Cliff	60	Empty	0	Inactive	3.85	Good condition but no whitewash. Not active in last 5 years
280	Cliff	55	Empty	0	Active	11.73	Newly built nest this year.

Table 3. Golden Eagle and California Condor Observations Made During Surveys

The following table lists the identification number (ID) of all Golden Eagle and California Condor observations made during surveys conducted in January and April of 2014. Each nest ID number is accompanied by the following information: (1) common name of species observed (Species), (2) number of individuals observed (Quan.), (3) age of individuals observed (Age), (4) sex of individuals observed (Sex), and (5) relevant notes (Notes).

ID	Species	Quan.	Age	Sex	Notes
500	Golden Eagle	1	Adult	Unknown	
501	Golden Eagle	1	Adult	Unknown	
502	Golden Eagle	2	Adult	Pair	
503	Golden Eagle	1	Adult	Unknown	
504	Golden Eagle	1	Adult	Unknown	
505	Golden Eagle	1	Subadult	Unknown	2nd year bird
506	Golden Eagle	2	Adult	Pair	Not aggressive toward 2nd year bird in area
507	Golden Eagle	1	Unknown	Unknown	Perched
508	Golden Eagle	2	Adult	Pair	Perched at top of ridge
509	Golden Eagle	1	Adult	Unknown	Perched
510	Golden Eagle	1	Unknown	Unknown	Soaring over peak
511	Golden Eagle	4	Mixed	Mixed	One group of three Golden Eagles (two adults, one subadult) and a fourth, lone adult in the distance
512	Golden Eagle	2	Adult	Pair	
513	Golden Eagle	1	Adult	Unknown	Adult on nest in incubation posture
514	Golden Eagle	1	Adult	Female	Adult on nest in incubation posture
515	Golden Eagle	1	Adult	Unknown	In flight
516	California Condor	2	Adult	Pair	Emerged from crevice in cliff
517	Golden Eagle	1	Adult	Unknown	Flying to south
518	Golden Eagle	1	Adult	Female	Flying over field
519	Golden Eagle	1	Adult	Female	Adult on nest in incubation posture
520	Golden Eagle	1	Adult	Unknown	Flying about 600 feet above ground
521	Golden Eagle	1	Adult	Unknown	In flight
522	Golden Eagle	1	Adult	Unknown	
523	Golden Eagle	1	Subadult	Unknown	
524	Golden Eagle	1	Adult	Unknown	Flying. One of two adults detected in territory
525	Golden Eagle	1	Adult	Female	Perched. One of two adults detected in territory

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APPENDIX A. PHOTOGRAPHS OF GOLDEN EAGLE NESTS

Nest ID 235

Nest ID 237

Nest ID 238

Nest ID 239

Nest ID 240

Nest ID 241

Nest ID 242

Nest ID 243

Nest ID 244

Nest ID 245

Nest ID 246

Nest ID 247

Nest ID 248

Nest ID 249

Nest ID 251

Nest ID 253

Nest ID 254

Nest ID 255

Nest ID 256

Nest ID 257

Nest ID 258

Nest ID 259

Nest ID 260

Nest ID 262

Nest ID 263

Nest ID 264

Nest ID 265

Nest ID 266

Nest ID 267

Nest ID 268

Nest ID 269

Nest ID 270

Nest ID 271

Nest ID 272

Nest ID 273

Nest ID 274

Nest ID 275

Nest ID 276

Nest ID 277

Nest ID 278

Nest ID 279

Nest ID 280

APPENDIX B. NON-GOLDEN EAGLE SURVEY RESULTS

The following table lists the identification number (ID) of all non-Golden Eagle nests discovered during surveys conducted in January and April of 2014. Each nest ID number is accompanied by the following information: (1) species of nest-owner (Species), (2) substrate supporting nest (Substrate), (3) nest contents (Contents), (4) quantity of nest contents (Quan.), (5) nest status (Status), (6) distance in miles from nest to the proposed Project (Project Dist. [mi.]), and (7) relevant notes (Notes).

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
1	Barn Owl	Cliff	Empty	0	Inactive	8.56	Possible Prairie Falcon eyrie
2	Barn Owl	Cliff	Empty	0	Inactive	8.45	Possible Prairie Falcon eyrie
3	Barn Owl	Cliff	Empty	0	Inactive	8.27	Possible Prairie Falcon eyrie
4	Barn Owl	Cliff	Empty	0	Inactive	1.31	
5	Barn Owl	Cliff	Empty	0	Inactive	1.73	
6	Barn Owl	Cliff	Empty	0	Inactive	1.94	
7	Barn Owl	Cliff	Empty	0	Inactive	2.16	
8	Barn Owl	Cliff	Empty	0	Inactive	2.85	
9	Common Raven	Cliff	Empty	0	Inactive	7.96	Fallen nest
10	Common Raven	Cliff	Empty	0	Inactive	8.18	
11	Common Raven	Windmill	Empty	0	Inactive	5.71	
12	Common Raven	Cliff	Empty	0	Inactive	5.12	
13	Common Raven	Cliff	Empty	0	Inactive	5.06	
14	Common Raven	Cliff	Empty	0	Inactive	9.33	
15	Common Raven	Cliff	Empty	0	Inactive	7.99	
16	Common Raven	Cliff	Empty	0	Inactive	5.64	
17	Common Raven	Cliff	Empty	0	Inactive	7.28	
18	Common Raven	Cliff	Empty	0	Inactive	7.31	
19	Common Raven	Cliff	Empty	0	Inactive	8.22	
20	Common Raven	Cliff	Empty	0	Inactive	8.49	
21	Common Raven	Cliff	Empty	0	Inactive	6.05	
22	Common Raven	Rock	Empty	0	Inactive	7.04	
23	Common Raven	Cliff	Empty	0	Inactive	4.47	
24	Common Raven	Cliff	Empty	0	Inactive	4.88	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
25	Common Raven	Cliff	Empty	0	Inactive	9.57	
26	Common Raven	Cliff	Empty	0	Inactive	10.52	
27	Common Raven	Cliff	Empty	0	Inactive	10.53	Three Common Raven nests, same cliff
28	Common Raven	Cliff	Empty	0	Inactive	11.22	
29	Common Raven	Cliff	Empty	0	Inactive	10.23	
30	Common Raven	Cliff	Empty	0	Inactive	10.30	
31	Common Raven	Cliff	Empty	0	Inactive	9.50	
32	Common Raven	Cliff	Empty	0	Inactive	6.86	
33	Common Raven	Cliff	Empty	0	Inactive	5.89	
34	Common Raven	Cliff	Empty	0	Inactive	5.77	
35	Common Raven	Cliff	Empty	0	Inactive	6.35	
36	Common Raven	Cliff	Empty	0	Inactive	6.53	
37	Common Raven	Cliff	Empty	0	Inactive	6.57	
38	Common Raven	Cliff	Empty	0	Inactive	6.71	
39	Common Raven	Cliff	Empty	0	Inactive	7.37	
40	Common Raven	Cliff	Empty	0	Inactive	6.33	
41	Common Raven	Cliff	Empty	0	Inactive	4.55	
42	Common Raven	Cliff	Empty	0	Inactive	4.60	
43	Common Raven	Cliff	Empty	0	Inactive	4.10	
44	Common Raven	Cliff	Empty	0	Inactive	6.13	
45	Common Raven	Cliff	Empty	0	Inactive	5.99	
46	Common Raven	Cliff	Empty	0	Inactive	7.14	
47	Common Raven	Cliff	Empty	0	Inactive	9.49	
48	Common Raven	Cliff	Empty	0	Inactive	10.11	
49	Common Raven	Cliff	Empty	0	Inactive	10.12	
50	Common Raven	Cliff	Empty	0	Inactive	7.29	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
51	Common Raven	Cliff	Empty	0	Inactive	6.17	
52	Common Raven	Cliff	Empty	0	Inactive	4.25	
53	Common Raven	Cliff	Empty	0	Inactive	4.82	
54	Common Raven	Cliff	Empty	0	Inactive	5.88	
55	Common Raven	Cliff	Empty	0	Inactive	4.56	
56	Common Raven	Cliff	Empty	0	Inactive	4.58	
57	Common Raven	Cliff	Empty	0	Inactive	4.22	
58	Common Raven	Cliff	Empty	0	Inactive	3.72	
59	Common Raven	Cliff	Empty	0	Inactive	4.36	
60	Common Raven	Cliff	Empty	0	Inactive	1.27	
61	Common Raven	Cliff	Empty	0	Inactive	2.77	
62	Common Raven	Cliff	Empty	0	Inactive	2.30	
63	Common Raven	Cliff	Empty	0	Inactive	10.22	
64	Common Raven	Cliff	Empty	0	Inactive	2.89	
65	Common Raven	Cliff	Empty	0	Inactive	3.14	
66	Common Raven	Cliff	Empty	0	Inactive	2.78	Near Red-tailed Hawk nest
67	Common Raven	Cliff	Empty	0	Inactive	0.64	
68	Common Raven	Cliff	Empty	0	Inactive	2.98	
69	Common Raven	Cliff	Empty	0	Active	2.09	
70	Common Raven	Cliff	Empty	0	Inactive	2.43	
71	Common Raven	Cliff	Empty	0	Inactive	2.41	
72	Common Raven	Cliff	Empty	0	Inactive	3.40	
73	Common Raven	Cliff	Empty	0	Active	3.32	
74	Common Raven	Cliff	Empty	0	Inactive	3.06	
75	Common Raven	Cliff	Empty	0	Inactive	3.62	
76	Common Raven	Cliff	Empty	0	Inactive	5.07	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
77	Common Raven	Cliff	Empty	0	Inactive	5.04	
78	Common Raven	Cliff	Empty	0	Inactive	5.07	
79	Common Raven	Cliff	Empty	0	Inactive	10.04	
80	Common Raven	Cliff	Empty	0	Inactive	9.97	
81	Common Raven	Cliff	Empty	0	Inactive	9.65	Two nests next to each other
82	Common Raven	Cliff	Empty	0	Inactive	9.65	
83	Common Raven	Cliff	Empty	0	Inactive	6.37	Two old nests nearby
84	Common Raven	Cliff	Empty	0	Active	4.22	
85	Common Raven	Cliff	Empty	0	Inactive	4.99	
86	Common Raven	Cliff	Empty	0	Inactive	3.90	
87	Common Raven	Cliff	Empty	0	Inactive	3.04	
88	Common Raven	Cliff	Empty	0	Inactive	3.03	
89	Common Raven	Cliff	Empty	0	Inactive	3.16	
90	Common Raven	Cliff	Empty	0	Inactive	2.85	
91	Common Raven	Valley Oak	Empty	0	Inactive	3.24	
92	Common Raven	Cliff	Empty	0	Inactive	2.56	
93	Common Raven	Cliff	Empty	0	Inactive	2.29	
94	Common Raven	Tower	Empty	0	Inactive	0.82	
95	Common Raven	Tower	Empty	0	Inactive	0.36	
96	Common Raven	Tower	Empty	0	Inactive	0.23	
97	Common Raven	Tower	Empty	0	Inactive	0.41	
98	Common Raven	Tower	Empty	0	Inactive	0.00	
99	Common Raven	Tower	Empty	0	Inactive	0.00	Nest in a transformer pole
100	Common Raven	Tower	Empty	0	Inactive	0.00	
101	Common Raven	Tower	Empty	0	Inactive	0.00	
102	Common Raven	Tower	Empty	0	Inactive	0.21	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
103	Common Raven	Tower	Empty	0	Inactive	0.55	
104	Common Raven	Tower	Empty	0	Inactive	0.87	
105	Common Raven	Tower	Empty	0	Inactive	1.01	
106	Common Raven	Tower	Empty	0	Inactive	5.49	
107	Common Raven	Tower	Empty	0	Inactive	5.70	Two nests on one tower
108	Common Raven	Tower	Empty	0	Inactive	9.96	
109	Common Raven	Valley Oak	Empty	0	Inactive	9.11	
110	Common Raven	Blue Oak	Empty	0	Inactive	9.13	
111	Common Raven	Digger Pine	Empty	0	Inactive	7.48	
112	Common Raven	Blue Oak	Empty	0	Inactive	0.66	
113	Common Raven	Blue Oak	Empty	0	Inactive	2.87	
114	Common Raven	Blue Oak	Empty	0	Inactive	2.95	
115	Common Raven	Cliff	Empty	0	Inactive	3.77	
116	Common Raven	Blue Oak	Empty	0	Inactive	5.29	
117	Common Raven	Cliff	Empty	0	Inactive	9.23	
118	Common Raven	Cliff	Empty	0	Inactive	9.17	
119	Common Raven	Tower	Empty	0	Inactive	10.07	
120	Common Raven	Tower	Empty	0	Inactive	10.03	
121	Common Raven	Tower	Empty	0	Inactive	9.99	Two nests in two adjacent towers
122	Common Raven	Tower	Empty	0	Inactive	9.92	
123	Common Raven	Tower	Empty	0	Inactive	9.88	Two nests in one tower
124	Common Raven	Tower	Empty	0	Inactive	9.85	
125	Common Raven	Tower	Empty	0	Inactive	9.87	
126	Common Raven	Tower	Empty	0	Inactive	10.06	
127	Common Raven	Cliff	Empty	0	Inactive	4.72	
128	Common Raven	Cliff	Empty	0	Inactive	7.22	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
129	Common Raven	Cliff	Empty	0	Inactive	7.41	
130	Common Raven	Cliff	Empty	0	Inactive	7.42	
131	Common Raven	Cliff	Empty	0	Inactive	7.71	
132	Common Raven	Digger Pine	Empty	0	Inactive	8.36	
133	Common Raven	Cliff	Empty	0	Inactive	10.15	
134	Common Raven	Digger Pine	Empty	0	Inactive	9.72	
135	Common Raven	Digger Pine	Empty	0	Inactive	8.66	
136	Common Raven	Cliff	Empty	0	Inactive	5.39	
137	Common Raven	Digger Pine	Empty	0	Inactive	5.37	
138	Common Raven	Cliff	Empty	0	Inactive	4.67	
139	Common Raven	Cliff	Empty	0	Inactive	5.43	
140	Common Raven	Cliff	Empty	0	Inactive	5.59	
141	Common Raven	Cliff	Empty	0	Inactive	5.36	Next to Prairie Falcon
142	Common Raven	Cliff	Empty	0	Inactive	5.48	
143	Common Raven	Cliff	Empty	0	Inactive	4.43	
144	Common Raven	Cliff	Empty	0	Inactive	5.75	
145	Common Raven	Tower	Empty	0	Inactive	9.90	
146	Common Raven	Tower	Empty	0	Inactive	10.00	
147	Common Raven	Tower	Empty	0	Inactive	9.67	
148	Common Raven	Tower	Empty	0	Inactive	9.58	Two nests in one tower; old
149	Common Raven	Tower	Empty	0	Inactive	9.58	Two nests in one tower; old
150	Common Raven	Tower	Empty	0	Inactive	9.45	
151	Common Raven	Tower	Empty	0	Inactive	9.28	
152	Common Raven	Tower	Empty	0	Inactive	9.30	
153	Common Raven	Tower	Empty	0	Inactive	9.36	
154	Common Raven	Tower	Empty	0	Inactive	9.44	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
155	Common Raven	Tower	Empty	0	Inactive	9.49	
156	Common Raven	Tower	Empty	0	Inactive	9.56	
157	Common Raven	Tower	Empty	0	Inactive	9.62	
158	Common Raven	Tower	Empty	0	Inactive	9.67	Two nests in one tower
159	Common Raven	Tower	Empty	0	Inactive	9.67	Two nests in one tower
160	Common Raven	Tower	Empty	0	Inactive	9.23	
161	Common Raven	Tower	Empty	0	Inactive	8.70	
162	Common Raven	Tower	Empty	0	Inactive	8.54	
163	Common Raven	Tower	Empty	0	Inactive	8.41	
164	Common Raven	Tower	Empty	0	Inactive	8.26	Two nests in one tower
165	Common Raven	Tower	Empty	0	Inactive	8.26	Two nests in one tower
166	Common Raven	Tower	Empty	0	Inactive	8.18	Three nests in one tower
167	Common Raven	Tower	Empty	0	Inactive	8.18	Three nests in one tower
168	Common Raven	Tower	Empty	0	Inactive	8.18	Three nests in one tower
169	Common Raven	Tower	Empty	0	Inactive	8.12	
170	Common Raven	Tower	Empty	0	Inactive	8.06	
171	Common Raven	Tower	Empty	0	Inactive	7.85	Two nests in one tower
172	Common Raven	Tower	Empty	0	Inactive	7.85	Two nests in one tower
173	Common Raven	Tower	Empty	0	Inactive	7.66	
174	Common Raven	Tower	Empty	0	Inactive	7.66	
175	Common Raven	Tower	Empty	0	Inactive	7.70	Two nests in one tower
176	Common Raven	Tower	Empty	0	Inactive	7.70	Two nests in one tower
177	Common Raven	Tower	Empty	0	Inactive	7.93	
178	Common Raven	Tower	Empty	0	Inactive	8.04	
179	Common Raven	Tower	Empty	0	Inactive	8.38	
180	Common Raven	Tower	Empty	0	Inactive	8.51	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
181	Common Raven	Tower	Empty	0	Inactive	8.64	
182	Common Raven	Tower	Empty	0	Inactive	9.17	
183	Common Raven	Tower	Empty	0	Inactive	9.89	
184	Common Raven	Cliff	Empty	0	Inactive	6.38	
185	Common Raven	Digger Pine	Empty	0	Inactive	6.63	Bowl is deep
186	Common Raven	Digger Pine	Empty	0	Inactive	9.25	
187	Common Raven	Cliff	Empty	0	Inactive	6.91	Pair of Common Ravens near
188	Common Raven	Cliff	Empty	0	Inactive	5.97	
189	Common Raven	Cliff	Empty	0	Inactive	10.10	
190	Common Raven	Cliff	Empty	0	Inactive	10.12	
191	Common Raven	Cliff	Empty	0	Inactive	10.22	
192	Common Raven	Cliff	Empty	0	Inactive	7.29	
193	Common Raven	Blue Oak	Empty	0	Inactive	7.25	deep bowl
194	Common Raven	Blue Oak	Empty	0	Inactive	9.12	deep bowl
195	Common Raven	Cliff	Empty	0	Inactive	5.78	
196	Common Raven	Cottonwood	Empty	0	Inactive	0.00	
197	Common Raven	Blue Oak	Empty	0	Inactive	6.72	
198	Common Raven	Cliff	Empty	0	Inactive	7.88	
199	Common Raven	Digger Pine	Empty	0	Inactive	7.99	Fledged young in 2013
200	Common Raven	Cliff	Empty	0	Inactive	7.53	
201	Common Raven	Cliff	Unknown	N.A.	Active	4.57	Adult on nest in incubation posture. Near two inactive Common Raven Nests
202	Common Raven	Cliff	Empty	0	Inactive	8.31	
203	Common Raven	Cliff	Empty	0	Inactive	8.32	Active in 2013
204	Common Raven	Cliff	Empty	0	Inactive	8.18	Two Common Raven nests above and to right of inactive Golden Eagle nest
205	Common Raven	Cliff	Empty	0	Inactive	9.70	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
206	Common Raven	Cliff	Empty	0	Inactive	9.66	
207	Common Raven	Cottonwood	Unknown	N.A.	Active	8.80	Adult on nest
208	Common Raven	Cliff	Empty	0	Inactive	3.33	Lower of two nests on same cliff face
209	Common Raven	Cliff	Unknown	N.A.	Active	7.56	Adult on nest in incubation posture
210	Common Raven	Cliff	Empty	0	Active	7.60	Nest is freshly built on
211	Common Raven	Cliff	Empty	0	Active	4.81	
212	Common Raven	Cliff	Empty	0	Active	4.37	Upper and smaller of two nests on face
213	Common Raven	Cliff	Empty	0	Inactive	4.37	Lower and larger of two nests on face
214	Common Raven	Cliff	Empty	0	Inactive	9.56	
215	Common Raven	Cliff	Empty	0	Inactive	9.63	Large nest
216	Common Raven	Digger Pine	Empty	0	Inactive	9.65	
217	Common Raven	Digger Pine	Empty	0	Inactive	9.92	Lower of two nests in same tree
218	Common Raven	Digger Pine	Empty	0	Inactive	9.85	Upper of two nests in same tree; pine cones in bowl
219	Common Raven	Cliff	Empty	0	Active	5.63	
220	Common Raven	Cliff	Empty	0	Inactive	5.97	
221	Common Raven	Cliff	Unknown	N.A.	Unknown	4.16	Two nests close together. Difficult to fly, so hiked in to confirm status. Lower part of canyon used heavily as firing range, possibly used by Golden Eagles in the distant past
222	Common Raven	Cliff	Empty	0	Inactive	5.69	Near active Prairie Falcon nest
223	Common Raven	Cliff	Empty	0	Active	2.32	Likely failed
224	Common Raven	Cliff	Empty	0	Inactive	7.91	Directly below another Common Raven nest on same cliff
225	Common Raven	Cliff	Empty	0	Inactive	7.91	Directly above another Common Raven nest on same cliff
226	Common Raven	Cliff	Empty	0	Active	5.95	Below an older nest. Likely failed
227	Common Raven	Cliff	Unknown	N.A.	Active	5.78	Above a newer nest. Adult on nest
228	Common Raven	Cliff	Empty	0	Active	5.60	Rebuilt in 2014. Likely failed

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
229	Common Raven	Cliff	Empty	0	Active	8.26	Rebuilt in 2014. Likely failed
230	Common Raven	Valley Oak	Eggs	1	Unknown	7.91	One Common Raven egg in an old Red-tailed Hawk nest. No Common Ravens observed
231	Common Raven	Cliff	Unknown	N.A.	Active	8.74	Adult on nest in incubation posture
232	Common Raven	Cliff	Unknown	N.A.	Active	10.68	Adult on nest in incubation posture
233	Common Raven	Cliff	Unknown	N.A.	Active	11.38	Adult on nest in incubation posture
234	Common Raven	Cliff	Unknown	N.A.	Unknown	3.37	Adult near, could not see contents clearly
281	Great Horned Owl	Cliff	Empty	0	Inactive	6.81	
282	Great Horned Owl	Cliff	Empty	0	Inactive	2.78	
283	Great Horned Owl	Cliff	Empty	0	Inactive	2.79	
284	Prairie Falcon	Cliff	Empty	0	Inactive	8.98	On top of old Common Raven nest; same cliff as Golden Eagle and Red-tailed Hawk nests
285	Prairie Falcon	Cliff	Empty	0	Inactive	7.28	Lots of whitewash
286	Prairie Falcon	Cliff	Empty	0	Inactive	7.85	
287	Prairie Falcon	Cliff	Empty	0	Inactive	4.40	
288	Prairie Falcon	Cliff	Empty	0	Inactive	10.01	
289	Prairie Falcon	Cliff	Empty	0	Inactive	10.33	
290	Prairie Falcon	Cliff	Empty	0	Inactive	10.33	
291	Prairie Falcon	Cliff	Empty	0	Inactive	8.57	
292	Prairie Falcon	Cliff	Empty	0	Inactive	9.53	
293	Prairie Falcon	Cliff	Empty	0	Inactive	9.52	
294	Prairie Falcon	Cliff	Empty	0	Inactive	7.22	
295	Prairie Falcon	Cliff	Empty	0	Inactive	6.58	
296	Prairie Falcon	Cliff	Empty	0	Inactive	6.27	On old Common Raven nest
297	Prairie Falcon	Cliff	Empty	0	Inactive	6.58	
298	Prairie Falcon	Cliff	Empty	0	Inactive	6.59	
299	Prairie Falcon	Cliff	Empty	0	Inactive	7.03	
300	Prairie Falcon	Cliff	Empty	0	Inactive	6.93	
301	Prairie Falcon	Cliff	Empty	0	Inactive	4.20	
302	Prairie Falcon	Cliff	Empty	0	Inactive	6.31	
303	Prairie Falcon	Cliff	Empty	0	Inactive	6.13	
304	Prairie Falcon	Cliff	Empty	0	Inactive	9.54	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
305	Prairie Falcon	Cliff	Empty	0	Inactive	10.14	
306	Prairie Falcon	Cliff	Empty	0	Inactive	10.20	
307	Prairie Falcon	Cliff	Empty	0	Inactive	10.14	
308	Prairie Falcon	Cliff	Empty	0	Inactive	5.19	Prairie Falcon observed near nest
309	Prairie Falcon	Cliff	Empty	0	Inactive	4.97	
310	Prairie Falcon	Cliff	Empty	0	Inactive	4.48	
311	Prairie Falcon	Cliff	Empty	0	Inactive	4.66	
312	Prairie Falcon	Cliff	Empty	0	Inactive	4.38	
313	Prairie Falcon	Cliff	Empty	0	Inactive	3.59	
314	Prairie Falcon	Cliff	Empty	0	Inactive	2.85	
315	Prairie Falcon	Cliff	Empty	0	Inactive	2.78	
316	Prairie Falcon	Cliff	Empty	0	Inactive	10.22	
317	Prairie Falcon	Cliff	Empty	0	Inactive	3.86	
318	Prairie Falcon	Cliff	Empty	0	Inactive	4.22	
319	Prairie Falcon	Cliff	Empty	0	Inactive	4.21	
320	Prairie Falcon	Cliff	Empty	0	Inactive	3.79	
321	Prairie Falcon	Cliff	Empty	0	Inactive	3.13	Three nests within 50 feet of each other. One on top and two below
322	Prairie Falcon	Cliff	Empty	0	Inactive	2.76	
323	Prairie Falcon	Cliff	Empty	0	Inactive	2.54	
324	Prairie Falcon	Cliff	Empty	0	Inactive	2.75	
325	Prairie Falcon	Cliff	Empty	0	Inactive	2.86	
326	Prairie Falcon	Cliff	Empty	0	Inactive	2.78	
327	Prairie Falcon	Cliff	Empty	0	Inactive	2.88	Over old Common Raven nest
328	Prairie Falcon	Cliff	Empty	0	Inactive	3.30	Priarie Falcon pair observed
329	Prairie Falcon	Cliff	Empty	0	Inactive	3.94	
330	Prairie Falcon	Cliff	Empty	0	Inactive	3.09	
331	Prairie Falcon	Cliff	Empty	0	Inactive	2.40	
332	Prairie Falcon	Cliff	Empty	0	Inactive	7.24	
333	Prairie Falcon	Cliff	Empty	0	Inactive	2.75	
334	Prairie Falcon	Cliff	Empty	0	Inactive	4.95	Another Prairie Falcon eyrie located on same rock
335	Prairie Falcon	Cliff	Empty	0	Inactive	4.95	Another Prairie Falcon eyrie located on same rock
336	Prairie Falcon	Cliff	Empty	0	Inactive	4.68	
337	Prairie Falcon	Cliff	Empty	0	Inactive	8.18	
338	Prairie Falcon	Cliff	Empty	0	Inactive	8.18	
339	Prairie Falcon	Cliff	Empty	0	Inactive	7.56	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
340	Prairie Falcon	Cliff	Empty	0	Inactive	4.82	
341	Prairie Falcon	Cliff	Empty	0	Inactive	5.45	
342	Prairie Falcon	Cliff	Empty	0	Inactive	5.36	Nest to Common Raven
343	Prairie Falcon	Cliff	Empty	0	Inactive	10.12	
344	Prairie Falcon	Cliff	Empty	0	Inactive	5.43	
345	Prairie Falcon	Cliff	Unknown	N.A.	Active	5.68	Adult sitting in nest in incubation posture. Nesting in old Common Raven nest. Abundant whitewash above and in nest.
346	Red-tailed Hawk	Eucalyptus	Empty	0	Inactive	8.07	
347	Red-tailed Hawk	Eucalyptus	Empty	0	Inactive	8.07	
348	Red-tailed Hawk	Eucalyptus	Empty	0	Inactive	6.43	
349	Red-tailed Hawk	Cottonwood	Empty	0	Inactive	5.07	
350	Red-tailed Hawk	Cottonwood	Empty	0	Inactive	5.33	
351	Red-tailed Hawk	Cottonwood	Empty	0	Inactive	5.41	
352	Red-tailed Hawk	Eucalyptus	Empty	0	Inactive	6.31	
353	Red-tailed Hawk	Cliff	Empty	0	Inactive	7.33	
354	Red-tailed Hawk	Cliff	Empty	0	Inactive	7.95	
355	Red-tailed Hawk	Cliff	Empty	0	Inactive	7.38	
356	Red-tailed Hawk	Cliff	Empty	0	Inactive	6.93	
357	Red-tailed Hawk	Cliff	Empty	0	Inactive	4.25	
358	Red-tailed Hawk	Cliff	Empty	0	Inactive	3.33	
359	Red-tailed Hawk	Cliff	Empty	0	Inactive	3.45	
360	Red-tailed Hawk	Cliff	Empty	0	Inactive	4.65	
361	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	8.53	
362	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	8.41	
363	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	8.20	Two nests in same tree
364	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	8.20	Two nests in same tree
365	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	8.08	

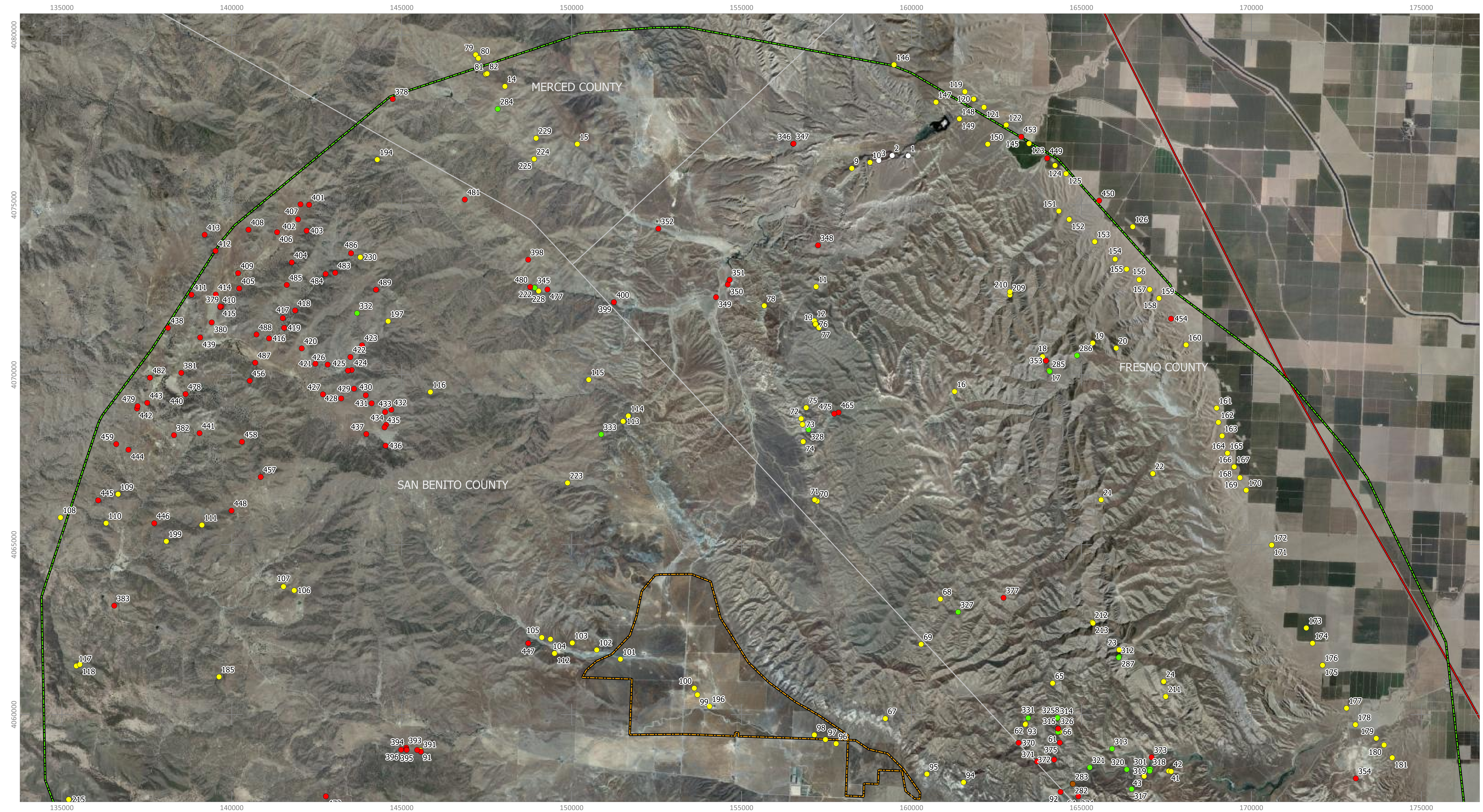
ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
366	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	8.07	
367	Red-tailed Hawk	Unknown Oak	Empty	0	Inactive	6.42	
368	Red-tailed Hawk	Cottonwood	Empty	0	Inactive	1.26	
369	Red-tailed Hawk	Cliff	Empty	0	Inactive	1.85	
370	Red-tailed Hawk	Cliff	Empty	0	Inactive	2.02	
371	Red-tailed Hawk	Cliff	Empty	0	Inactive	2.21	
372	Red-tailed Hawk	Cliff	Empty	0	Inactive	2.52	
373	Red-tailed Hawk	Cliff	Empty	0	Inactive	4.27	
374	Red-tailed Hawk	Cliff	Empty	0	Inactive	2.89	
375	Red-tailed Hawk	Cliff	Empty	0	Inactive	2.71	
376	Red-tailed Hawk	Cliff	Empty	0	Inactive	2.78	Near Common Raven nest
377	Red-tailed Hawk	Cliff	Empty	0	Inactive	3.54	
378	Red-tailed Hawk	Cliff	Empty	0	Inactive	9.92	
379	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.26	
380	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.25	
381	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.17	
382	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.66	
383	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.64	
384	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	7.49	Near another Red-tailed Hawk nest in adjacent tree
385	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	7.51	Near another Red-tailed Hawk nest in adjacent tree
386	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	4.91	Same territory as nearby nest
387	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	4.97	Same territory as nearby nest
388	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	4.94	
389	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	5.01	
390	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	1.75	
391	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	3.24	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
392	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	3.29	
393	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	3.46	
394	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	3.47	
395	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	3.47	Nest falling apart
396	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	3.56	
397	Red-tailed Hawk	Cliff	Empty	0	Inactive	2.56	
398	Red-tailed Hawk	Cliff	Empty	0	Active	6.20	
399	Red-tailed Hawk	Cottonwood	Empty	0	Inactive	5.04	
400	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	5.04	
401	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.25	
402	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.19	
403	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	8.94	
404	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.75	
405	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.19	
406	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.31	
407	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.36	
408	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.73	
409	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.37	
410	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.27	
411	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	9.83	
412	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	9.95	
413	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	10.29	
414	Red-tailed Hawk	Windmill	Empty	0	Inactive	9.47	
415	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.28	
416	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.21	
417	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.23	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
418	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.14	
419	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.10	
420	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	7.62	
421	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	7.26	
422	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	6.82	
423	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	6.79	
424	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	6.65	
425	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	6.70	Two nests near each other
426	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	7.07	
427	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	6.84	
428	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	6.51	
429	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	6.42	
430	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	6.17	
431	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	6.00	
432	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	5.64	
433	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	5.71	
434	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	5.56	
435	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	5.56	
436	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	5.37	
437	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	5.78	
438	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	9.86	
439	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.29	
440	Red-tailed Hawk	Valley Oak	Empty	0	Active	8.88	
441	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.27	
442	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.49	
443	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.38	

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
444	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.27	
445	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	9.41	
446	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	8.30	
447	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	1.17	
448	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	7.09	
449	Red-tailed Hawk	Tower	Empty	0	Inactive	9.87	Red-tailed Hawk perched nearby
450	Red-tailed Hawk	Tower	Empty	0	Inactive	9.93	Red-tailed Hawk perched nearby
451	Red-tailed Hawk	Cliff	Empty	0	Inactive	4.82	
452	Red-tailed Hawk	Cliff	Empty	0	Inactive	7.19	
453	Red-tailed Hawk	Tower	Empty	0	Inactive	9.90	Red-tailed Hawk perched nearby
454	Red-tailed Hawk	Tower	Empty	0	Inactive	9.47	
455	Red-tailed Hawk	Digger Pine	Empty	0	Active	8.14	New nest bowl. Two adults near
456	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	8.10	Two adults near
457	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	6.91	Old nest
458	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	7.54	
459	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	9.51	
460	Red-tailed Hawk	Cliff	Empty	0	Inactive	6.74	
461	Red-tailed Hawk	Cliff	Empty	0	Inactive	4.51	
462	Red-tailed Hawk	Cliff	Empty	0	Inactive	4.43	
463	Red-tailed Hawk	Cliff	Eggs	2	Incubating	4.50	Newly built nest this year.
464	Red-tailed Hawk	Cliff	Empty	0	Inactive	3.33	Upper of two nests on same cliff face
465	Red-tailed Hawk	Cliff	Empty	0	Inactive	3.87	
466	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	7.22	Fledged young in 2013
467	Red-tailed Hawk	Cliff	Empty	0	Inactive	10.19	Old nest, only remnants or possibly never built completely
468	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	8.64	Adult Red-tailed Hawk near nest acting territorial, but nest not built on

ID	Species	Substrate	Contents	Quan.	Status	Project Dist. (mi.)	Notes
469	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	5.68	
470	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	4.34	
471	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	5.11	
472	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	5.16	Old nest
473	Red-tailed Hawk	Digger Pine	Unknown	N.A.	Active	8.25	Adult on nest
474	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	9.24	
475	Red-tailed Hawk	Cliff	Empty	0	Active	3.80	Fresh, built this year. No grasses.
476	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	9.55	
477	Red-tailed Hawk	Cliff	Empty	0	Inactive	5.57	Located below old Golden Eagle nest
478	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	8.88	
479	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	9.50	
480	Red-tailed Hawk	Cliff	Empty	0	Inactive	5.73	
481	Red-tailed Hawk	Cliff	Empty	0	Inactive	7.68	
482	Red-tailed Hawk	Valley Oak	Eggs	2	Active	9.58	Adult observed incubating
483	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	8.03	
484	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	8.14	
485	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	8.55	
486	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	8.08	
487	Red-tailed Hawk	Valley Oak	Empty	0	Active	8.19	Freshly lined with lichens on Jan. 23. Empty and no activity on Apr. 5.
488	Red-tailed Hawk	Blue Oak	Empty	0	Inactive	8.44	Large bowl
489	Red-tailed Hawk	Valley Oak	Empty	0	Inactive	7.28	Old, remnants of a large stick nest
490	Red-tailed Hawk	Digger Pine	Empty	0	Inactive	4.26	
491	Red-tailed Hawk	Cliff	Unknown	N.A.	Active	3.43	Adult on nest in incubation posture
492	Turkey Vulture	Cliff	Empty	0	Inactive	6.91	



County Border
Major Road
Proposed Project Boundary
Study Area

Nest Locations
Barn Owl
Common Raven
Prairie Falcon
Great Horned Owl
Red-tailed Hawk
Turkey Vulture

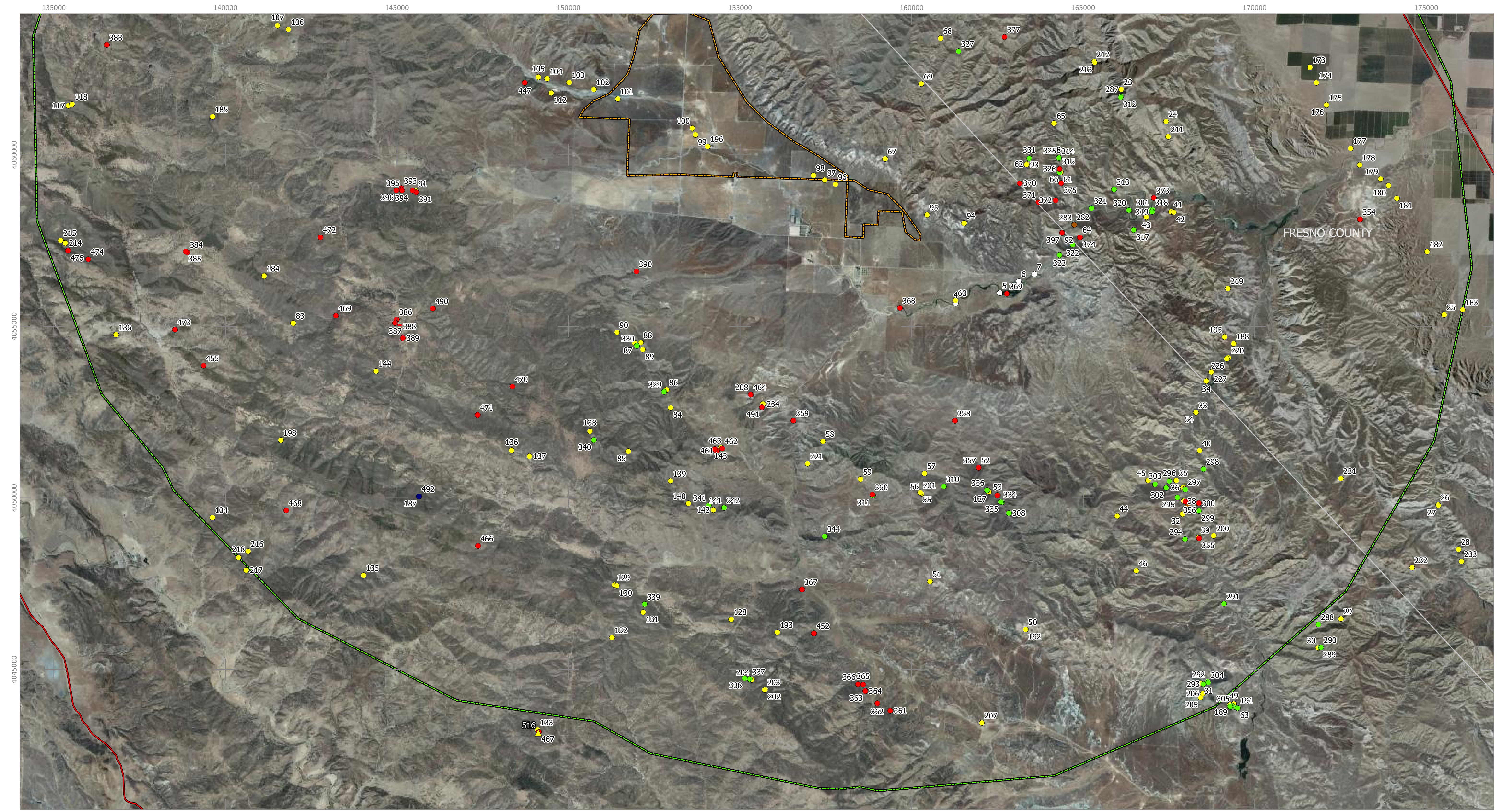
5000 0 5000 10000 15000 20000 ft
1:105,791

UTM NAD83 Zone 11 Coordinate Grid
Map Date: 5/8/2014
Author: Michael J. Kuehn
Background Source: US Department of Agriculture

EXHIBIT 2. 2014 Nesting Survey: Non-Golden Eagle Results (Northern Study Area)

Panoche Valley Solar Project | Merced, Fresno and San Benito Counties, California

BBI



County Border
Major Road
Proposed Project Boundary
Study Area

Special Status Species Observations

California Condor

Nest Locations

Barn Owl
Common Raven
Prairie Falcon
Great Horned Owl
Red-tailed Hawk
Turkey Vulture

5000 0 5000 10000 15000 20000 ft

1:105,791

UTM NAD83 Zone 11 Coordinate Grid
Map Date: 5/8/2014
Author: Michael J. Kuehn
Background Source: US Department of Agriculture

EXHIBIT 3. 2014 Nesting Survey: Non-Golden Eagle Results (Southern Study Area)

Panoche Valley Solar Project | Merced, Fresno and San Benito Counties, California

BBI

APPENDIX C. SPECIES LIST

The following list of 36 bird and 10 mammal species represents a complete compendium of vertebrate species detected during surveys by BBI biologists in January and April, 2014. Sensitive status designations are derived directly from the California Department of Fish and Wildlife's California Wildlife Habitats Relationship Database. Sensitive statuses in this database may pertain only to a subspecies or genetically distinct population of the species, and are included here only if the sensitive population has the potential to occur in the Study Area.

Birds

Common Name	Scientific Name	FE	FT	CE	CT	CFP	SSC
Mallard	Anas platyrhynchos						
California Quail	Callipepla californica						
Chukar	Alectoris chukar						
Wild Turkey	Meleagris gallopavo						
Cattle Egret	Bubulcus ibis						
White-faced Ibis	Plegadis chihi						
Turkey Vulture	Cathartes aura						
Bald Eagle	Haliaeetus leucocephalus			X		X	
Northern Harrier	Circus cyaneus						
Cooper's Hawk	Accipiter cooperii						
Red-tailed Hawk	Buteo jamaicensis						
Ferruginous Hawk	Buteo regalis						
Golden Eagle	Aquila chrysaetos					X	
Killdeer	Charadrius vociferus						
Rock Pigeon	Columba livia						
Greater Roadrunner	Geococcyx californianus						
Barn Owl	Tyto alba						
Great Horned Owl	Bubo virginianus						
Acorn Woodpecker	Melanerpes formicivorus						
Northern Flicker	Colaptes auratus						
American Kestrel	Falco sparverius						
Merlin	Falco columbarius						
Prairie Falcon	Falco mexicanus						
Loggerhead Shrike	Lanius ludovicianus	X					
Western Scrub-Jay	Aphelocoma californica						
Yellow-billed Magpie	Pica nuttalli						
American Crow	Corvus brachyrhynchos						
Common Raven	Corvus corax						
Canyon Wren	Catherpes mexicanus						
Western Bluebird	Sialia mexicana						
California Thrasher	Toxostoma redivivum						
European Starling	Sturnus vulgaris						

California Towhee	Melozone crissalis						
Western Meadowlark	Sturnella neglecta						
House Finch	Haemorhous mexicanus						

Mammals

Common Name	Scientific Name	FE	FT	CE	CT	CP	SSC
Desert Cottontail	Sylvilagus audubonii						
Black-tailed Jackrabbit	Lepus californicus						X
California Ground Squirrel	Spermophilus beecheyi						
Coyote	Canis latrans						
Gray Fox	Urocyon cinereoargenteus						
American Badger	Taxidea taxus						X
Bobcat	Lynx rufus						
Wild Pig	Sus scrofa						
Elk	Cervus elaphus						
Mule Deer	Odocoileus hemionus						

APPENDIX D. RESUMES

Peter H. Bloom, Ph.D. | President

Qualifications

Peter Bloom has been a professional environmental consultant for more than 35 years, principally in California. He specializes in the environmental sciences, is an internationally recognized expert in raptor biology and conservation and is considered one of the best all-around field biologists in California with his extensive knowledge and experience with all terrestrial vertebrate groups (amphibians, reptiles, birds, and mammals) and the vascular plants. Corporate clients for whom he has prepared or contributed to the production of numerous biological assessments and environmental impact reports include The Irvine Company, Rancho Mission Viejo, Tejon Ranch, Newhall Ranch, Ahmanson Ranch, Metropolitan Water District, and Los Angeles Department of Water and Power. He has also worked extensively with the Department of Defense, U.S. Fish and Wildlife Service, National Park Service, Bureau of Land Management, U.S. Forest Service, California Department of Fish and Game, and various non-profit conservation groups providing valuable research and advice, primarily on raptor ecology and conservation. He has conducted avian and herpetological research in the western United States, Alaska, Peru, Ecuador, and India and has been responsible for a wide variety of biological, ecological, and conservation studies ranging from local biological assessments to regional conservation planning. Dr. Bloom has published more than 30 peer-reviewed scientific papers and technical reports and taught California natural history at a local junior college for more than 12 years.

Professional Experience

As founder and President of Bloom Biological, Inc., Dr. Bloom has prepared numerous biological assessments and worked on an array of avian research projects in the western United States, Alaska, Peru, Ecuador, and India, spending over 600 hours conducting helicopter and fixed-wing nest survey work and aerial radio-tracking of eagles, California condors, hawks, and herons. He has also been responsible for conducting or supervising:

- fiber-optics and electrical powerline installation surveys and construction monitoring;
- surveys of nesting and wintering birds of prey for the California Department of Fish and Game (CDFG), BLM, U.S. Forest Service, Department of Defense, and numerous private land owners;
- transponder and radio-tagging of adult California red-legged frogs in Ventura County;
- focused surveys for California gnatcatcher, southwestern willow flycatcher, least Bell's vireo, yellow-billed cuckoo, Swainson's hawks, golden eagles, arroyo toad, California red-legged frog, desert tortoise, Pacific pond turtle (including trapping and surveying habitat), coast horned lizard, flat-tailed horned lizard, Belding's orange-throated whiptail, coastal whiptail, southern rubber boa, coastal patch-nosed snake, California glossy snake, two-striped garter snake (including trapping and surveying habitat), red-diamond rattlesnake, southern flying squirrel, and Pacific pocket mouse;
- general herpetological, small mammal, breeding and winter bird surveys in southern California;
- translocation of several hundred arroyo toads at Camp Pendleton Marine Corps Base;
- sensitive herpetological, mammal, and raptor surveys for the Transportation Corridor Agency in Orange County; and
- a raptor status and management plan for Naval Weapons Station, Seal Beach and Fallbrook Detachment.

As a research biologist at the Western Foundation of Vertebrate Zoology, served on the Science Advisory Board of the South Orange County Natural Communities Conservation Program. During his tenure there he:

- provided herpetological input into the Orange County environmental GIS and Cleveland National Forest environmental inventory.
- managed a long-term (30 yr.) raptor ecology study in California;
- managed a successful Great Blue Heron mitigation project designed to increase numbers of nesting herons through placement of artificial nest platforms;
- supervised and performed predator management activities for USFWS related to protection of California least terns, snowy plovers, and light-footed clapper rails in southwestern California from avian and other vertebrate predators (locations included Vandenberg Air Force Base, Naval Weapons Station Seal Beach, Batiquitos Lagoon, Port of Long Beach, Port of San Diego, and Tijuana Slough National Wildlife Refuge);
- supervised a two year CalTrans radio-telemetry study of nesting peregrine falcons and their relationship to California least terns in southwestern California; and
- organized and finished seven years of a MAPS passerine monitoring station.
- Together with sub-permittees, banded ~ 45,000 birds, mostly nestlings (1970 – 2013).

While serving as a research biologist and advisor in India, responsibilities included educating local biologists in the various techniques needed to capture birds, and conducting radio-telemetry research.

Served as thesis advisor to seven students at CSU Long Beach, one student at CSU Humboldt, and one student at CSU Fullerton.

As research biologist for the National Audubon Society, was responsible for writing the grant proposal and ultimately the successful award of two grants totaling $300,000 for six years of fulltime research on the ecology of southern California raptor populations. Responsibilities included project management, personnel selection, supervision of 12 volunteers, proposal and budget preparation, method design, data analysis, report writing, and publication of results. Directed the effort to capture all wild free-flying California condors for transmitter placement or captive breeding. Radio-tracked condors and conducted contaminant studies involving condors and 180 golden eagles.

As a research biologist at the University of California, Santa Cruz, was principal investigator on a three year study designed to determine the status of northern goshawk populations in California for CDFG.

Trapped and placed transmitters on great gray owls for the National Park Service , prairie falcons for CDFG, and peregrine falcons in Peru for the Bodega Bay Institute of Pollution Ecology.

As a wildlife biologist for BLM, was principal investigator of a study designed to determine the status of the Swainson's hawk in California. Surveyed all semi-arid and desert regions, reviewed literature and museum records, assessed reproduction, banded adults and young, and prepared the final report. His efforts contributed to the state-listing of Swainson's hawk as threatened.

Surveyed and reported on the ecology and distribution of raptors inhabiting the 200-square-mile Camp Pendleton Marine Corps Base.

While serving as a biological technician for BLM, conducted reptile, amphibian, small mammal, and avian surveys of 3.25 million acres of public land as part of a grazing EIS.

Education

Ph.D., Natural Resources, College of Natural Resources, University of Idaho, Moscow
M.S., Biology, California State University, Long Beach
B.S., Zoology, California State University, Long Beach

Awards

Graduation with Honors – Best Thesis Award School of Natural Sciences 1979
The Wildlife Society Western Section: Professional of the Year, 2005

Association of Field Ornithologists: Bergstrom Award, 1981
The Nature Conservancy: $27,000 for satellite transmitters, 2004 and 2006

Permits & Certifications

Federal endangered species recovery permit (TE-787376) for red-legged frog (including placement of transmitters and transponders), arroyo toad, California gnatcatcher (including banding), least Bell's vireo (including banding), southwestern willow flycatcher (including banding), California least tern, snowy plover, peregrine falcon (banding), bald eagle (banding), and Swainson's hawk (banding).

California scientific collecting permit and memorandum of understanding for all raptors, including state-threatened Swainson's hawk, reptiles, amphibians, small mammals, and many additional species of birds, including state-threatened western yellow-billed cuckoo, California least tern, snowy plover, peregrine falcon, and bald eagle
Federal Master Banding Permit No. 20431
- Federal Bird Marking and Salvage Permit
- Predator Management Permit
- Migratory Bird Relocation Permit (burrowing owl and other species)

Brown-headed cowbird trapping authorization

Desert Tortoise Council-approved for conducting desert tortoise monitoring surveys

Selected Publications

Home range and habitat use of Cooper's Hawks in urban and natural areas. C.A. Lepczyk and P.S. Warren (eds). Studies in Avian Biology No. 45. www.ucpress.edu/go/sab. 2012. (with Chiang, S.N., P.H. Bloom, A.M.Bartuszevige and S. E. Thomas)

Impact of the lead ammunition ban on reducing lead exposure in golden eagles and turkey vultures in California. PloS One. 18 pgs. 2011. (with Kelly, T.R., S. Torres, Y. Hernandez, R. Poppenga, W.M. Boyce, and C.K. Johnson)

Vagrant western Red-shouldered Hawks: Origins, natal dispersal patterns and survival. The Condor. 113:538-546. 2011. (with J.M. Scott, J.M. Papp, J.W. Kidd, S. Thomas)

Capture techniques. Pgs. 193 – 219. In Bird and Bildstein (eds). Raptor research and management techniques. Hancock House, Blaine, WA. 2007. (with W.S. Clark and J.W. Kidd)

Status of Burrowing Owls in southwestern California. In Proceedings of the California burrowing owl symposium, November 2003. Bird populations monographs No. 1. Institute for Bird Populations and Albion Environmental, Inc. 2007. (with Kidd, J.W., P.H. Bloom, C.W. Barrows and C.T. Collins)

Turkey vulture marking history: the switch from leg bands to patagial tags. *North American Bird Bander* 30:59-64. 2005. (with C. S. Houston)

Basic II and basic III plumages of rough-legged hawks. *Journal of Field Ornithology* 76:83-89. 2005. (with William Clark)

Molt and sequence of plumages of golden eagles, and a technique for in-hand ageing. *North American Bird Bander* 26:97-116. 2001. (with William Clark)

The status of Harlan's hawk in southern California. *Western Birds* 31:200-202. 2000. (with Charles Collins)

Post-migration weight gain of Swainson's hawks in Argentina. *Wilson Bulletin* 111:428-432. 1999. (with M. I. Goldstein, J. H. Sarasola, and T. E. Lacher)

BBI

Characteristics of red-tailed hawk nest sites in oak woodlands of central California. Proceedings of a Symposium on Oak Woodlands: Ecology, Management, and Urban Interface Issues. Pgs. 365-372. 1998. (with W. D. Tietje, and J. K. Vreeland)

The urban buteo: red-shouldered hawks in southern California. Pgs 31-39 in: Raptors in Human Landscapes, Adaptations to Built and Cultivated Environments. 1996. D. M. Bird, D. E. Varland,, and J. J. Negro, eds. Academic Press. (with M. D. McCrary)

Reproductive performance, age structure, and natal dispersal of Swainson's hawks in the Butte Valley, California. Journal of Raptor Research 29:187-192. 1995. 1995. (with B. Woodbridge and K. K. Finley)

The biology and current status of the long-eared owl in coastal southern California. Bulletin of the Southern California Academy of Sciences 93:1-12. 1994.

Red-shouldered hawk home range and habitat use in southern California. Journal of Wildlife Management 57:258-265. 1993. (with M. D. McCrary and M. J. Gibson)

The dho-gaza with great horned owl lure: an analysis of its effectiveness in capturing raptors. Journal of Raptor Research 26:167-178. 1992. (with J. L. Henckel, E. H. Henckel, J. K. Schmutz, B. Woodbridge, J. R. Bryan, R. L. Anderson, P. J. Detrich, T. L. Maechtle, J. O. McKinley, M. D. McCrary, K. Titus, and P. F. Schempf [Bloom senior author])

Lead hazards within the range of the California condor. The Condor 92:931-937. 1990. (with O. H. Pattee, J. M. Scott, and M. R. Smith)

Investigations of the decline of Swainson's hawk populations in California. Journal of Raptor Research 23:63-71. 1990. (with R. W. Risebrough, R. W. Schlorff, and E. E. Littrell)

Importance of riparian systems to nesting Swainson's hawks in the Central Valley of California. Pgs. 612-618 in Warner, R.E. and K.M. Hendrix eds., California Riparian Systems, Ecology, Conservation, and Productive Management. University of California Press. 1984. (with R. D. Schlorff)

Michael Kuehn, Ph.D. | Senior Biologist & Statistical Analyst

Qualifications

Dr. Kuehn is an avian ecologist with experience conducting field research throughout the Americas from Ecuador to Alaska. He also has a solid working knowledge of the other terrestrial vertebrate groups (amphibians, reptiles, and mammals), and has taught courses about their ecology and identification at UC-Santa Barbara. He is familiar with the fauna and flora of coastal California and the Mojave/Sonoran Desert regions. He has studied nesting birds for 15 years, principally in California, Nevada, Arizona, Montana, Idaho and Alaska, but also in Ecuador. Dr. Kuehn has been responsible for a wide variety of biological, ecological, and conservation studies ranging from local biological assessments to studies aimed at understanding specific stressors on regional avian communities. He has designed and conducted numerous avian field studies, and supervised field crews during the implementation of these studies in addition to performing statistical analysis and interpretation of data for report preparation.

Professional Experience

As a biologist at Bloom Biological, Dr. Kuehn has worked for three years in a variety of capacities to help design and conduct ecological assessments and prepare permitting documents, including the following:

Development of statistically valid pre-construction and post-construction avian survey protocols that meet federal and state permit requirements for alternative energy projects.

Managed multiple environmental assessments at alternative energy projects, involving survey design and site selection, training biologists to follow specific survey methods and protocols, scheduling and data management, as well as GIS management, data synthesis, statistical analysis and report preparation.

Contributed to the drafting of multiple Eagle Conservation Plans for wind energy projects seeking to apply for USFWS programmatic incidental eagle take permits.

Experienced with the application of field survey data to generate eagle fatality estimates for wind energy projects using the USFWS-developed Bayesian fatality prediction model using R Statistical software.

Conducted field surveys for a variety of passerine birds, owls, and other raptors.

Trained in raptor trapping (including Golden Eagles) and radio telemetry tracking of tagged birds.

Worked as an avian specialist, conducting nest searching and monitoring for the Sunrise Powerlink Project in San Diego and Imperial counties in California.

Assisted in creating burrows and conducting surveys for Burrowing Owls.

Dr. Kuehn also has the following experience:

As a research assistant at the Western Foundation of Vertebrate Zoology, conducted surveys for Loggerhead Shrikes on Santa Cruz Island and for all bird species along the Santa Clara River (Ventura County).

As a research associate at the University of California, Santa Barbara, designed and directed a two-year study investigating the effects of a tamarisk biocontrol agent on avian communities using riparian habitat in southern Nevada.

Served on a Technical Advisory Committee for a Walton Family Foundation funded initiative to restore habitat for Southwestern Willow Flycatchers in the Colorado Basin in the wake of Tamarisk biocontrol beetle introduction during 2011 and 2012.

Conducted independent research on reproductive strategies of birds breeding at high latitudes in central Alaska.

As a graduate student at UC Santa Barbara, conducted seven years of field research in Alaska, Idaho and Montana to investigate the behavioral defenses of hosts against Brown-headed Cowbird parasitism.

Participated for four years in a long-term ecological investigation of landscape effects on nesting success of riparian birds in Western Montana

Participated in a study of nesting birds in the cloud-forests of central and southern Ecuador.

Education

Ph.D., University of California, Department of Ecology, Evolution and Marine Biology, Santa Barbara

B.S., Fisheries and Wildlife Management, Lake Superior State University, Sault Ste. Marie, Michigan

Awards

Worster Award for Graduate/Undergraduate Collaborative Research, Department Ecology, Evolution and Marine Biology, University of California, Santa Barbara ($6000). 2007

Frank M. Chapman Memorial Grant, American Museum of Natural History ($2500). 2007
Student Research Award, Animal Behavior Society ($1000). 2007

Exploration Fund Award, Explorer's Club ($1200). 2007

Paul A. Stewart Research Award, Wilson Ornithological Society ($500). 2007

Ralph Schreiber Ornithology Research Award, Los Angeles Audubon Society ($2500). 2006

Student Research Award, American Ornithologist's Union ($1800). 2003

Permits & Certifications

USFWS Sci. Collector's Permit (MB085567-0)

USGS Bird Banding Subpermitee (22905-F)

Selected Publications

Kuehn, M. J., B. D. Peer, and S. I. Rothstein. (*Submitted Dec. 25, 2013*). Expression of Nest Defense Behaviors by a Brood Parasite Host is Experience-Dependent and Retained in the Absence of Parasitism. Evolution.

Kuehn, M. J., B. D. Peer, and S. I. Rothstein. 2014. Variation in host response to brood parasitism reflects evolutionary differences and not phenotypic plasticity. Anim. Behav. 88:21-28.

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Rivers, J. W., and M. J. Kuehn. Predation of eared grebe by great blue heron. 2007. Wilson Journal of Ornithology. 118(1): 112-113.

Peer, B. D., S. I. Rothstein, M. J. Kuehn and R. C. Fleischer. 2005. Host defenses against cowbird Molothrus spp. parasitism: implications for cowbird management. Pp. 84-97 in C. P. Ortega, J. F. Chace and B. D. Peer eds., Management of cowbirds and their hosts: balancing science, ethics and mandates. Ornithological Monographs. No. 57.

Tewksbury, J. J., T. E. Martin, S. J. Hejl, M. J. Kuehn and W. J. Jenkins. 2002. Parental care of a cowbird host: caught between the costs of egg-removal and nest predation. Proc. R. Soc. Lond. B. 269: 423-429.

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LIVE OAK ASSOCIATES, INC.

an Ecological Consulting Firm

SUMMARY OF BIOTIC RESOURCES
SOLARGEN ENERGY'S
PANOCHE RANCH SOLAR FARM

Prepared by:
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TABLE OF CONTENTS

1 INTRODUCTION 1
1.1 Project Description 1
2 EXISTING CONDITIONS 3
2.1 Biotic Habitats 3
FIGURE 1. SPECIAL STATUS SPECIES 10,000 ACRES 5
FIGURE 2. SPECIAL STATUS SPECIES 900 ACRES 6
2.2 Special Status Plants And Animals 7
FIGURE 3. SJKF 10-MILE RADIUS OF 10,000 ACRE SITE 11
FIGURE 4. SJKF 10-MILE RADIUS OF THE 900 ACRE SITE 12

1 INTRODUCTION

The following is a summary of a reconnaissance survey conducted by Live Oak Associates, Inc. (LOA) between 1 and 3 April 2009 on the proposed Panoche Ranch Solar Farm located in the Panoche Valley, San Benito and Fresno Counties, California. This summary offers an overview of the proposed project and discusses the biotic resources directly observed during the reconnaissance survey and also those that are historically know to occur in the site's vicinity.

1.1 PROJECT DESCRIPTION

Solargen Energy Inc. proposes to construct and operate a 1.5 Gigawatt solar photovoltaic (PV) energy generating facility that would be named the Panoche Ranch Solar Farm (Farm). The proposed location of the Farm is on private lands in the Panoche Valley, the majority of which (approximately 10,000 acres) are located in the eastern portion of San Benito County. A smaller area of approximately 900 acres is located north of Mercey Hot Springs in western Fresno County.

The Farm is proposed, in part, to support California in meeting the Renewable Portfolio Standard mandate, requiring investor-owned utilities to supply 20% of their total electricity through renewable energy by the year 2010. Benefits of the proposed Farm include the following:

- Direct conversion of sunlight to electricity through the PV effect does not require water to generate electricity
- Solargen's PV panels consist of non-toxic materials such as glass, silicon, concrete and steel
- The Farm would offset potential emissions of greenhouse gases that contribute to climate change and other pollutants such as nitrogen dioxide from fossil fuel fired power plants

The Farm would be constructed on contiguous parcels of land historically used for grazing. A buffer zone with a minimum width of 35-feet would be maintained between the PV panels and surrounding land and the operation of the Farm would not interfere with adjacent land uses currently in place.

The selection of the site in Panoche Valley is based mainly on sun light, topography and proximity to the Moss to Panoche transmission line owned by PG&E. This line provides a unique opportunity to connect energy produced at the Farm to an existing point on the system with available electric transmission capacity. The Panoche Valley offers a relatively level valley floor, occurring between approximately 1240 and 1400 feet above sea level. The Panoche Valley area supports a strong solar resource according to the National Renewable Energy Laboratory Solar Radiation Database (http://www.nrel.gov/gis/data_analysis.html), which has collected data for the last decade on various locations around the United States. The Farm would be expected to remain in operation for at least 30 years, with the possibility of a subsequent re-powering for additional years of operation. The energy produced here would mainly benefit users in San Benito and Fresno Counties, though outlying customers would also receive a portion of their energy from the Farm.

The Farm would consist primarily of PV panels on steel support structures, which would be dark in color. These panels would be arranged in rows, with panels tilting upward and facing south or southwest. Each panel would be 7- by 8-feet and they would stand no more than 15-feet above the ground. The panels would be arranged in blocks, and each block would be supported by an inverter and transformer. These units would stand no more than 25-feet above the ground. Medium-voltage collection system lines would be buried underground. It is believed that this system, with no moving parts, no thermal cycle, no water needs, a low visual profile and underground collection system would help minimize the Farm's potential impacts to the environment.

Due to the topography of the Panoche Valley, the installation of the Farm would not require large-scale grading. The main areas of grading would occur for all-weather access roads, the Farm substation, and an operations and maintenance (OM) facility. The roads would be heavily used during the construction phase, and then rarely used for maintenance in subsequent years.

As stated previously, the Farm would not require water to generate electricity. However, some water would be required for sanitary facilities and for periodic panel cleaning. It is estimated that these uses would require approximately 10.5 acre-feet of water per year, based on a one time per year cleaning schedule. This annual water demand represents approximately 6% of that used for a similar-sized solar thermal facility, based on recent California Energy Commission information. It is estimated that the construction of the Farm would take approximately 6 years to complete, and during this time, additional water would be necessary for sanitary facilities, dust control, initial panel washing and manufacturing concrete. Solargen is exploring opportunities to clean and recycle gray water for reuse onsite. Existing onsite wells should be sufficient to serve the Farm's water needs, however thorough studies of the water resources both onsite and in the greater Panoche Valley area are planned.

An approximately 5-acre substation is proposed as part of the project, and includes an adjacent area of up to 2 acres to be occupied by an OM facility, including a small parking area. One or more cement pads would be constructed as foundations for substation equipment, and other areas would utilize a gravel substrate. An 8-foot chain link fence would be constructed around the substation. These facilities would be strategically placed adjacent to the existing PG&E Moss to Panoche 230 kV transmission line. In addition to the substation and OM facility, there would be approximately one gear switch house for every 40 inverter and transformer combinations, each of which would have similar dimensions to the inverters and transformers.

2 EXISTING CONDITIONS

The outline of the proposed project is irregularly-shaped consisting of two blocks of land. The main area being considered is approximately 10,000 acres consisting of all or part of Township 15S, Range 10E, Sections: 3, 4, 5, 8, 9, 10, 11, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25; and Township 15S, Range 11E, Sections: 18, 19, 20, 29, and 30 all located in the eastern region of San Benito County, California, in an area known as the Panoche Valley. The majority of parcels within the site are used for cattle grazing. The site is surrounded by rangeland and bordered to the west by the Gabilan Range and to the east by the Panoche Hills. A number of drainages and creeks are present in the area including the Panoche and Las Aguilas Creeks. The portion of the Valley associated with the proposed project ranges in elevation from approximately 1240 feet National Geodetic Vertical Datum (NGVD) to approximately 1400 NGVD.

The second area being considered by the applicant is a smaller parcel of approximately 900 acres located just east of the Little Panoche Reservoir and northeast of Mercey Hot Springs, in an area known as Little Panoche Valley in western Fresno County. The outline of this parcel is also irregularly-shaped, and encompasses portions of Township 13S, Range 11E, Sections: 20, 21, 28, 29 and 30. This area is basically a plateau with an elevation range of approximately 700 feet NGVD to 1,000 feet NGVD, featuring several ravines. Land uses in this area are the reservoir, the Little Panoche Wildlife Area, an old tire dump, and almond orchards; the Little Panoche Creek is in close proximity. The site itself is currently used for grazing cattle.

Like much of California, the sites and their surroundings experience a Mediterranean climate with dry hot summers and cool wet winters. However, this region does not experience heavy rainfall. Annual precipitation in the general vicinity of the site ranges between 8- and 10-inches, almost 85% of which falls between October and March. Nearly all precipitation falls in the form of rain. Stormwater runoff readily infiltrates the sites' soils; when field capacity has been reached, gravitational water flows into the creeks and drainages.

2.1 BIOTIC HABITATS

Although the biotic habitats vary within Panoche Valley, the areas suitable for developing a solar farm are comprised of annual, non-native grasslands used mainly to graze cattle. It was in these areas that LOA focused reconnaissance surveys. Stock ponds were observed in Section 4 and, as mentioned above, Panoche and Las Aguilas Creeks and a number of unnamed drainages and washes traverse the grasslands. Most of the waterways were dry during the April 2009 surveys, and consisted mainly of gravely bottoms.

At the time of the April 2009 reconnaissance survey, much of Panoche Valley was heavily grazed by livestock. Prominent grass species observed during the April visit included ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis*), foxtail barley (*Hordeum murinum ssp. leporinum*) and rat-tail fescue (*Vulpia myuros*). Dominant forbs included broad-leaved filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), shining peppergrass (*Lepidium nitidum var. nitidum*) and vinegarweed (*Tricostema lanceolatum*). Fiddleneck (*Amsinckia menziesii*), devils lettuce (*Amsinckia tessellata*), shepherds purse (*Capsella bursa-pastoris*), turkey mullein (*Eremocarpus setigerus*) and bur clover

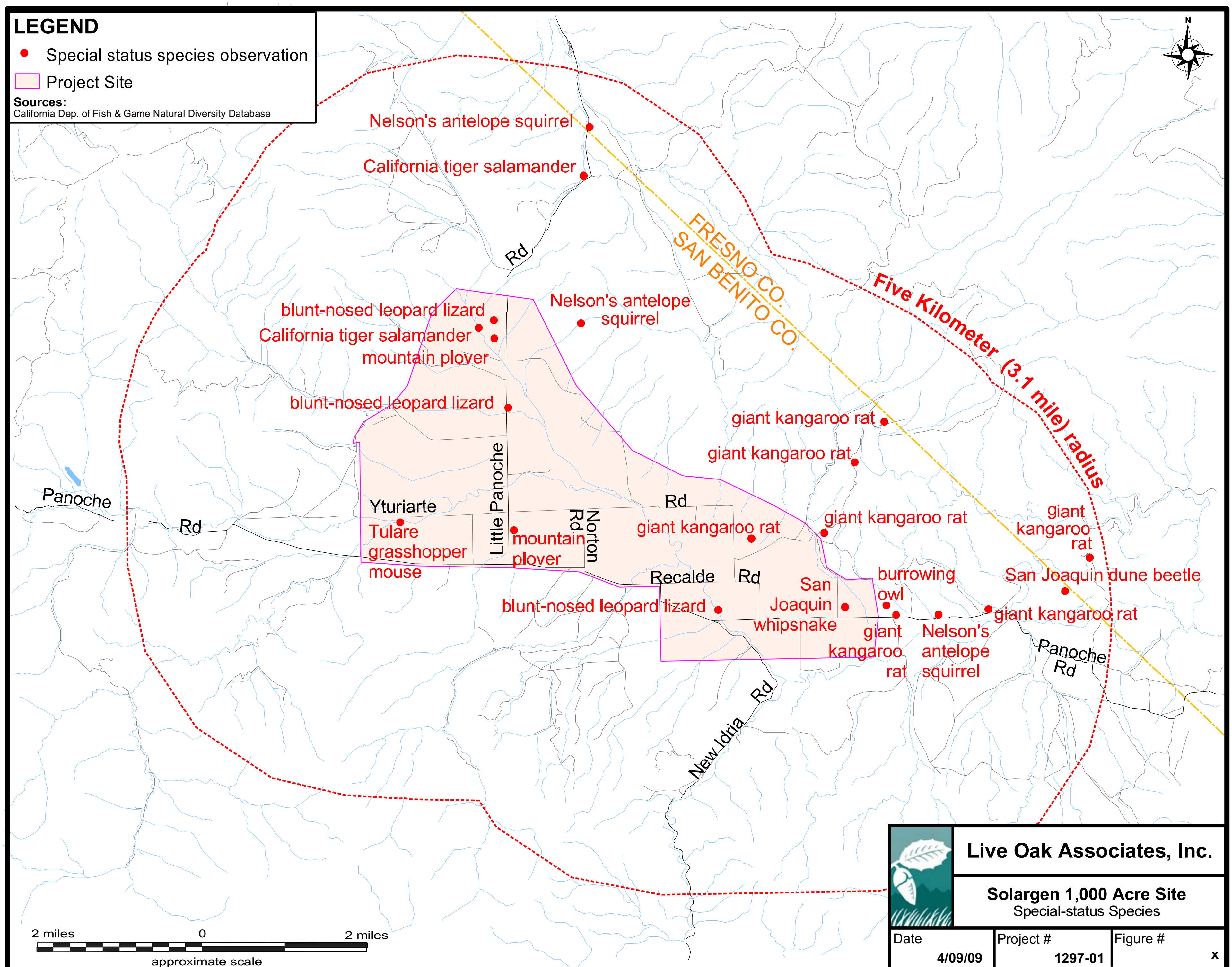
(*Medicago polymorpha*) were also common, especially along ranch roads. Species diversity increased in areas less disrupted by livestock or historic cultivation and included a variety of native wildflowers such as blow wives (*Achyrachaena mollis*), blue dicks (*Dichelostemma capitaum*), California gold fields (*Lasthenia californica*), tidy-tips (*Layia platyglossa*) and California creamcups (*Platystemon californicus*).

Rangelands of the site, like grasslands throughout the region, serve as productive biotic habitats supporting a large diversity of native terrestrial vertebrates. Open habitats of the region provide significant foraging habitat for a variety of resident and wintering raptors, as well as granivorous (seed-eating) birds. The cover of native and non-native grasses and forbs provide cover for large populations of small mammals that, in turn, attract a diversity of predatory species. A number of these species are expected to utilize grasslands occurring on the site throughout all or part of the year as breeding and/or foraging habitat and many species remain during their entire life cycle. Some of these species are given special status listing (Figures 1 and 2).

Amphibians would be limited onsite due to the dominance of upland habitat; however, amphibians likely use the stock ponds found in Range 10E, Section 4 and utilize the waters of the creeks and drainages when they are flowing. Due to the large amount of acreage and a limited amount of time to conduct reconnaissance surveys, these ponds and drainages were not surveyed in detail. Access to section 4 was not obtained at the time of the reconnaissance level survey therefore examination of the stock ponds was not possible. Amphibian species that could occur here include the California tiger salamander (*Ambystoma californiense*)(CTS) which was observed in the area in 1992, western toad (*Bufo boreas*), Pacific chorus frog (*Hyla regilla*) and bullfrog (*Rana catesbeiana*). The presence of bull frogs or predacious fish in these water bodies would limit the suitability for CTS breeding habitat.

The rangelands of the site offer suitable habitat for a number of locally occurring reptilian species. The Pacific gopher snake (*Pituophis catenifer catenifer*) and western rattlesnake (*Crotalus viridis*) were all observed during the April 2009 surveys. These same rangelands could potentially support the western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*), California horned lizard (*Phrynosoma coronatum frontale*), blunt-nosed leopard lizard (*Gambelia silus*) which has been documented in Range 10E, Sections 4, 9, and 25 between 1979 and 2004, southern alligator lizard (*Elgaria multicarinatus*), San Joaquin coachwhip (*Masticophis flagellum ruddocki*) observed in Range 11E, Section 29 in 1984, common king snake (*Lampropeltis getula*), and common garter snake (*Thamnophis sirtalis*).

Both resident and migratory birds, particularly raptors and granivorous birds, are expected to utilize the field as foraging habitat. Raptors observed on the site included red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), prairie falcon (*Falco mexicanus*) American kestrel (*Falco sparverius*), and turkey vulture (Cathartes aura) Other raptors that may forage onsite include the white-tailed kite (*Elanus leucurus*), Swainson's hawk (*Buteo swainsoni*), and golden eagle (*Aquila chrysaetos*). Additional bird species observed on the site or in the vicinity included the greater roadrunner (*Geococcyx californianus*), burrowing owl (*Athene cunicularia*), Anna's hummingbird (*Calypte anna*), loggerhead shrike (*Lanius ludovicianus*), yellow-billed magpie (*Pica nuttalli*), American crow (*Corvus brachyrhynchos*), common raven (*Corvus corax*) including a nest on a transformer tower on the 900-acre parcel, California horned lark



LEGEND
Special status species observation
Project Site
Sources:
California Dep. of Fish & Game Natural Diversity Database
N
Nelson's antelope squirrel
California tiger salamander
Rd
FRESNO CO.
SAN BENITO CO.
Five Kilometer (3.1 mile) radius
blunt-nosed leopard lizard
California tiger salamander
mountain plover
Nelson's antelope squirrel
blunt-nosed leopard lizard
giant kangaroo rat
giant kangaroo rat
Panoche
Rd
Yturiarte
Little Panoche
Rd
Norton Rd
Tulare grasshopper mouse
mountain plover
giant kangaroo rat
giant kangaroo rat
giant kangaroo rat
Recalde
Rd
blunt-nosed leopard lizard
San Joaquin whipsnake
burrowing owl
San Joaquin dune beetle
giant kangaroo rat
giant kangaroo rat
Nelson's antelope squirrel
Panoche Rd
New Idria Rd
2 miles
0
2 miles
approximate scale
Live Oak Associates, Inc.
Solargen 1,000 Acre Site
Special-status Species
Date
4/09/09
Project #
1297-01
Figure #
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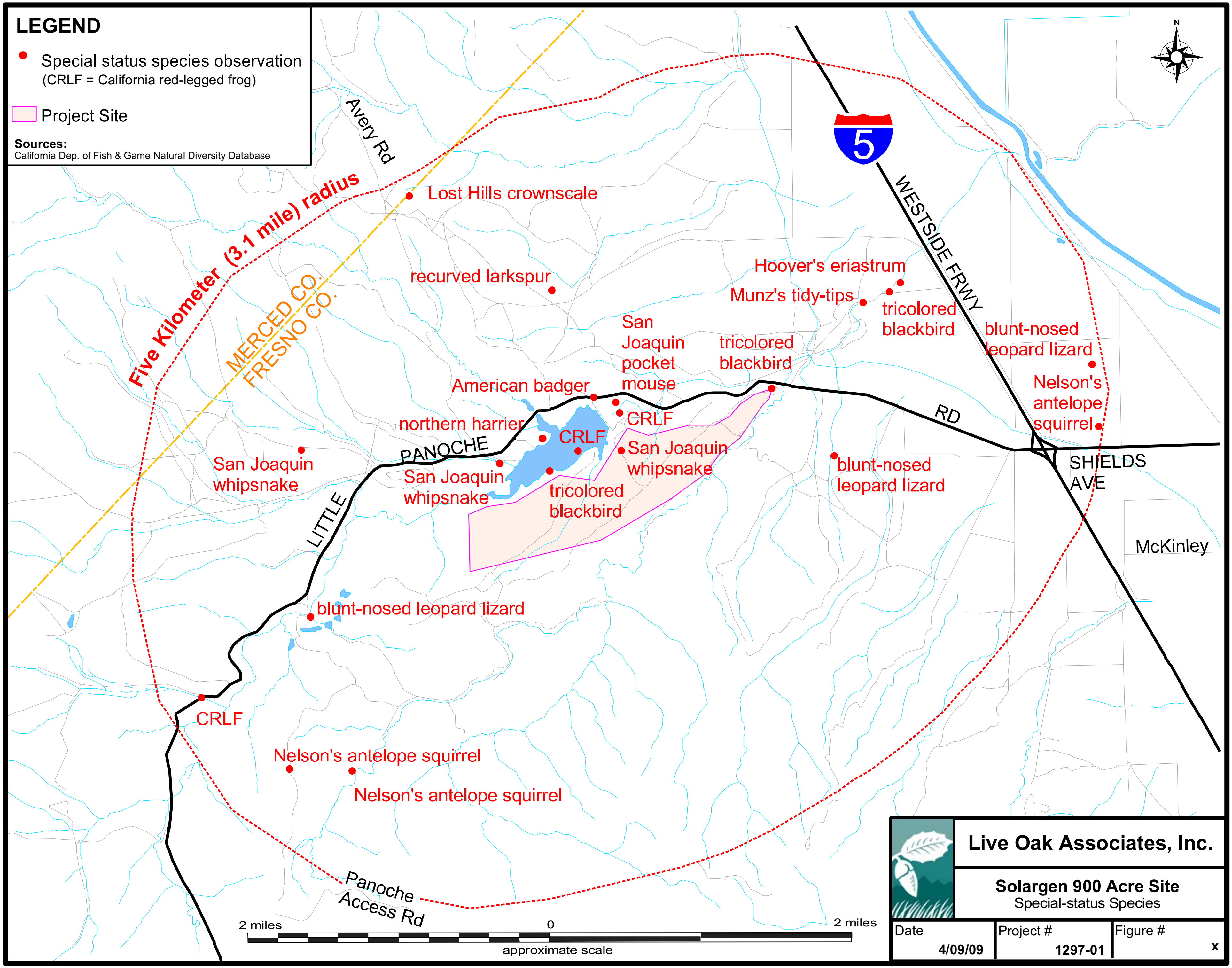

LEGEND
Special status species observation
(CRLF = California red-legged frog)
Project Site
Sources:
California Dep. of Fish & Game Natural Diversity Database
Five Kilometer (3.1 mile) radius
MERCED CO.
FRESNO CO.
Avery Rd
5
WESTSIDE FRWY
Lost Hills crownscale
recurved larkspur
Hoover's eriastrum
Munz's tidy-tips
tricolored blackbird
San Joaquin pocket mouse
tricolored blackbird
blunt-nosed leopard lizard
Nelson's antelope squirrel
American badger
CRLF
northern harrier
CRLF
PANOCHE
RD
San Joaquin whipsnake
San Joaquin whipsnake
San Joaquin whipsnake
tricolored blackbird
blunt-nosed leopard lizard
SHIELDS AVE
LITTLE
McKinley
blunt-nosed leopard lizard
CRLF
Nelson's antelope squirrel
Nelson's antelope squirrel
Panoche Access Rd
2 miles
0
2 miles
approximate scale
N
Live Oak Associates, Inc.
Solargen 900 Acre Site
Special-status Species
Date
4/09/09
Project #
1297-01
Figure #
x

(*Eremophila alpestris actia*), European starling (*Sturnus vulgaris*), red-winged blackbird (*Agelaius phoeniceus*), tricolored blackbird (*A. tricolor*) and western meadowlark (*Sturnella neglecta*). California condors (*Gymnogyps californianus*) would also be expected to forage over the site given its proximity to the Pinnacles National Monument. A variety of owls could occur regionally including the common barn owl (*Tyto alba*) and great gray owl (*Strix nebulosa*) Shorteared owl (*Asio flammeus*)

Small mammals likely to occur on the site include the Botta's pocket gopher (*Thomonys bottae*), and western harvest mouse (*Reithrodontomys megalotis*). The San Joaquin pocket mouse (*Perognathus inornatus*), grasshopper mouse (*Onychomys torridus*), Tulare grasshopper mouse (*O. t. tularensis*) observe within Range 10S Section 20 in 1938, and deer mouse (*Peromyscus maniculatus*) would be rare additions to the site, as the site lacks thick grass and herbaceous cover. A number of California ground squirrels (*Spermophilus beecheyi*) and their burrows were observed at various areas of the site. The region supports various kangaroo rat species, and a number of precincts were observed in Range 10S, Sections: 11, 13, 14, 15, and 24, and Range 11S, Sections 18, 19 and 30, indicating the potential presence of the giant kangaroo rat (*Dipdomys ingens*). The San Joaquin antelope squirrel (*Ammospermophilus nelsoni*) has been documented in the area, and this species was observed from the roadway approximately 3.5 miles east of the site in April 2009.

Small mammals often attract predators, including reptiles and birds previously discussed. The abundance of small mammals also attracts larger mammals known to occur in the region, including the San Joaquin kit fox (*Vulpes macrotis mutica*) multiple occurrences have been made in the region and the Panoche Valley is considered one of three core habitats for the species (Figures 3 and 4), cougar (*Puma concolor*) known to occur in the region, and bobcat (*Lynx rufus*) a jaw of which was found during the April 2009 site visit. Black-tailed deer (*Odocoileus hemionus columbianus*), also occur in the region and likely graze the areas of the site from time to time.

2.2 SPECIAL STATUS PLANTS AND ANIMALS

A number of special status plants and animals occur in the vicinity of the study area. The 10,000-acre project site is located within the SE corner of Cerro Colorado, SW corner of Mercey Hot Springs, NE corner of Llanda and northern portion of Panoche U.S.G.S. 7.5 minute quadrangles, and the 900-acre project site is located within the Laguna Seca U.S.G.S. 7.5 minute quadrangle. These quadrangles and surrounding quadrangles (Chounet, Tumey Hills, Rock Springs Peak, Hernandez Reservoir, Idria, Ortigalita Peak, Ortigalita Peak NW, Hammonds Ranch, Charleston School and Dos Palos) were used in the search for special status plants and animals in the vicinity of the study area.

There are two federally listed plant species that occur in the region, the San Benito evening primrose (*Camissonia benitensis*) only known from the Idria area and San Joaquin woolythreads (*Monolopia congdonni*). In addition, there are a number of CNPS listed plants that occur regionally, several of which occur in grasslands such as those found in the Panoche Valley.

A number of special status animal species occur in the region of the proposed Farm site. Table 1 below addresses a select group of the animal species that could or do occur onsite or in the nearby vicinity. The locations of nearby sightings of special status species have been shown in Figures 1 and 2; and figures 3 and 4 show observations of the San Joaquin kit fox within a 10-mile radius of the two study areas. Sources of information for this table included *California's Wildlife, Volumes I, II, and III* (Zeiner et al. 1988), *California Natural Diversity Data Base* (CDFG 2009), *Endangered and Threatened Wildlife and Plants* (USFWS 2009), *Annual Report on the Status of California State Listed Threatened and Endangered Animals and Plants* (CDFG 2009), and *The California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California* (CNPS 2001 and online inventory).

TABLE 1. SECLECT LIST OF SPECIAL STATUS ANIMAL SPECIES THAT OCCUR OR HAVE THE POTENTIAL TO OCCUR WITHIN THE VICINITY OF THE STUDY AREA

ANIMALS (adapted from CDFG 2009 and USFWS 2009)

Species Listed as Threatened or Endangered under the State and/or Federal Endangered Species Act

Species	Status	Habitat	Occurrence in the Study Area
California Tiger Salamander (*Ambystoma californiense*)	FT, SCE	Requires vernal pools for breeding and rodent burrows in annual grasslands for refuge.	**Possible.** Stock ponds were observed in Section 4, and CTS were observed in this area in 1992. It is possible the species remains present; however, the presence of bull frogs and/or predacious fish would reduce successful breeding for the species.
Blunt-Nosed Leopard Lizard (*Gambelia silus*)	FE, CE, CP	Frequents grasslands, alkali meadows and chenopod scrub of the San Joaquin Valley from Merced south to Kern Co.	**Likely.** BNLL have been documented by the CNDDB in Sections 4, 9, and 25 between 1979 and 2004. Potentially suitable habitat occurs onsite for BNLL.
San Joaquin Antelope Ground Squirrel (*Ammospermophilus nelsoni*)	CT	Occurs in the southwest portion of the valley on dry, sparsely vegetated loamy soils.	**Possible.** SJAS were recorded by the CNDDB in Section 3, and antelope squirrels were observed approximately 3.5 miles east of the subject properties during reconnaissance surveys conducted in April 2009.
Giant Kangaroo Rat (Di*pdomys ingens*)	FE, CE	Occurs in grasslands and shrub communities on gentle slopes (less than 11%). Primarily feeds on seeds, and occasionally on green plants and insects.	**Present.** GKR create burrow systems known as “precincts” with well worn paths between burrows. They also have a propensity to store their seeds outside their burrows. Evidence of this behavior and scats of appropriate size for GKR were observed in Sections 11, 13, 14, 15, 18, 19, 24 and 30 during recon surveys in April 2006. The CNDDB lists occurrences for this species in Sections 19 and 29 in 1992 and 2004, respectively. Therefore, GKR are presumed present onsite.
San Joaquin Kit Fox (*Vulpes macrotis mutica*)	FE, CT	Frequents desert alkali scrub and annual grasslands and may forage in adjacent agricultural habitats. Utilizes enlarged (4 to 10 inches in diameter) ground squirrel burrows as denning habitat.	**Present.** Panoche Valley is known to be one of 3 core habitat areas for SJKF. Burrows of suitable size for SJKF denning and scats of appropriate size for SJKF were observed in Sections 11, 13, 14, 15, 18, 19, 24 and 30 during recon surveys in April 2006. The CNDDB lists occurrences of the species in Sections 20, 22, 23, 25, 29 and 30 between 1975 and 2006. Conversations with local residents indicate frequent sightings. Therefore, SJKF are presumed present onsite.

State Sepcies of Special Concern

Species	Status	Habitat	Occurrence in the Study Area
Burrowing Owl (*Athene cunicularia*)	CSC	Frequents open, dry annual or perennial grasslands, deserts, and scrublands characterized by low growing vegetation. This species is dependent upon burrowing mammals, most notably the California ground squirrel, for nest burrows.	**Likely.** Burrowing owls were observed along Little Panoche Road between Mercey Hot Springs and the 10,000-acre site during April 2009 recon surveys. Furthermore, BUOW were observed in 2004 in Range 11S Section 29.

Explanation of Occurrence Designations and Status Codes

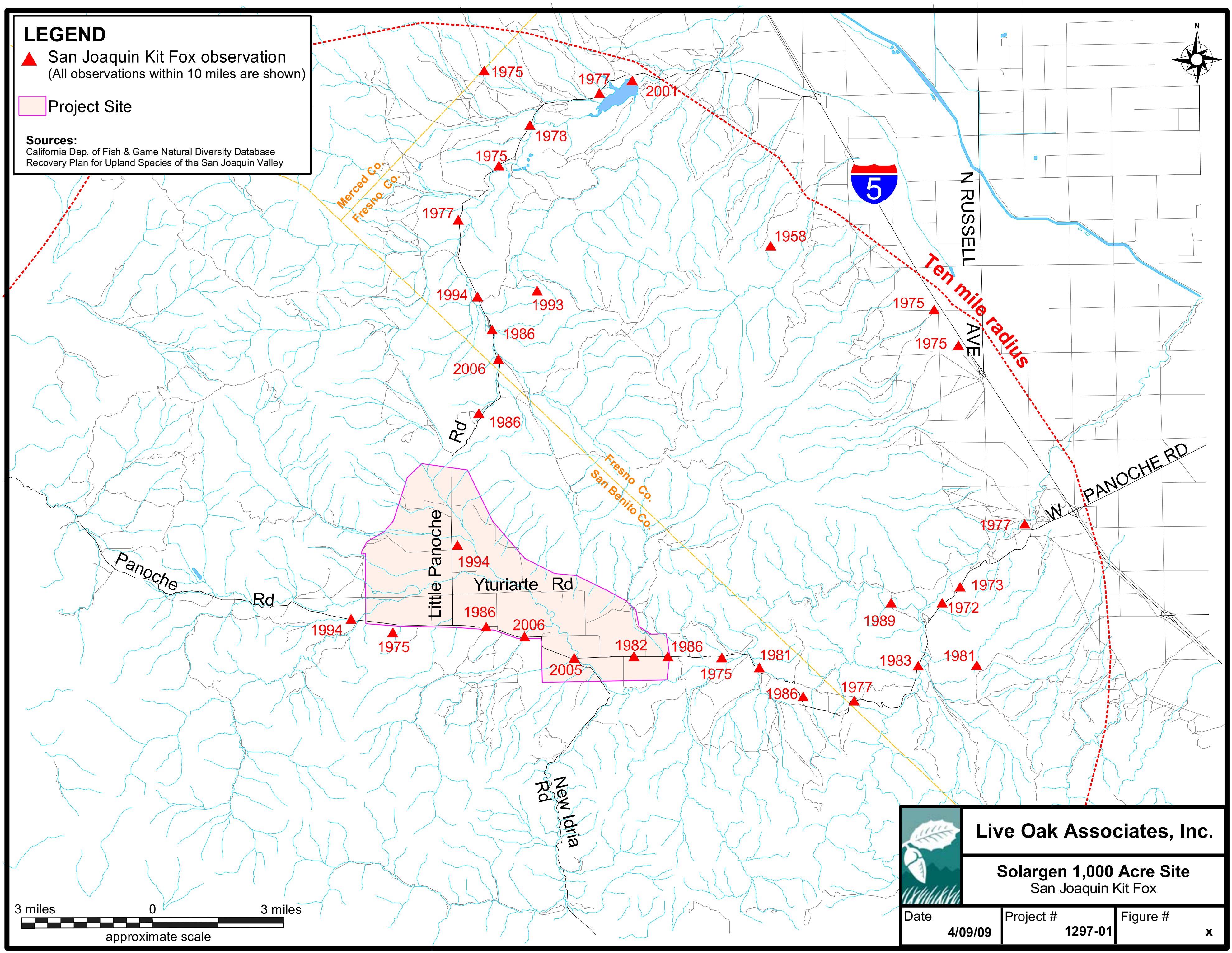
Present: Species observed on the sites at time of field surveys or during recent past.
Likely: Species known to occur in the vicinity and would likely occur onsite due to presence of like habitat.
Possible: Species not observed on the sites, but it could occur there from time to time.
Unlikely: Species not observed on the sites, and would not be expected to occur there except, perhaps, as a transient
Absent: Species not observed on the sites, and precluded from occurring there because habitat requirements not met.

STATUS CODES

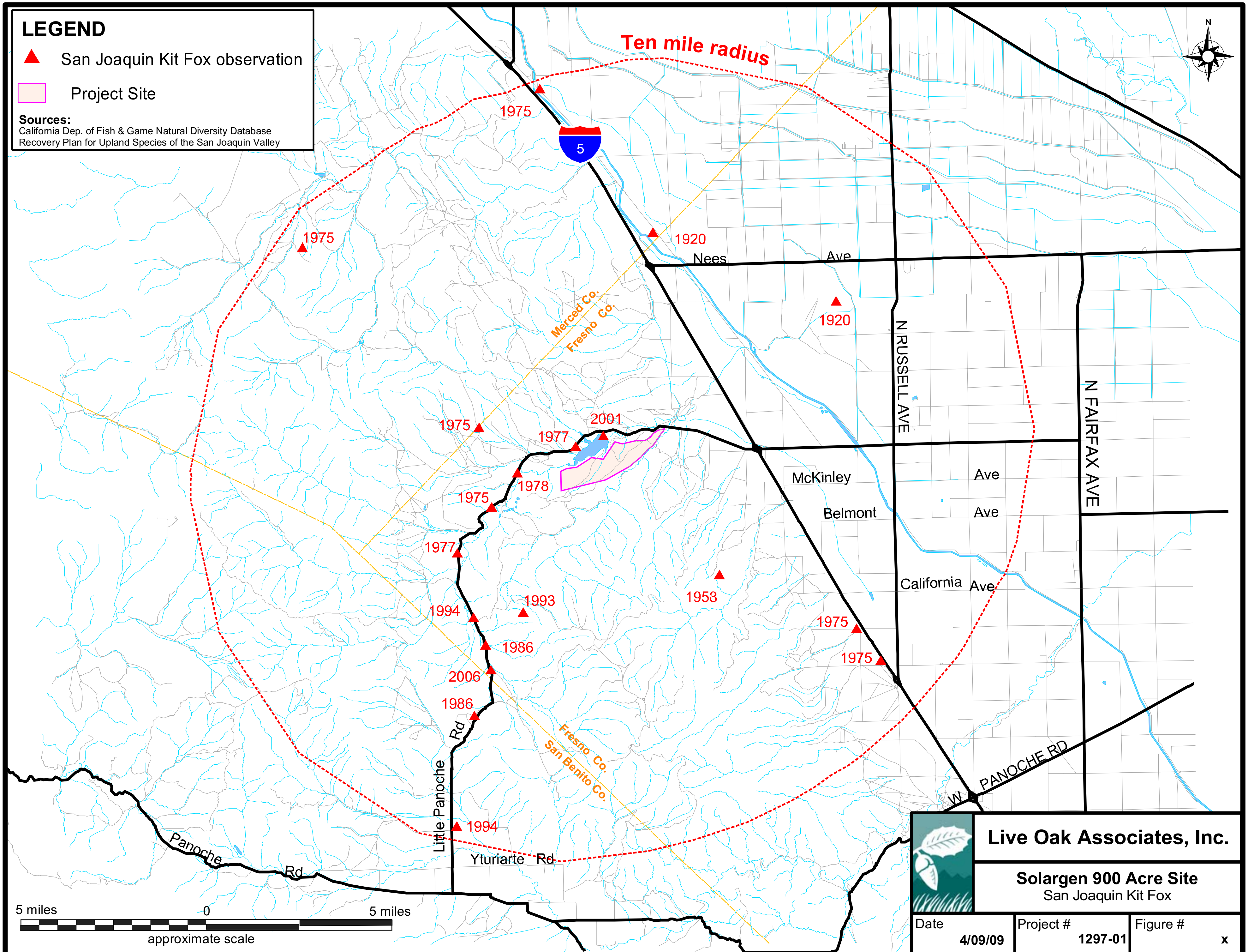
FE	Federally Endangered	CE	California Endangered
FT	Federally Threatened	CT	California Threatened
FPE	Federally Endangered (Proposed)	CR	California Rare
FC	Federal Candidate	CP	California Protected
		CSC	California Species of Special Concern
		SCE	California Candidate (Endangered)

CNPS California Native Plant Society Listings:

1A	Plants Presumed Extinct in California	3	Plants about which we need more information – a review list
1B	Plants Rare, Threatened, or Endangered in California and elsewhere	4	Plants of limited distribution – a watch list
2	Plants Rare, Threatened, or Endangered in California, but more common elsewhere		



LEGEND
San Joaquin Kit Fox observation
(All observations within 10 miles are shown)
Project Site
Sources:
California Dep. of Fish & Game Natural Diversity Database
Recovery Plan for Upland Species of the San Joaquin Valley
Merced Co.
Fresno Co.
Fresno Co.
San Benito Co.
Ten mile radius
5
N RUSSELL AVE
W PANOCHE RD
Panoche Rd
Little Panoche Rd
Yturiarte Rd
New Idria Rd
1975
1977
2001
1978
1975
1977
1958
1994
1993
1986
2006
1975
1975
1986
1994
1977
1973
1972
1989
1986
2006
1994
1975
1982
1986
1981
1983
1981
2005
1975
1986
1977
3 miles
0
3 miles
approximate scale
N
Live Oak Associates, Inc.
Solargen 1,000 Acre Site
San Joaquin Kit Fox
Date
4/09/09
Project #
1297-01
Figure #
x



LEGEND
San Joaquin Kit Fox observation
Project Site
Sources:
California Dep. of Fish & Game Natural Diversity Database
Recovery Plan for Upland Species of the San Joaquin Valley
Ten mile radius
5
1975
1920
Nees
Ave
1975
1920
Merced Co.
Fresno Co.
N RUSSELL AVE
N FAIRFAX AVE
1975
2001
1977
1978
1975
McKinley
Ave
Belmont
Ave
1977
California
Ave
1958
1993
1994
1975
1986
1975
2006
1986
Fresno Co.
San Benito Co.
Rd
Little Panoche
W. PANOCHE RD
1994
Panoche
Rd
Yturiarte
Rd
5 miles
0
5 miles
approximate scale
Live Oak Associates, Inc.
Solargen 900 Acre Site
San Joaquin Kit Fox
Date
4/09/09
Project #
1297-01
Figure #
x

LIVE OAK ASSOCIATES, INC.
an Ecological Consulting Firm

November 24, 2009

Eric Cherniss
Vice President of Project Development
Solargen Energy, Inc.
20400 Stevens Creek Blvd., Suite 700
Cupertino, CA 95014

Subject: Late summer/early fall rare plant surveys for the Panoche Valley Solar Farm project in San Benito County, California (PN 1297-04)

Dear Eric:

At your request, Live Oak Associates, Inc. (LOA), completed focused surveys for special status plants (i.e., plants designated as endangered, threatened, or rare) on 6,200 acres of the approximately 10,000-acre Panoche Valley Solar Farm site located along Panoche Road and Little Panoche Road in San Benito County. Specifically, this survey was conducted to determine whether or not late-season-blooming rare plant species are present on the site.

Site Location and Existing Conditions

The project site occurs on the floor of Panoche Valley between the Gabilan Range to the west and the Panoche Hills to the east. The survey area is generally bounded to the west, north, and east by open space and rangelands and to the south by Yturiarte Road (Figure 1). Surrounding lands consist of rangelands used for cattle grazing.

The survey area consists of all or portions of the following: sections 3, 4, 5, 7, 8, 9, 10, 11, 13, 14, 15, 16, and 17 of township 15 south, range 10 east; and sections 18 and 19 of township 15 south, range 11 east (Figure 2). Panoche Creek, Las Aguilas Creek, and several other unnamed drainages run through the site. Soils on the site range from slightly acid to moderately alkaline. Topographically, the site is relatively flat, ranging in elevation from approximately 1300 ft. National Geodetic Vertical Datum (NGVD) along Yturiarte Road to approximately 1400 ft. NGVD along the east and west edges of the valley floor.

Target Special Status Species

The late summer/early fall rare plant surveys focused on six target species that are known to occur in the region and have habitat requirements that the site may potentially support (Table 1). These species also have late-season flowering periods (i.e., late summer to early fall), making them easiest to identify at this time of year. None of the six target species are listed on the federal or state endangered species lists.

Table 1. Target species for the late-season rare plant surveys.

Species	CNPS Listing*	Family	Description
Crownscale (*Atriplex coronata* var. *coronata*)	CNPS 4	Chenopodiaceae	Life form: Annual herb. Habitat: Chenopod scrub, valley and foothill grasslands, and vernal pools. Occurs on alkaline soils. Blooms: March–October.
Lost Hills crownscale (*Atriplex vallicola*)	CNPS 1B	Chenopodiaceae	Life form: Annual herb. Habitat: Chenopod scrub, valley and foothill grasslands, and vernal pools. Often occurs on powdery, alkaline soils that are vernally moist. Blooms: April–August.
Big tarplant (*Blepharizonia plumosa*)	CNPS 1B	Asteraceae	Life form: Annual herb. Habitat: Valley and foothill grasslands, often in dry areas. Blooms: July–October.
Hispid bird's-beak (*Cordylanthus mollis* ssp. *hispidus*)	CNPS 1B	Scrophulariaceae	Life form: Annual herb. Habitat: Meadows and seeps, playas, and valley and foothill grasslands. Often occurs on damp, alkaline soils. Blooms: June–September.
Idria buckwheat (*Eriogonum vestitum*)	CNPS 4	Polygonaceae	Life form: Annual herb. Habitat: Valley and foothill grasslands. Blooms: April–August.
San Joaquin bluecurls (*Trichostema ovatum*)	CNPS 4	Lamiaceae	Life form: Annual herb. Habitat: Chenopod scrub and valley and foothill grasslands. Blooms: July–October.

***California Native Plant Society (CNPS) list designations**
1B: Plants Rare, Threatened, or Endangered in California and elsewhere
4: Plants of limited distribution – a watch list

Survey Methods

Prior to conducting the surveys, LOA searched the California Natural Diversity Database (CDFG 2009) and the *Inventory of Rare and Endangered Plants* (CNPS 2009) to identify the nearest known populations of the target species to the project site and to review photographs and habitat requirements of the species.

Focused special status plant species surveys were conducted by LOA botanist Neal Kramer and LOA ecologists Davinna Ohlson, Melissa Denena, Nathan Hale, Jeff Gurule, Dave Hartesveldt, Pamela Peterson, and Molly Goble. Sections 10 and 15 were surveyed for rare plants concurrent with the blunt-nosed leopard lizard surveys; these surveys were conducted August 17-19 and

August 24-26, 2009. Surveys over the remaining sections were conducted on September 14-18, September 21-25, and September 30–October 2, 2009.

In summary, the survey team walked the entire site in evenly-spaced transects, ensuring 100% visual coverage, during the species' blooming period when they would be evident and most identifiable. Emphasis was placed on areas more likely to support suitable habitat for the target species. All vascular plant species observed were recorded in a field notebook and, to the maximum extent practicable, identified to the lowest taxonomic order (Appendices A and B). This survey methodology is consistent with survey protocols outlined in the *CNPS Botanical Survey Guidelines* and the California Department of Fish and Game Resource Agency's *Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened and Endangered Plants and Natural Communities* (Appendix C).

Results

None of the target late-blooming special status species were found on any sections of the site during the August, September, and October 2009 surveys (Appendix B). Based on our findings, we conclude that these species are absent from the project site. Ground disturbance activities (e.g., grading, trenching, or drilling) occurring on the site within the next three to five years would not adversely impact these species, as they are not expected to recruit on the site within this timeframe.

Should ground disturbance activities begin more than three to five years past the date of these surveys, then the site should be resurveyed to evaluate any changes in site conditions and determine if the target species remain absent from the site.

If you have any questions regarding our findings, please contact Michele Korpos at mkorpos@loainc.com or (408) 281-5881 at your earliest convenience.

Sincerely,

Davinna Ohlson

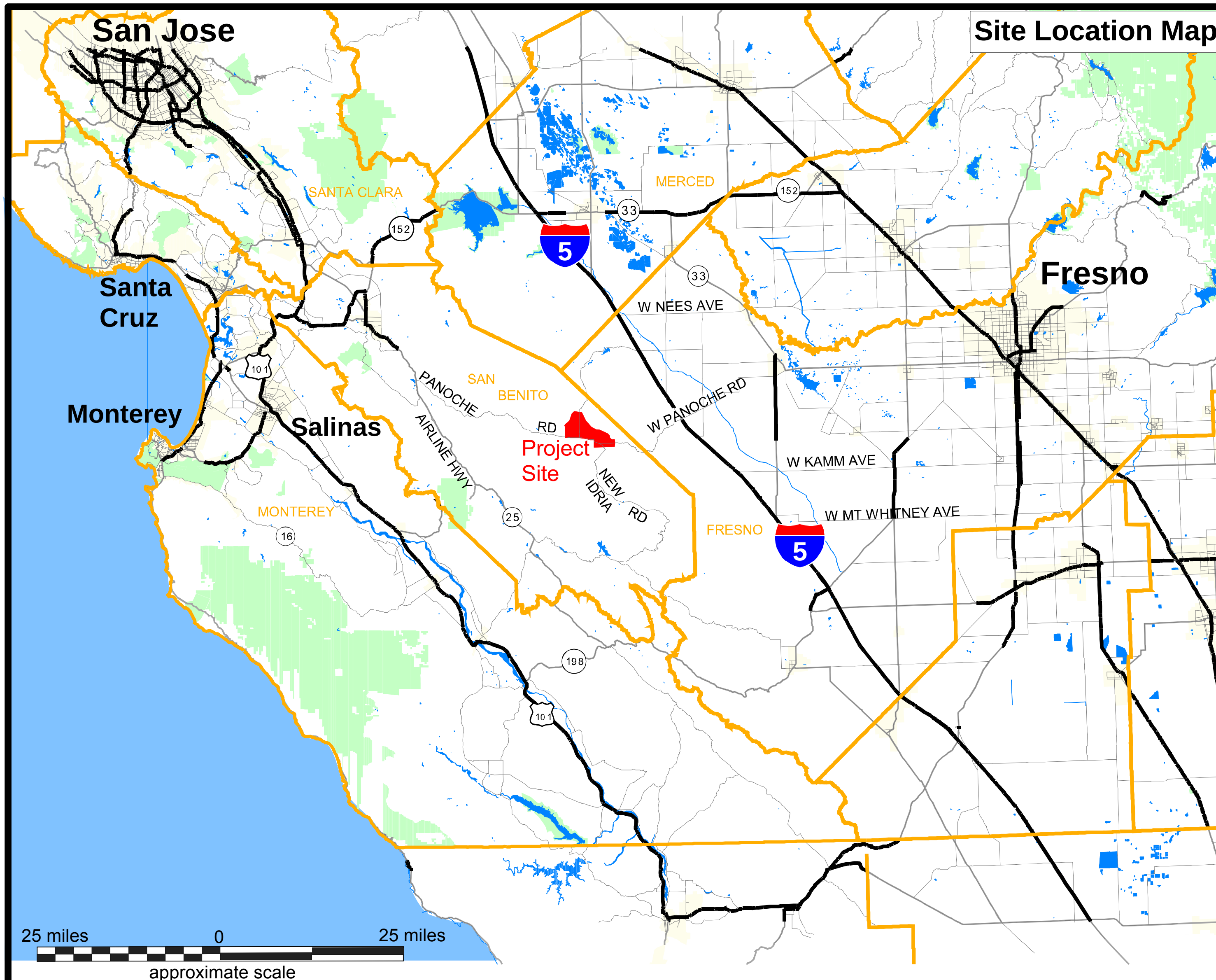
Davinna Ohlson, M.S.
Senior Project Manager
Plant/Wildlife Ecologist

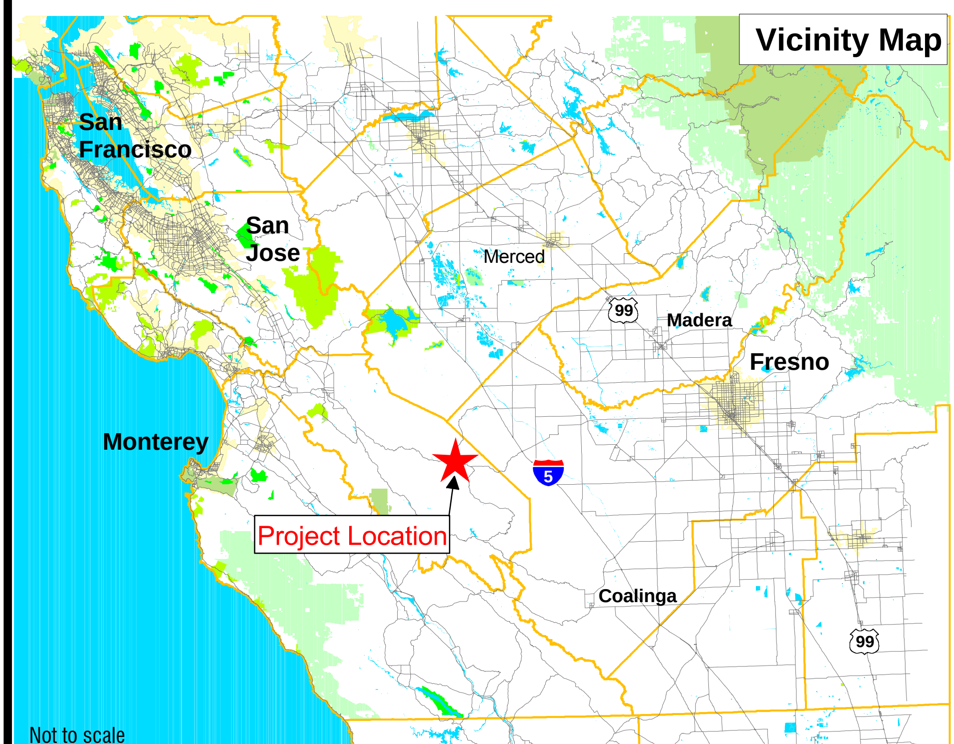
Enclosures

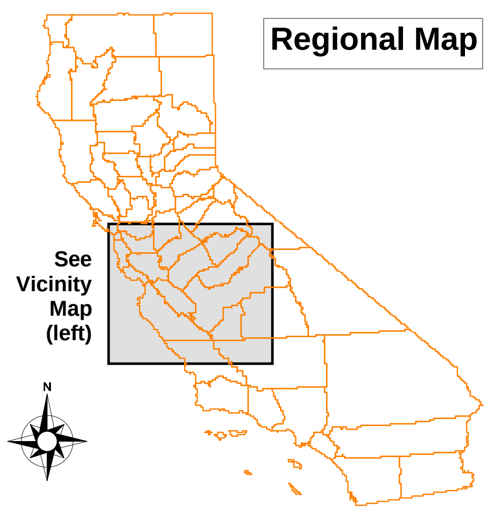
References

California Department of Fish and Game. 2009. California fish and game code. Gould Publications. Binghamton, NY.

California Native Plant Society. 2009. Inventory of Rare and Endangered Vascular Plants of California (7th Edition). Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. California Native Plant Society. Sacramento, CA.



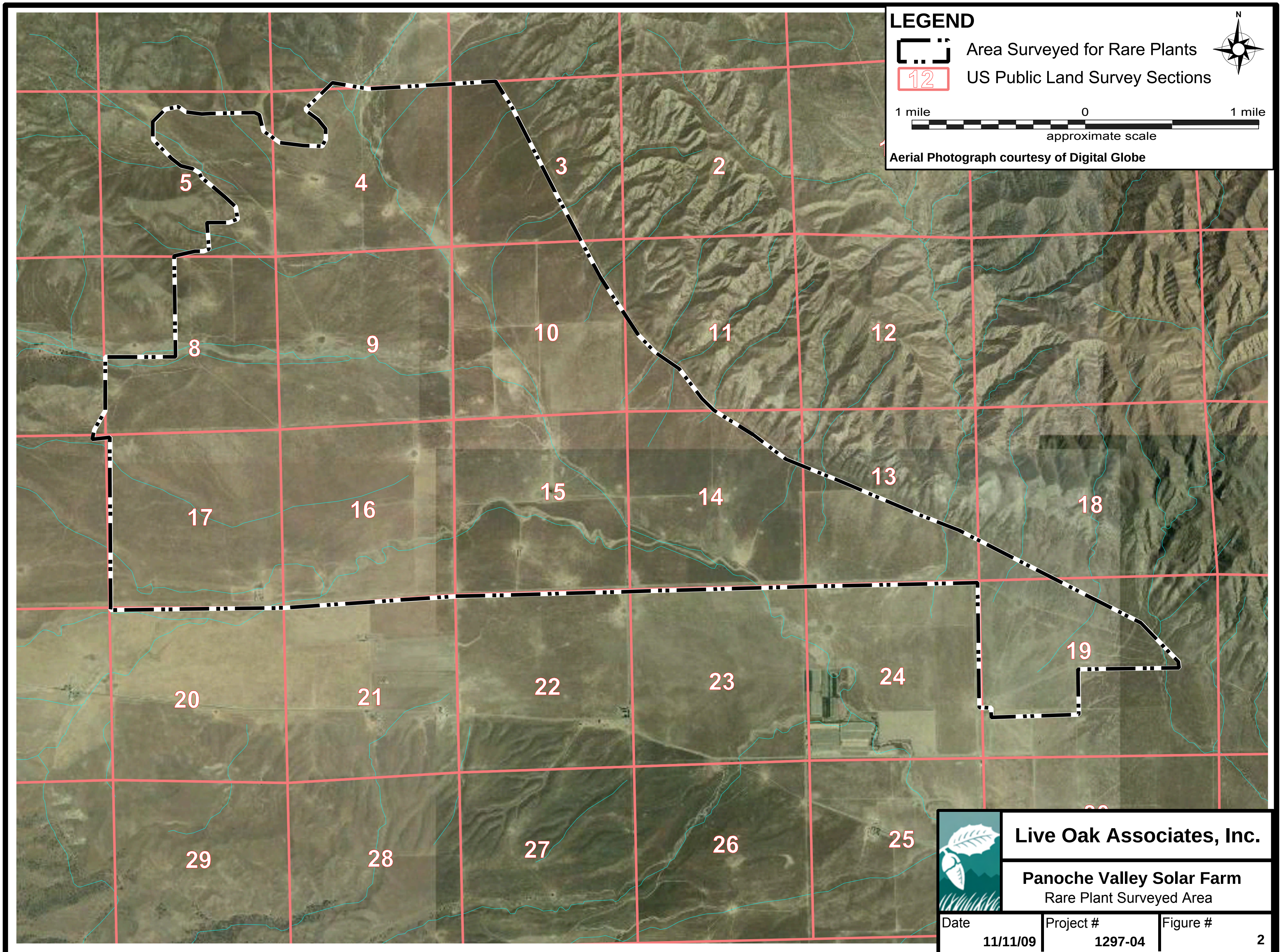




Live Oak Associates, Inc.

Panoche Valley Solar Farm
Vicinity Map

Date	Project #	Figure #
11/11/09	1297-04	1


LEGEND
Area Surveyed for Rare Plants
12
US Public Land Survey Sections
N
1 mile
0
1 mile
approximate scale
Aerial Photograph courtesy of Digital Globe
5
4
3
2
8
9
10
11
12
17
16
15
14
13
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20
21
22
23
24
29
28
27
26
25
Live Oak Associates, Inc.
Panoche Valley Solar Farm
Rare Plant Surveyed Area
Date
11/11/09
Project #
1297-04
Figure #
2

APPENDIX A: VASCULAR PLANTS OF THE STUDY AREA

The plants species listed below were observed on the Panoche Valley solar farm site during the field survey conducted by Live Oak Associates from August through October 2009. The U.S. Fish and Wildlife Service wetland indicator status of each plant has been shown following its common name.

OBL - Obligate
FACW - Facultative Wetland
FAC - Facultative
FACU - Facultative Upland
UPL - Upland
+/- - Higher/lower end of category
NI - No investigation

Scientific Name	Common Name	Wetland Status
AMARANTHACEAE - Amaranth Family		
*Amaranthus albus**	tumbleweed, white amaranth	FACU
Atriplex fruiticulosa	ball saltbush	
Atriplex polycarpa	cattle/allscale/desert saltbush	UPL
*Salsola tragus**	Russian thistle, tumbleweed	FACU
ANACARDIACEAE - Sumac or Cashew Family		
*Schinus molle**	California/Peruvian pepper tree	UPL
APIACEAE - Carrot Family		
Lomatium sp.	common lomatium	UPL
Sanicula crassicaulis	Pacific sanicle, gamble weed	UPL
APOCYNACEAE - Dogbane Family		
Asclepias fasicularis	narrow-leaf milkweed	FAC
ARALIACEAE - Ginseng Family		
*Hedera helix**	english ivy	UPL
ASTERACEAE - Sunflower Family		
Achyrachaena mollis	blow wives	UPL
Ambrosia acanthicarpa	annual bursage	
Blepharizonia laxa	big tarweed	UPL
*Centaurea melitensis**	tocalote	UPL
Conyza canadensis	horseweed	FAC
Hemizonia kelloggii	Kellogg's tarweed	UPL
Heterotheca oregona var. rudis	inland Oregon golden aster	UPL
Holocarpha obconica	San Joaquin Tarweed	UPL
Holocarpha virgata var. virgata	virgate/pitgland tarweed	UPL
*Hypochaeris glabra**	smooth cat's ear	UPL
Isocoma menziesii var. vernonioides	coastal isocoma, coast goldenbush	FACW
*Lactuca serriola**	prickly lettuce	FAC
Lagophylla ramosissima	common hareleaf	UPL
Lasthenia californica	coast/California/common goldfields	UPL
Layia platyglossa	tidy-tips	UPL
Lessingia nemaclada	slenderstem/thread-stem lessingia	UPL
*Matricaria matricarioides**	pineapple weed	FACU

Scientific Name	Common Name	Wetland Status
Monolopia major	cupped monolopia	UPL
Psilocarphus brevissimus var. brevissimus	dwarf woolly-heads	OBL
Rafinesquia californica	California chicory	UPL
Senecio flaccidus var. douglasii	Douglas' groundsel/shrubby butterweed	UPL
*Senecio vulgaris**	common groundsel	NI*
BORAGINACEAE - Borage Family		
Amsinckia menziesii var. intermedia	common fiddleneck	UPL
Amsinckia menziesii var. menziesii	Menzies' /small-flowered fiddleneck	UPL
Amsinckia tessellata	devil's lettuce, checker fiddleneck	
Heliotropium curassavicum	seaside/salt heliotrope	OBL
Plagiobothrys acanthocarpus	adobe popcornflower	OBL
Plagiobothrys stipitatus var. ?	slender popcorn flower	OBL
BRASSICACEAE - Mustard Family		
*Capsella bursa-pastoris**	shepherd's purse	FAC-
*Cardaria draba**	heart-podded hoary cress	UPL
*Descurainia sophia**	flixweed, tansymustard	UPL
*Hirschfeldia incana**	summer mustard	UPL
Lepidium dictyotum var. dictyotum	alkali peppergrass	OBL
Lepidium nitidum var. nitidum	shining peppergrass	UPL
*Sisymbrium irio**	London rocket	UPL
*Sisymbrium orientale**	oriental mustard	UPL
Thysanocarpus curvipes	lacepod/fringe pod, ribbed fringepod	UPL
CHARACEAE - Green Algae		
Chara sp.	green algae	OBL
CONVOLVULACEAE - Morning-Glory or Bindweed Family		
*Convolvulus arvensis**	bindweed, orchard morningglory	UPL
CUCURBITACEAE - Gourod Family		
Marah fabaceus	California man-root	UPL
EPHEDRACEAE - Ephedra Family		
Ephedra californica	California ephedra, Mormon tea	UPL
EUPHORBIACEAE - Spurge Family		
Chamaesyce ocellata ssp. ocellata	Contura Creek sandmat, valley spurge	UPL
Eremocarpus setigerus	turkey mullein, dove weed	UPL
FABACEAE - Legume Family		
Astragalus gambelianus	Gambell's dwarf milkvetch	UPL
Astragalus oxyphysus	Mt. Diablo milkvetch, Diablo locoweed	UPL
Lotus wrangelianus	California lotus	UPL
Lupinus bicolor	miniature lupine, Lindley's annual lupine	UPL
Lupinus microcarpus	gully/chick lupine	UPL
Lupinus succulentus	arroyo lupine	UPL
*Medicago polymorpha**	burclover	UPL
*Melilotus indicus**	sour clover, Indian melilot	FAC
*Robinia pseudoacacia**	black locust	FAC
FAGACEAE - Oak Family		
Quercus agrifolia	coast live oak	UPL
FRANKENIACEAE - Frankenia Family		
Frankenia salina	alkali heath	FACW+
GERANIACEAE - Geranium Family		

Scientific Name	Common Name	Wetland Status
*Erodium botrys**	broad-leaved filaree	UPL
*Erodium cicutarium**	red-stemmed filaree	UPL
*Erodium moschatum**	white-stemmed filaree	UPL
JUGLANDACEAE - Walnut Family		
*Juglans hindsii**	Northern California blacck walnut	
LAMIACEAE - Mint Family		
*Marrubium vulgare**	horehound	FAC
*Marrubium vulgare**	horehound	FAC
Trichostema lanceolatum	vinegarweed	UPL
LOASACEAE - Loasa Family		
Mentzelia sp.	blazingstar	UPL
MALVACEAE - Mallow Family		
*Malva parviflora**	cheeseweed	UPL
Malvella leprosa	alkali mallow	FAC*
MORACEAE - Mulberry Family		
*Maclura pomifera**	osage orange	UPL
*Morus alba**	white/silkworm mulberry	NI
MYRTACEAE - Myrtle Family		
*Eucalyptus sp.**		UPL
NYCTAGINACEAE - Four O'Clock Family		
Mirabilis californica	wishbone bush	UPL
OLEACEAE - Olive Family		
*Olea europaea**	olive	UPL
ONAGRACEAE - Evening primrose Family		
Clarkia sp.		UPL
PAPAVERACEAE - Poppy Family		
Platystemon californicus	California cream cups	UPL
PINACEAE - Pine Family		
*Pinus sp.**	pine	
PLANTAGINACEAE - Plantain Family		
Plantago erecta	California plantain	UPL
POACEAE - Grass Family		
*Avena sp.**	wild oat	UPL
*Bromus diandrus**	ripgut brome	UPL
*Bromus hordeaceus**	soft chess	FACW-
*Bromus madritensis**	foxtail chess, red brome	UPL
*Cynodon dactylon**	bermuda grass	FAC
Distichlis spicata	saltgrass	FACW*
*Hordeum marinum ssp. gussoneanum**	Mediterranean barley	FAC
*Hordeum murinum ssp. leporinum**	barnyard/farmer's foxtail, foxtail barley	NI
Leymus triticoides	beardless/ alkali ryegrass	FAC+
Vulpia microstachys	annual fescue	UPL
*Vulpia myuros var. myuros**	rat-tail fescue	FACU*
POLYGONACEAE - Buckwheat Family		
Eriogonum angulosum	anglestem buckwheat	UPL
Eriogonum fasciculatum	California buckwheat	UPL
Eriogonum gracile var. gracile	slender woolly buckwheat	UPL
Eriogonum gracillimum	rose & white buckwheat	UPL

Scientific Name	Common Name	Wetland Status
Pterostegia drymarioides	pterostigia	UPL
*Rumex crispus**	curly dock	FACW-
PRIMULACEAE - Primrose Family		
Dodecatheon sp.	shooting star	UPL
PUNICACEAE - Pomegranate Family		
*Punica granatum**	pomegranate	NI
ROSACEAE - Rose Family		
*Malus sp.**	apple	
*Prunus dulcis**	almomd	UPL
*Rosa sp.**	rose	
RUTACEAE - Rue Family		
*Citrus sinensis**	orange	
SALICACEAE - Willow Family		
Populus fremontii ssp. fremontii	Fremont cottonwood	FACW
Salix laevigata	red willow	~NI
SOLANACEAE - Nightshade Family		
Datura stramonium?*	jimson weed	UPL
Datura wrightii	tolguacha, toluaca, sacred thorn-apple	UPL
*Nicotiana glauca**	tree tobacco	FAC
Solanum americanum	common/small flowered nightshade	FAC
Solanum umbelliferum	blue witch	UPL
TAMARICACEAE - Tamarisk Family		
*Tamarix aphylla**	athel	FACW-
THEMIDACEAE -		
Dichelostemma capitatum ssp. capitatum	blue dicks	UPL
VERBENACEAE - Vervain Family		
Verbena lasiostachys var.?	western verbena	FAC-
ZYGOPHYLLACEAE - Caltrop Family		
*Tribulus terrestris**	puncture vine	UPL

APPENDIX B: PLANTS OBSERVED ON THE SITE BY SECTION

The table below details the plant species observed on the Panoche Valley solar farm site by section during the rare plant surveys conducted by LOA from August through October 2009.

Scientific Name	Section														
	3	4	5	7	8	9	10	11	13	14	15	16	17	18E	19E
Achyrachaena mollis													X		
*Amaranthus albus**							X								X
Ambrosia acanthicarpa										X					X
Amsinckia menziesii				X					X	X			X		X
Amsinckia menziesii var. intermedia								X				X			
Amsinckia menziesii var. menziesii		X													
Amsinckia tessellata	X			X											
Asclepias fasicularis						X	X			X	X	X			
Astragalus sp.										X		X			
Astragalus gambelianus															
Astragalus oxyphysus															
Atriplex fruiticulosa		X													
Atriplex polycarpa									X						X
*Avena sp.**			X	X	X			X	X	X		X			
Blepharizonia laxa															X
*Bromus diandrus**	X			X				X				X	X		
*Bromus hordeaceus**	X	X	X	X	X	X	X	X	X	X		X	X	X	
*Bromus madritensis**	X	X	X	X	X	X	X	X	X	X		X	X		X
*Capsella bursa-pastoris**		X													
*Cardaria draba**															
*Centaurea melitensis**	X				X					X					
Chamaesyce ocellata ssp. ocellata	X	X	X		X	X	X	X	X	X	X	X	X	X	X
Chara sp.											X		X		
*Citrus sinensis**													X		
Clarkia sp.					X										
*Convolvulus arvensis**		X				X	X	X		X	X	X	X		
Conyza canadensis													X		

Scientific Name	Section														
	3	4	5	7	8	9	10	11	13	14	15	16	17	18E	19E
*Cynodon dactylon**					X	X	X				X		X		
Datura stramonium?*															
Datura wrightii							X			X	X	X	X		
*Descurainia sophia**															
Dichelostemma capitatum ssp. capitatum															
Distichlis spicata									X	X		X			
Dodecatheon sp.					X								X		
Ephedra californica															
Eremocarpus setigerus	X		X		X	X	X		X	X	X	X		X	X
Eriogonum angulosum	X								X						X
Eriogonum fasciculatum															
Eriogonum gracile var. gracile						X									
Eriogonum gracillimum										X		X			
Erodium sp.			X		X								X		
*Erodium botrys**								X				X			
*Erodium cicutarium**									X				X		
*Erodium moschatum**									X						
*Eucalyptus sp.**		X					X				X	X			
Frankenia salina									X						
*Hedera helix**													X		
Heliotropium curassavicum										X	X	X	X		
Hemizonia kelloggii															
Heterotheca oregona var. rudis					X					X	X	X			
*Hirschfeldia incana**										X			X		
Holocarpha obconica															X
Holocarpha virgata var. virgata		X	X	X	X					X		X	X		
*Hordeum marinum ssp. gussoneanum**		X		X											
*Hordeum murinum ssp. leporinum**	X	X	X	X	X			X	X	X	X	X	X	X	X
*Hypochaeris glabra**												X			
Isocoma menziesii var. vernonioides									X	X	X				
*Juglans hindsii.**											X		X		
*Lactuca serriola**						X				X			X		
Lagophylla ramosissima					X	X				X		X			

Scientific Name	Section														
	3	4	5	7	8	9	10	11	13	14	15	16	17	18E	19E
Lasthenia californica										X					
Layia platyglossa															
Lepidium dictyotum var. dictyotum		X				X									
Lepidium nitidum var. nitidum	X	X		X	X	X	X	X	X	X		X		X	X
Lessingia nemaclada					X										
Leymus triticoides										X					
Lomatium sp.															
Lotus sp.															X
Lotus wrangelianus															
Lupinus sp.				X											
Lupinus bicolor					X	X							X		
Lupinus microcarpus					X					X					
Lupinus succulentus										X					
*Maclura pomifera**													X		
*Malus sp.**													X		
*Malva sp.**									X				X		
*Malva parviflora**															
Malvella leprosa											X				
Marah fabaceus															
*Marrubium vulgare**										X			X		
*Marrubium vulgare**															
*Matricaria matricarioides**													X		
*Medicago polymorpha**		X													
*Melilotus indicus**										X					
Mentzelia sp.															
Mirabilis californica															
Monolopia major															
*Morus alba**												X	X		
*Nicotiana glauca**												X	X		
*Olea europaea**										X					
*Pinus sp.**										X					
Plagiobothrys acanthocarpus		X													
Plagiobothrys stipitatus var. ?		X				X					X				

Scientific Name	Section														
	3	4	5	7	8	9	10	11	13	14	15	16	17	18E	19E
Plantago erecta		X			X				X	X			X		X
Platystemon californicus															
Populus fremontii ssp. fremontii															
*Prunus dulcis**										X					
Psilocarphus brevissimus var. brevissimus		X				X									
Pterostegia drymarioides															
*Punica granatum**										X					
Quercus agrifolia													X		
Rafinesquia californica															
*Robinia pseudoacacia**										X					
*Rosa sp.**													X		
*Rumex crispus**															
Salix laevigata											X				
*Salsola tragus**	X								X	X				X	X
Sanicula crassicaulis					X										
*Schinus molle**										X			X		
Senecio flaccidus var. douglasii					X	X						X			
*Senecio vulgaris**															
*Sisymbrium sp**								X							
*Sisymbrium irio**		X								X		X			
*Sisymbrium orientale**										X					
Solanum americanum									X						
Solanum umbelliferum			X			X									
*Tamarix aphylla**										X	X				
Thysanocarpus curvipes															
*Tribulus terrestris**							X								
Trichostema lanceolatum	X	X	X		X	X	X								
Verbena lasiostachys var.													X		
Vulpia microstachys	X	X	X	X	X	X						X	X	X	X
*Vulpia myuros var. myuros**	x	x		X	X		X	X		X		X			

APPENDIX B

CALIFORNIA NATIVE PLANT SOCIETY BOTANICAL SURVEY GUIDELINES
&
GUIDELINES FOR ASSESSING THE EFFECTS OF PROPOSED PROJECT ON RARE, THREATENED AND ENDANGERED PLANTS AND NATURAL COMMUNITIES BY THE RESOURCE AGENCY OF THE CALIFORNIA DEPARTMENT OF FISH AND GAME

CNPS Botanical Survey Guidelines

(from CNPS *Inventory*, 6th Edition, 2001)

The following recommendations are intended to help those who prepare and review environmental documents determine when a botanical survey is needed, who should be considered qualified to conduct such surveys, how surveys should be conducted, and what information should be contained in the survey report. The California Native Plant Society recommends that lead agencies not accept the results of surveys unless they are conducted and reported according to these guidelines.

1. Botanical surveys are conducted in order to determine the environmental effects of proposed projects on all botanical resources, including special status plants (rare, threatened, and endangered plants) and plant (vegetation) communities. Special status plants are not limited to those that have been listed by state and federal agencies but include any plants that, based on all available data, can be shown to be rare, threatened, or endangered under the following definitions:

A species, subspecies, or variety of plant is "endangered" when the prospects of its survival and reproduction are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, or disease. A plant is "threatened" when it is likely to become endangered in the foreseeable future in the absence of protection measures. A plant is "rare" when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens.[1]

Rare plant (vegetation) communities are those communities that are of highly limited distribution. These communities may or may not contain special status plants. The most current version of the California Natural Diversity Database's *List of California Terrestrial Natural Communities*[2] should be used as a guide to the names and status of communities.

Consistent with the California Native Plant Society's goal of preserving plant biodiversity on a regional and local scale, and with California Environmental Quality Act environmental impact assessment criteria[3], surveys should also assess impacts to locally significant plants. Both plants and plant communities can be considered significant if their local occurrence is on the outer limits of known distribution, a range extension, a rediscovery, or rare or uncommon in a local context (such as within a county or region). Lead agencies should address impacts to these locally unique botanical resources regardless of their status elsewhere in the state.

2. Botanical surveys must be conducted to determine if, or to the extent that, special status or locally significant plants and plant communities will be affected by a proposed project when any natural vegetation occurs on the site and the project has the potential for direct or indirect effects on vegetation.

3. Those conducting botanical surveys must possess the following qualifications:

a. Experience conducting floristic field surveys;
b. Knowledge of plant taxonomy and plant community ecology and classification;
c. Familiarity with the plants of the area, including special status and locally significant plants;
d. Familiarity with the appropriate state and federal statutes related to plants and plant collecting; and,
e. Experience with analyzing impacts of a project on native plants and communities.

4. Botanical surveys should be conducted in a manner that will locate any special status or locally significant plants or plant communities that may be present. Specifically, botanical surveys should be:

a. Conducted in the field at the proper times of year when special status and locally significant plants are both evident and identifiable. When special status plants are known to occur in the type(s) of habitat present in the project area, nearby accessible occurrences of the plants (reference sites) should be observed to determine that the plants are identifiable at the time of survey.
b. Floristic in nature. A floristic survey requires that every plant observed be identified to species, subspecies, or variety as applicable. In order to properly characterize the site, a complete list of plants observed on the site shall be included in every botanical survey report. In addition, a sufficient number of visits spaced

throughout the growing season is necessary to prepare an accurate inventory of all plants that exist on the site. The number of visits and the timing between visits must be determined by geographic location, the plant communities present, and the weather patterns of the year(s) in which the surveys are conducted.

c. Conducted in a manner that is consistent with conservation ethics and accepted plant collection and documentation techniques[4,5]. Collections (voucher specimens) of special status and locally significant plants should be made, unless such actions would jeopardize the continued existence of the population. A single sheet should be collected and deposited at a recognized public herbarium for future reference. All collections shall be made in accordance with applicable state and federal permit requirements. Photography may be used to document plant identification only when the population cannot withstand collection of voucher specimens.

d. Conducted using systematic field techniques in all habitats of the site to ensure a thorough coverage of potential impact areas. All habitats within the project site must be surveyed thoroughly in order to properly inventory and document the plants present. The level of effort required per given area and habitat is dependent upon the vegetation and its overall diversity and structural complexity.

e. Well documented. When a special status plant (or rare plant community) is located, a California Native Species (or Community) Field Survey Form or equivalent written form, accompanied by a copy of the appropriate portion of a 7.5-minute topographic map with the occurrence mapped, shall be completed, included within the survey report, and separately submitted to the California Natural Diversity Database. Population boundaries should be mapped as accurately as possible. The number of individuals in each population should be counted or estimated, as appropriate.

5. Complete reports of botanical surveys shall be included with all environmental assessment documents, including Negative Declarations and Mitigated Negative Declarations, Timber Harvesting Plans, Environmental Impact Reports, and Environmental Impact Statements. Survey reports shall contain the following information:

a. Project location and description, including:
    1. A detailed map of the location and footprint of the proposed project.
    2. A detailed description of the proposed project, including one-time activities and ongoing activities that may affect botanical resources.
    3. A description of the general biological setting of the project area.

b. Methods, including:
    1. Survey methods for each of the habitats present, and rationale for the methods used.
    2. Description of reference site(s) visited and phenological development of the target special status plants, with an assessment of any conditions differing from the project site that may affect their identification.
    3. Dates of surveys and rationale for timing and intervals; names of personnel conducting the surveys; and total hours spent in the field for each surveyor on each date.
    4. Location of deposited voucher specimens and herbaria visited.

c. Results, including:
    1. A description and map of the vegetation communities on the project site. The current standard for vegetation classification, *A Manual of California Vegetation*[6], should be used as a basis for the habitat descriptions and the vegetation map. If another vegetation classification system is used, the report must reference the system and provide the reason for its use.
    2. A description of the phenology of each of the plant communities at the time of each survey date.
    3. A list of all plants observed on the project site using accepted scientific nomenclature, along with any special status designation. The reference(s) used for scientific nomenclature shall be cited.
    4. Written description and detailed map(s) showing the location of each special status or locally significant plant found, the size of each population, and method used to estimate or census the population.
    5. Copies of all California Native Species Field Survey Forms or Natural Community Field Survey Forms and accompanying maps.

d. Discussion, including:
    1. Any factors that may have affected the results of the surveys (e.g., drought, human disturbance, recent fire).
    2. Discussion of any special local or range-wide significance of any plant population or community on the site.
    3. An assessment of potential impacts. This shall include a map showing the distribution of special status and locally significant plants and communities on the site in relation to the proposed activities. Direct, indirect, and cumulative impacts to the plants and communities shall be discussed.
    4. Recommended measures to avoid and/or minimize direct, indirect, and cumulative impacts.

e. References cited and persons contacted.
f. Qualifications of field personnel including any special experience with the habitats and special status plants present on the site.

3.3.2 References Cited

[1] California Environmental Quality Act Guidelines, §15065 and §15380.

[2] List of California Terrestrial Natural Communities. California Department of Fish and Game Natural Diversity Database. Sacramento, CA.

[3] California Environmental Quality Act Guidelines, Appendix G (Initial Study Environmental Checklist).

[4] Collecting Guidelines and Documentation Techniques. California Native Plant Society Policy (adopted March 4, 1995).

[5] Ferren, W.R., Jr., D.L. Magney, and T.A. Sholars. 1995. The Future of California Floristics and Systematics: Collecting Guidelines and Documentation Techniques. *Madroño* 42(2):197-210.

[6] Sawyer, J.O. and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. California Native Plant Society. Sacramento, CA. 471 pp.

GUIDELINES FOR CONDUCTING RESEARCH ON RARE, THREATENED AND ENDANGERED PLANTS AND PLANT COMMUNITIES

August 1997

The Department of Fish and Game recognizes the importance of research in promoting the conservation, appreciation, and understanding of California's rare, threatened, and endangered plants and plant communities. Under Section 1907(a) and Section 2081(a) of the Fish and Game Code, the Department may authorize, through permits and Memoranda of Understanding, the take and possession of State-listed species for scientific, educational, and management purposes. The Department's Species Conservation and Recovery Program (SCARP) handles this permitting process for State-listed plant species. The Research Permit is typically the vehicle by which SCARP will authorize research on these species. To apply for a permit, use the **Proposal Format for Research Projects involving State-Listed Plants**, below.

The following information is intended to guide you in planning research on State-listed plant species.

1. The Department generally will not authorize collection of more than 5% of the seed or vegetative growth produced by any population of a listed species during any given year. In your proposal, please justify the amount you would like to collect.

2. Moving plants, seeds, or pollen from one location or population of the plant to another is generally discouraged, unless it is part of an overall recovery program, because of the possibility of genetic contamination of local natural populations. Proposals involving such movement must include justification of why this design is necessary and must address the possibility or likelihood of contamination. Methods to prevent any possible genetic contamination should be discussed.

3. If your research will include any reintroduction activities, the following criteria must be met: (a) sites chosen for reintroduction must have permanent protection in the event the reintroduction succeeds, and (b) the Investigator(s) must agree to monitor for a period that is long enough to assess the success of the reintroduction (we generally recommend seven years). Before planning a reintroduction, you should consider and include in your proposal the following factors: habitat suitability, probability of success, potential genetic contamination, and long-term protection and management needs (including funding sources).

4. Research should be conducted in a manner that is consistent with conservation ethics. Collections of voucher specimens of rare or suspected rare species should be made only when such actions will not jeopardize the continued existence of the population and in accordance with applicable State and Federal permit regulations, and generally are not needed from sites which have already been vouchered. Voucher specimens should be deposited at recognized public herbaria for future reference. Photography should be used to document plant identification and habitat whenever possible, but especially when the population cannot withstand collection of voucher specimens. The Investigators should take all precautions to minimize damage to rare species, the associated soil, and vegetation during field work.

5. Principal Investigators should possess the following qualifications:

    a. Experience as a botanical field investigator with plant identification skills and experience in experimental design, field methods, plant ecology, and at least a rudimentary knowledge of population genetics;

    b. Familiarity with the flora and fauna of the area, including rare species; and

    c. Familiarity with the appropriate State and Federal statutes related to rare plants and plant collecting.

6. Any unused seed collected from a State-listed species should be deposited at Rancho Santa Ana Botanic Garden or another facility which has the expertise and equipment necessary for seed storage, under direct arrangement with that facility and with Department approval. Research permits are issued only for scientific research projects. If your project is related to a mitigation effort, contact the Department regarding a 2081(b) incidental take permit.

LIVE OAK ASSOCIATES, INC.

an Ecological Consulting Firm

PROTOCOL-LEVEL DRY SEASON BRANCHIOPOD SURVEY RESULTS
90-DAY REPORT
PANOCHE VALLEY SOLAR FARM
SAN BENITO COUNTY, CALIFORNIA
(Tracking Number 81440-2010-CPA-0023)

Prepared by:

LIVE OAK ASSOCIATES, INC.

Rick Hopkins, PhD, Principal/Senior Conservation Biologist
Michele Korpos, Senior Project Manager/Wildlife Ecologist
Jeff Gurule, B.A., Senior Project Manager/Staff Ecologist
Geoffrey Cline, M.S., Staff Ecologist

Prepared for:

SOLARGEN ENERGY
Solargen Energy, Inc.
Eric Cherniss
VP Project Development
20400 Stevens Creek Boulevard, Suite 700
Cupertino, CA 95014

January 14, 2010 PN 1297-06b

TABLE OF CONTENTS

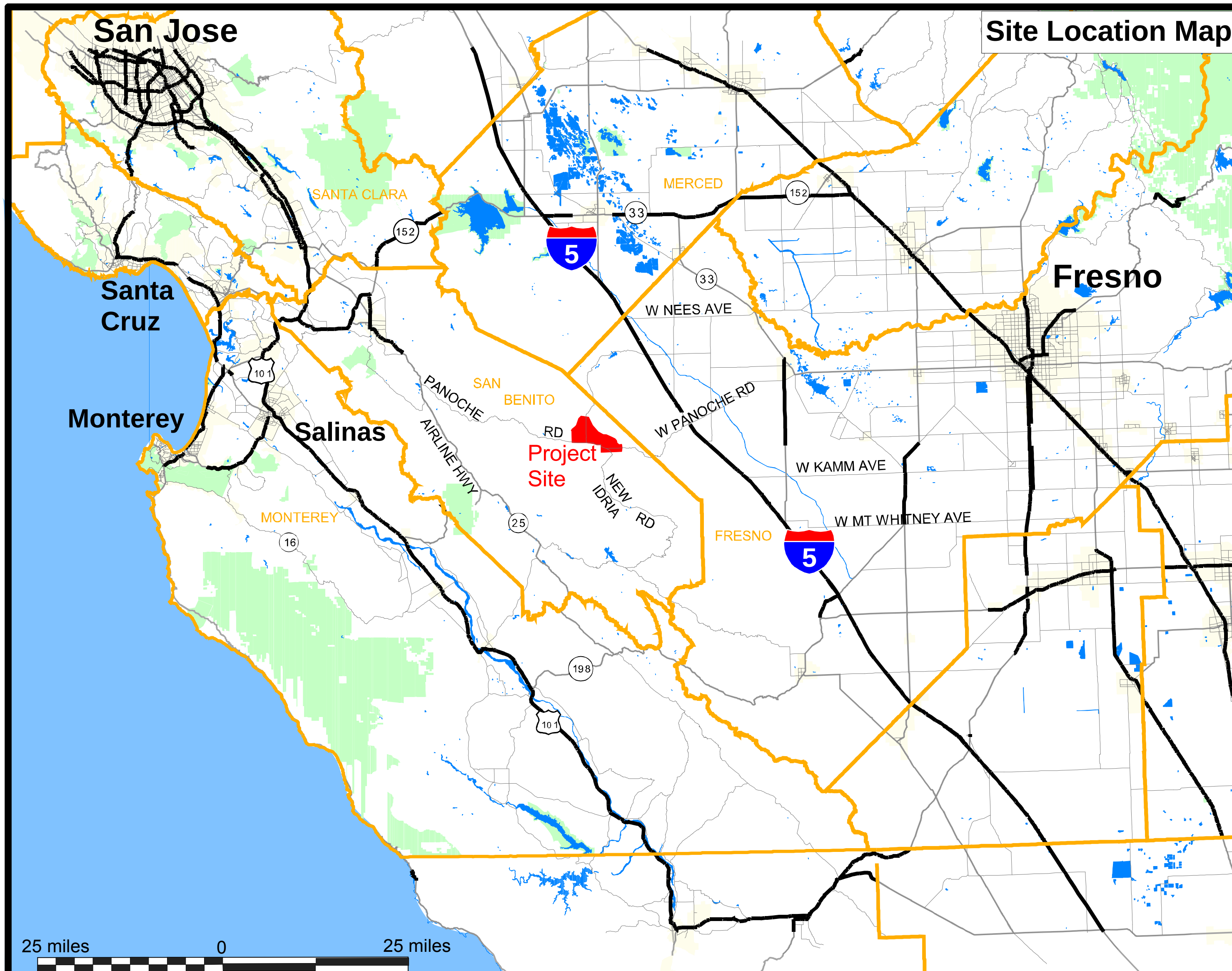
1.0 INTRODUCTION AND SITE DESCRIPTION 1
2.0 METHODS 5
2.1 Soil Collection 5
2.2 Soil Analysis 5
2.3 USFWS Reporting and Voucher Specimen 5
3.0 RESULTS 7
3.1 Dry Season Sampling 7
3.2 USFWS Reporting and Voucher Specimen 7
3.3 Conclusion 19
APPENDIX A: DRY SEASON AUTHORIZATION LETTER 20
APPENDIX B: DRY SEASON SOIL ANALYSIS REPORT 23
APPENDIX C: POOL COORDINATES 28
APPENDIX D: PHOTOS 30
APPENDIX D: SEPTEMBER 2010 DRY SEASON SURVEY DATA 34

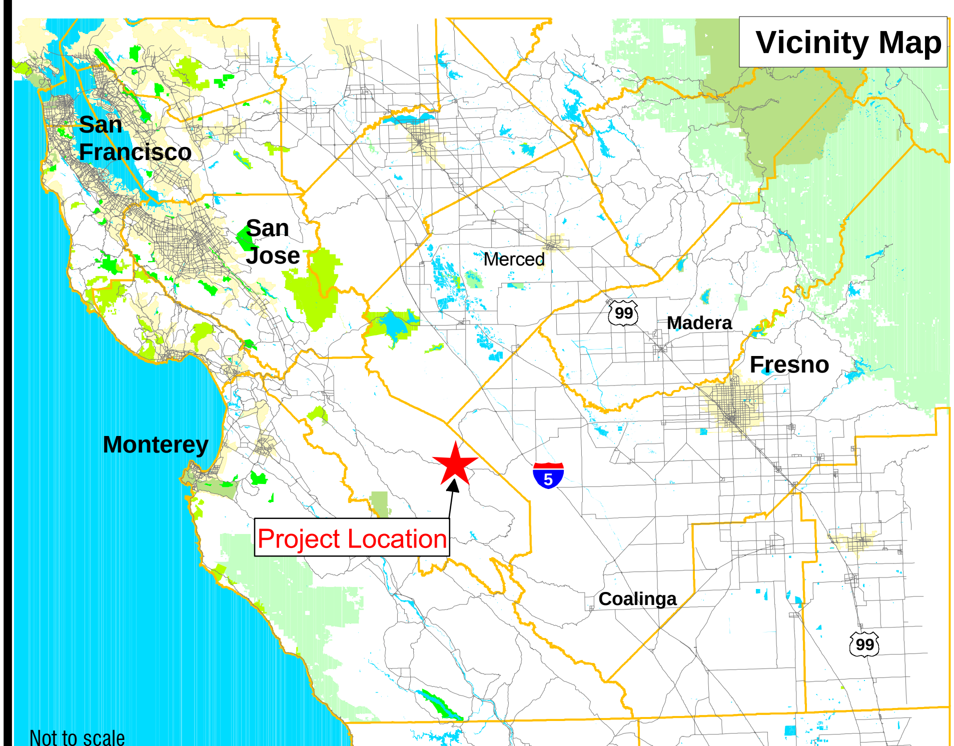
1.0 INTRODUCTION AND SITE DESCRIPTION

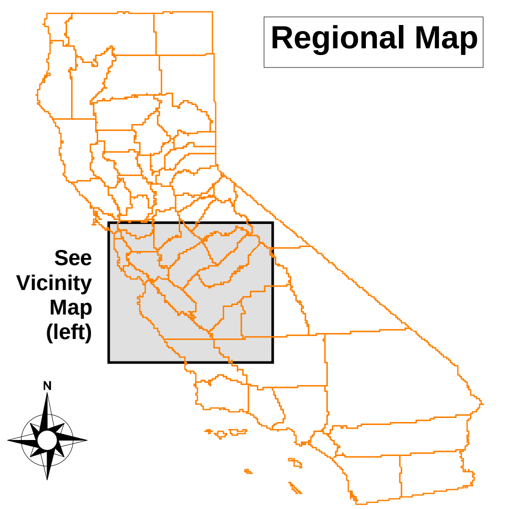
Protocol-level wet-season and dry season branchiopod surveys were conducted by Live Oak Associates, Inc. (LOA) on the Panoche Valley Solar Farm (PVSF) project site in San Benito County, California. Surveys consisted of protocol level wet season sampling in 2009/2010, the results of which were reported to the U.S. Fish and Wildlife Service (USFWS) Ventura office in a report titled *Protocol-Level Dry Season Branchiopod Survey Results 90-Day Report, Panoche Valley Solar Farm, San Benito County, California* (LOA 2010) and protocol level dry season sampling in 2010. The following report serves as the 90-day Report of the dry season surveys.

The site or study area consists of approximately 4,885-acres, located in Panoche Valley approximately 15 miles west of Interstate 5 and six miles south of Mercey Hot Springs near the intersection of Panoche Road and Little Panoche Road (Figure 1). The site can be found on the Cerro Colorado, Mercey Hot Springs, Llanada, and Panoche, California U.S.G.S quadrangles, in Sections 3-4, 8-11, and 13-16, Township 15 South, Range 10 East and Section 19, Township 15 South, Range 11 East (Figure 2). All the parcels within the study area are used for cattle grazing. The site is surrounded by rangeland and bordered to the west by the Gabilan Range and to the east by the Panoche Hills. A number of drainages and creeks are present in the area including the Panoche and Las Aguilas Creeks. The portion of the Valley associated with the proposed project ranges in elevation from approximately 1200 feet National Geodetic Vertical Datum (NGVD) to approximately 1490 feet NGVD.

Thirteen soil types from nine soil series were identified on the project site. The Riverwash soil type is the only soil considered hydric. This soil type is considered hydric due to frequent flooding for long durations or very long durations during the growing season. Riverwash consists of mixed water-washed sand and gravel, occurs along streams or rivers and is often flooded during storm events. Within the study area, Riverwash soils are associated with Panoche Creek and portions of Las Aguilas Creek. The Panoche Creek channel was not considered potential habitat for fairy shrimp or tadpole shrimp due to high flows that periodically scour the creek channel. Ponded areas that were sampled consisted primarily of two types; 1) Hard-packed depressions associated with ranch roads and cattle troughs which were extremely ruderal in nature and were repeatedly disturbed by vehicle traffic and/or cattle, and 2) Natural and artificial





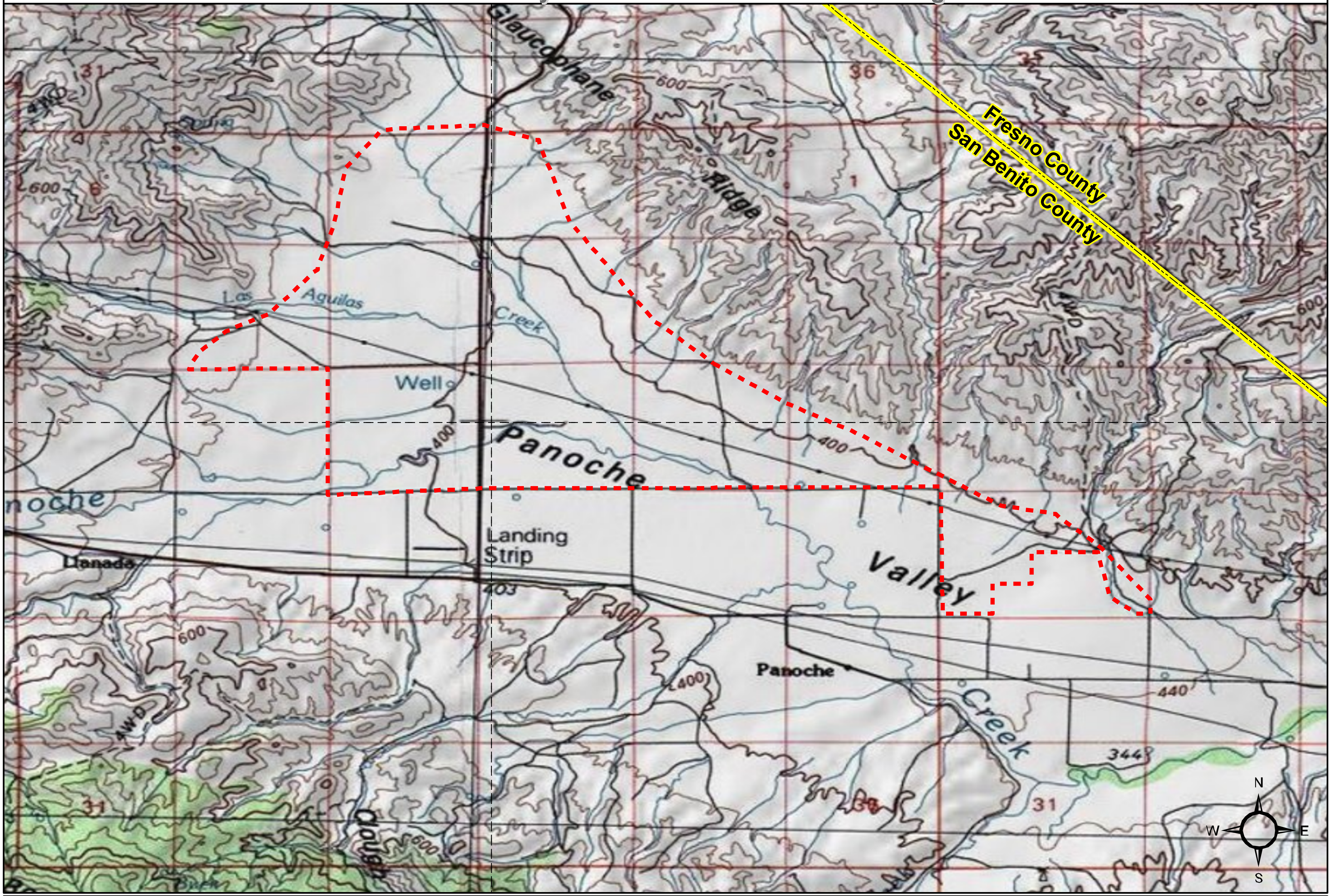


Live Oak Associates, Inc.

Panoche Valley Solar Farm
Vicinity Map

Date	Project #	Figure #
11/11/09	1297-04	1

Panoche Valley Solar Farm Figure 2



County Boundary
Study Area Boundary
USGS Quads: Cerro Colorado, Mercey Hot Springs, Panoche, Llanada

POWER ENGINEERS

R:\117257_Ponoche\DD\GIS\Applications\QuadMap Print Date: 11/11/2009

1:63,360 1 inch=1 mile

0 1 2 Miles

Solargen Energy

depressions within natural swales. Annual precipitation in the general vicinity of the site is highly variable from year to year. Annual rainfall ranges between 9 and 13 inches, almost 85% of which falls between October and March. During drought years, precipitation totals may only reach 5 inches per year. Storm-water infiltrates the soils of the site, but when field capacity has been reached, gravitational water flows into the creeks and drainages.

2.0 METHODS

In order to determine the presence or absence of shrimp species on the PVSF project site, LOA conducted protocol level wet season branchiopod surveys in the winter and spring of 2009/2010 and dry season surveys on September 27 – 30, 2010. All surveys were conducted in accordance with the *Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Brachiopods* (USFWS 1996). LOA was authorized to initiate dry season branchiopod surveys by David Pereksta with the USFWS on September 14, 2010 (Appendix A).

2.1 Soil Collection

On September 27 – 30, 2010, Jeff Gurule (TE-168924-0) with the assistance of Geoffrey Cline (an un-permitted LOA biologist) conducted the dry season soil collection. Soil samples were collected by Mr. Gurule and data was recorded in the field by Mr. Cline on USFWS approved dry season data sheets. The completed dry season data sheets are presented in Appendix D.

Prior to the onset of the 2010/2011 rainy season, soils from 117 seasonal pools, stock ponds, and puddles were collected. Approximately one liter volume of the top one to three centimeters of sediment was collected from ten sampling locations within each pond. Upon completion of the soil collection, soil was properly stored and transferred to Christopher Rogers of Kansas Biological Survey for cyst analysis.

2.2 Soil Analysis

The soil analysis methods and results were prepared in a separate report authored by Mr. Rogers. This report is presented in Appendix B.

2.3 USFWS Reporting and Voucher Specimen

The USFWS requires that a 90-day report be submitted to the appropriate field office (Sacramento USFWS in this case) following the completion of protocol-level branchiopod surveys. Additionally, the USFWS requires that a “Notice of Presence” be submitted upon identifying a federally listed branchiopod species from the project site authorized for sampling within ten working days of the finding. It is also required that a California Natural Diversity Data Base (CNDDB) field survey form be submitted to CDFG for listed species observed on site.

Any federally listed branchiopods collected during the protocol-level surveys must be submitted as voucher specimens to the California Academy of Sciences (CAS) or the Natural Museum of Los Angeles County (LACM). All specimens have to be preserved and submitted according to the CAS or LACM strict standards.

3.0 RESULTS

3.1 Dry Season Sampling

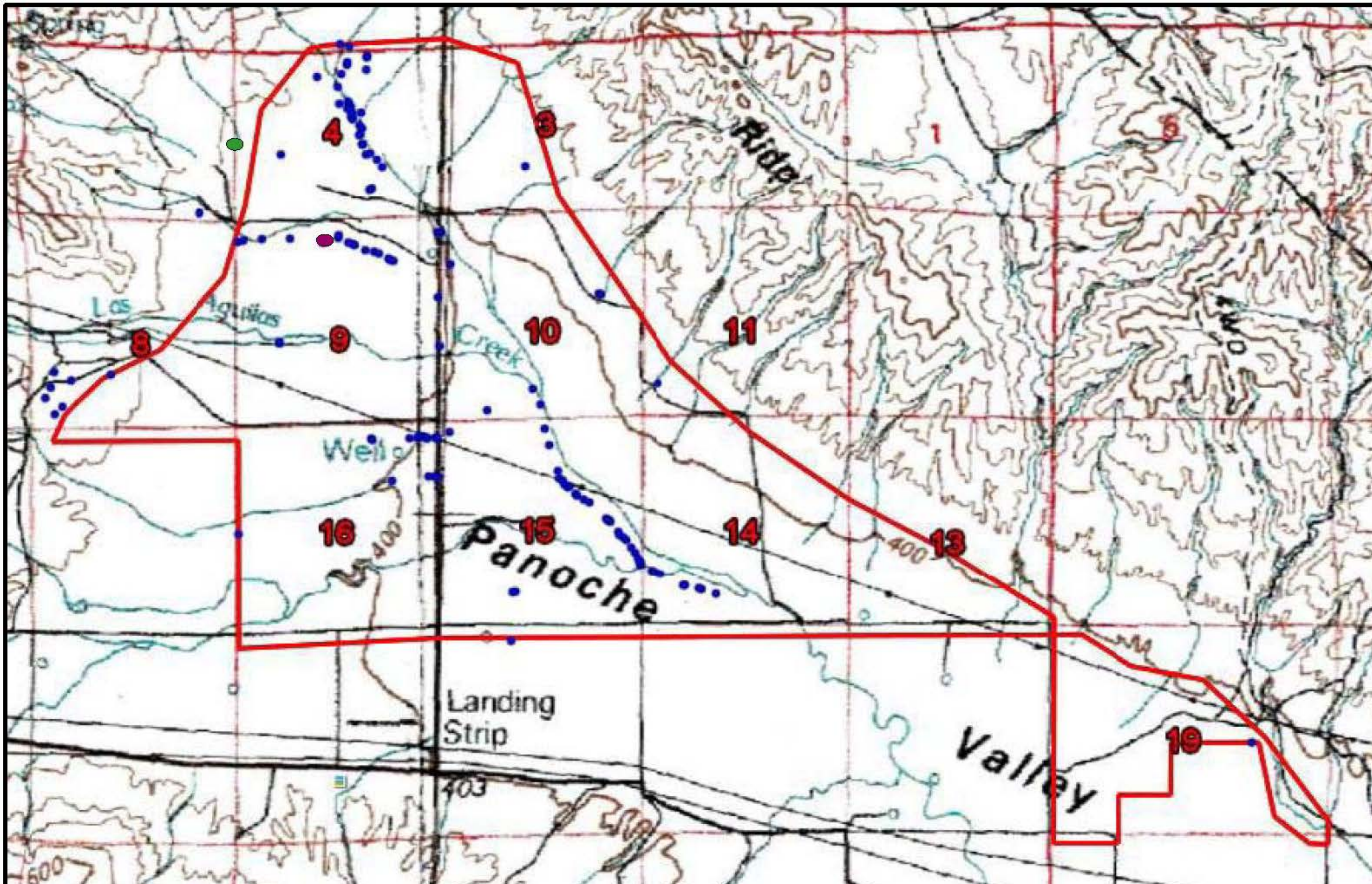
A total of 128 pools met the criteria for inundation in 2009/2010 and were sampled during the wet season for branchiopod species (Figure 3). Of the 128 pools sampled during the wet season 117 pools were sampled during the dry season survey. The discrepancy in the sampling numbers is due to separate pools becoming hydrologically connected as the wet season advanced, pools associated with cattle water troughs remaining wet throughout the year due to perennial runoff, and one pool associated with a cattle trough buried by ranchers in order to berm up the deepening depression around the cattle trough to allow cattle easy access to the water. As previously reported, the wet season survey found only one pool (Pool 12) experiencing an Anostracan hatch; with only one Anostracan species, the Federally Threatened vernal pool fairy shrimp (*Branchinecta lynchi*), detected. The dry season sampling effort found *Branchinecta* cysts in Pool 12 and Pool 13, which lies immediately down gradient from Pool 12. Therefore, it is assumed that the *Branchinecta* cysts were of the species *Branchinecta lynchi* since this species was the only Anostrocan species identified during the wet season surveys and the proximity of Pool 13 and Pool 12.

Tadpole shrimp (*lepiduris packerdi*) cysts were not detected in any of the soil samples. Pool coordinates are presented in Appendix C and photographs of the site, with photo specific information, are located in Appendix D.

3.2 USFWS Reporting and Voucher Specimen

This report serves as the dry season branchiopod 90-day report for the PVSF project site. Notification of the presence of the Federally Threatened *Branchinecta lynchi* was sent to Christopher Diel at the Ventura, CA Branch of the USFWS via an email on March 24, 2010 during the wet season survey.

As required by the USFWS, a CNDDB form was submitted to CDFG in order to document the presence of *Branchinecta lynchi* found during the 2009/2010 wet season surveys.



LEGEND

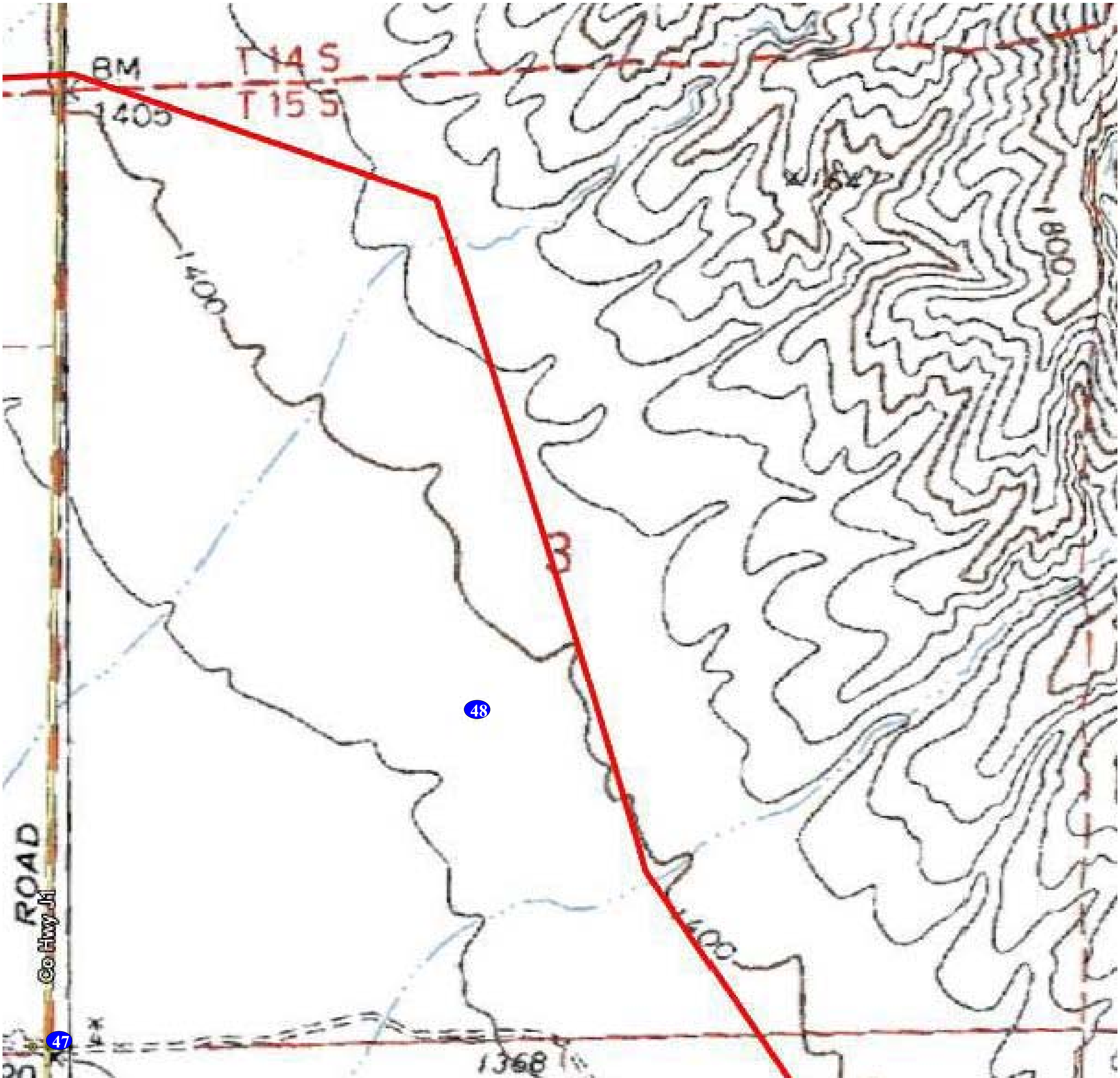
- Sampled Pools
- *Branchinecta lynchi*
- *Ambystoma californiense*
- Approximate Project Boundary

N

1 Mile 0 1 Mile

approximate scale

Live Oak Associates, Inc.		
Pool Locations **Panoche Valley Solar Farm** ***Overview Map***		
Date 7/8/10	Project # 1297-06	Figure # 3 - Overview



LEGEND

- 68 Sampled Pool
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

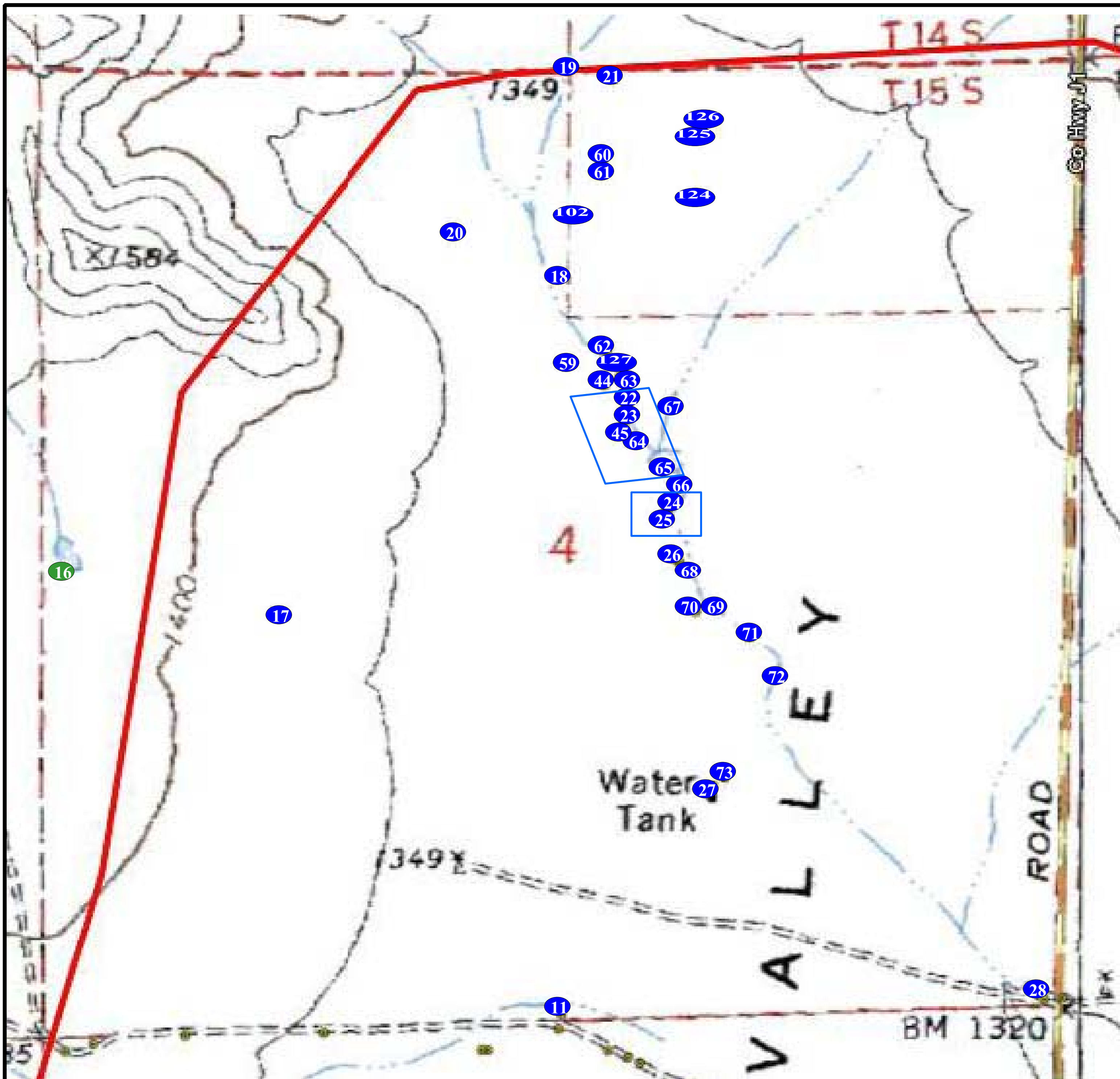
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 3

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 3



LEGEND

- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

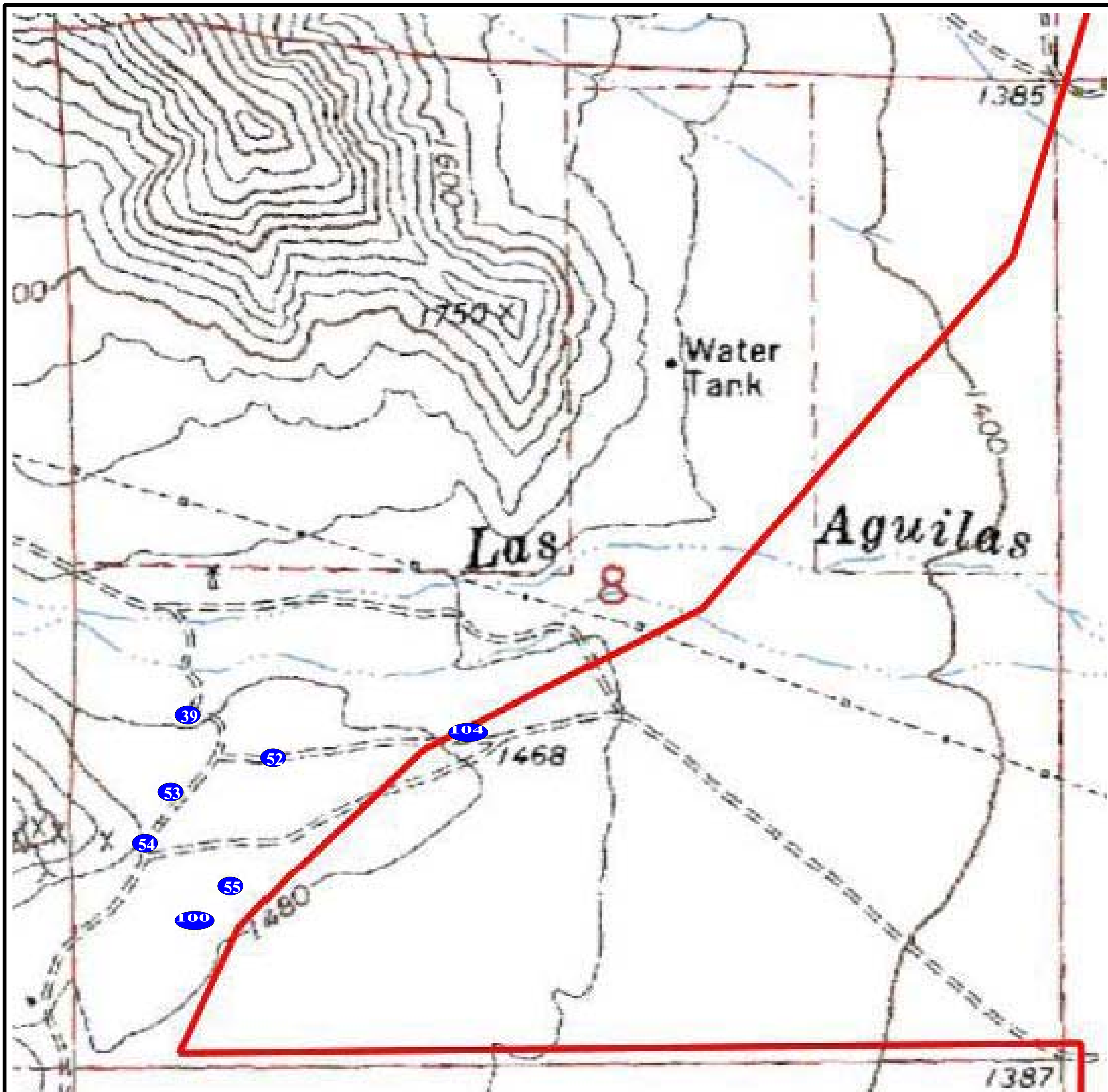
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 4

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 4



LEGEND

- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

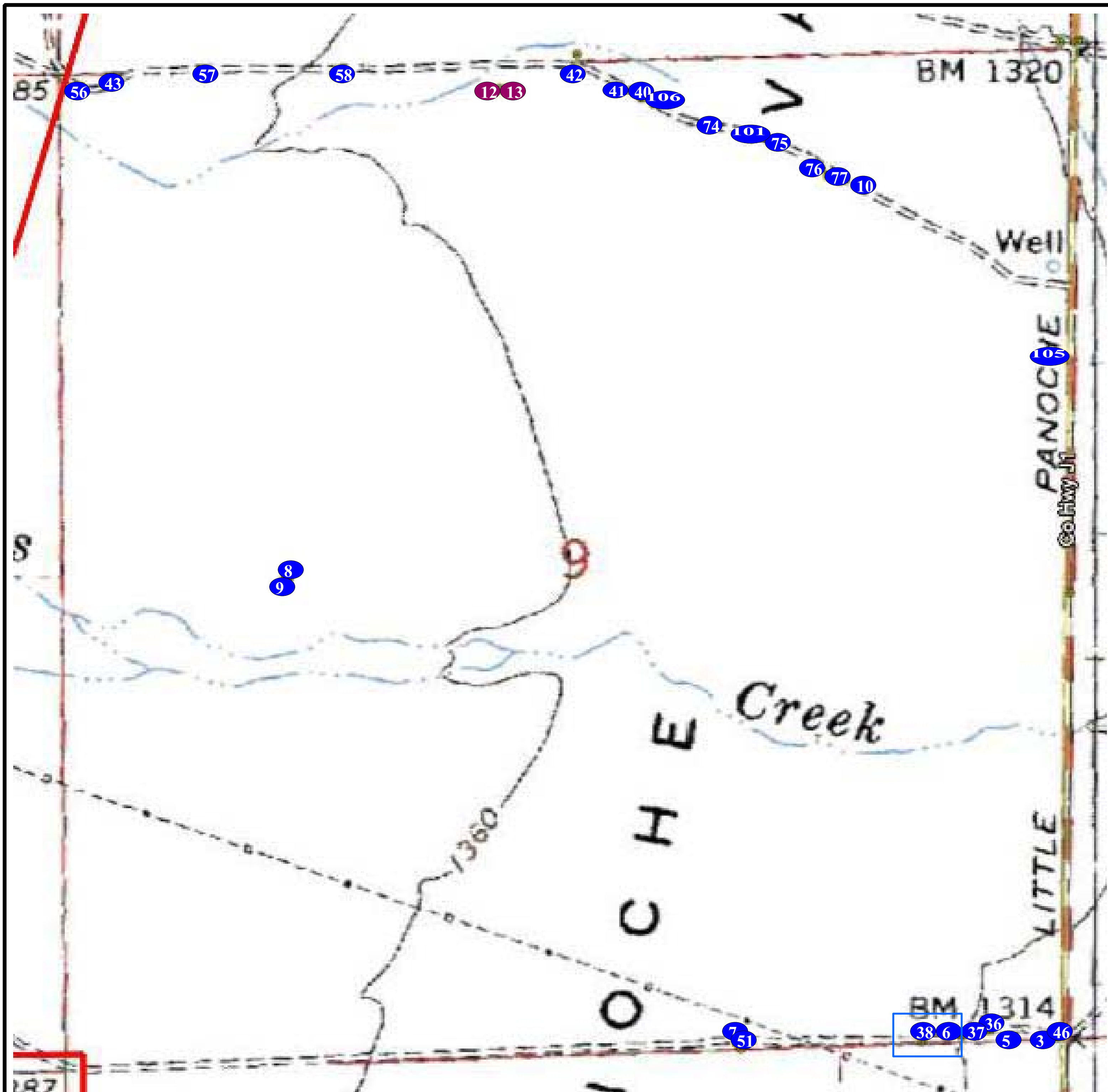
N

750' 0 750'
approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 8

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 8



LEGEND

- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

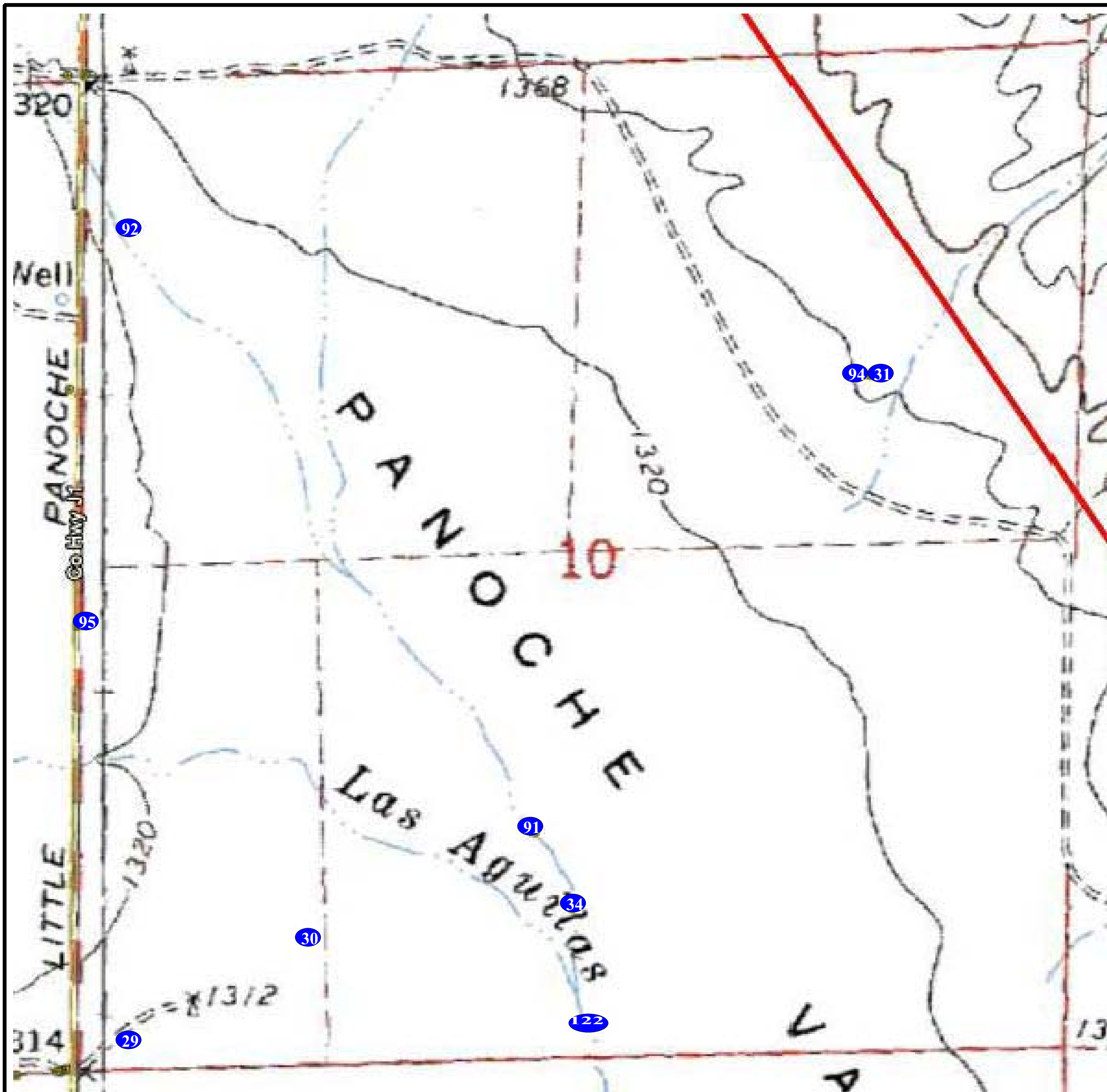
N

750' 0 750'
approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 9

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 9



LEGEND

68 Sampled Pools

68 *Branchinecta lynchi*

68 *Ambystoma californiense*

Pools Converged Into One Pool

Approximate Project Boundary

N

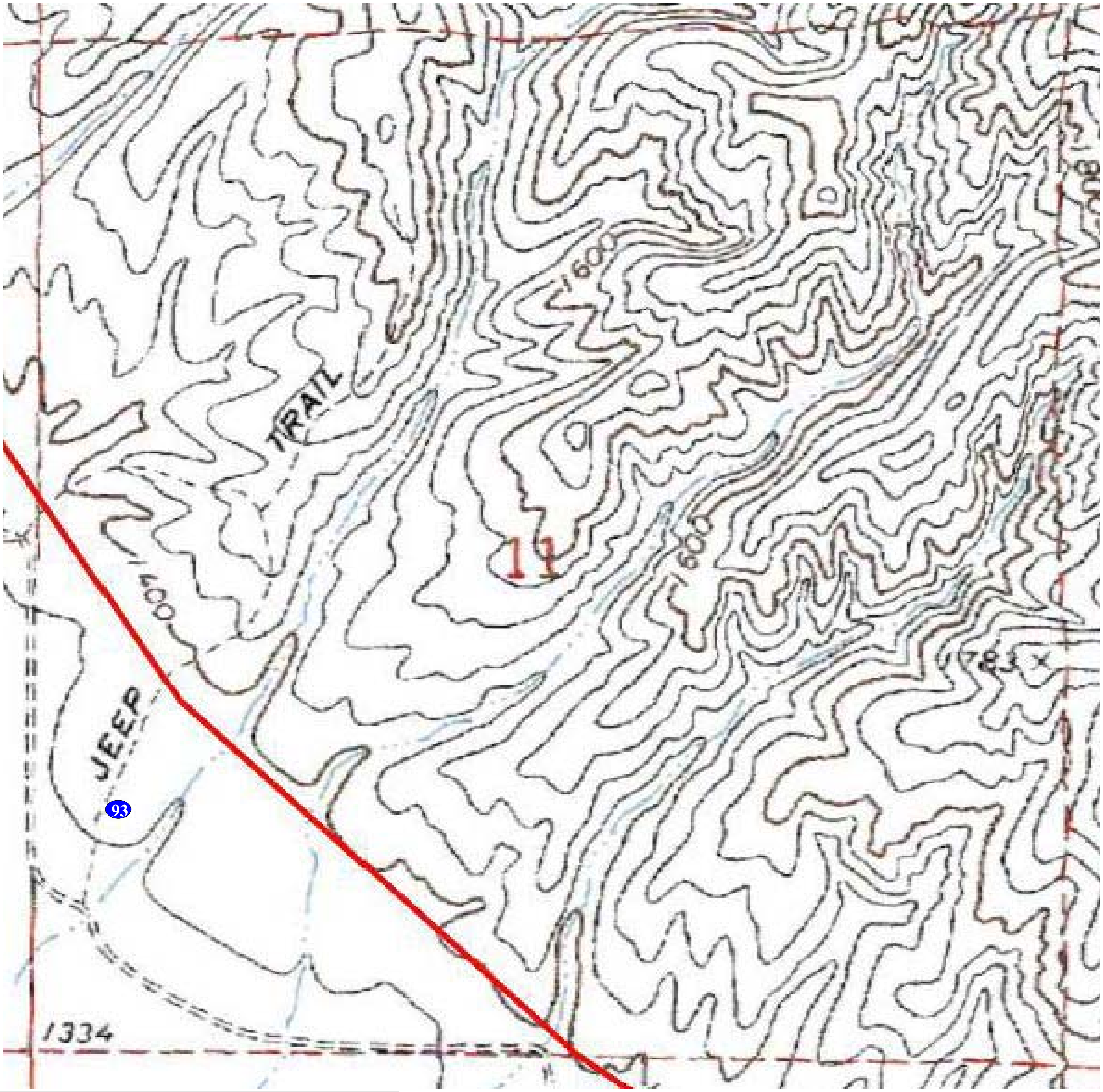
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 10

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 10



LEGEND

68 Sampled Pool
68 *Branchinecta lynchi*
68 *Ambystoma californiense*
Pools Converged Into One Pool
Approximate Project Boundary

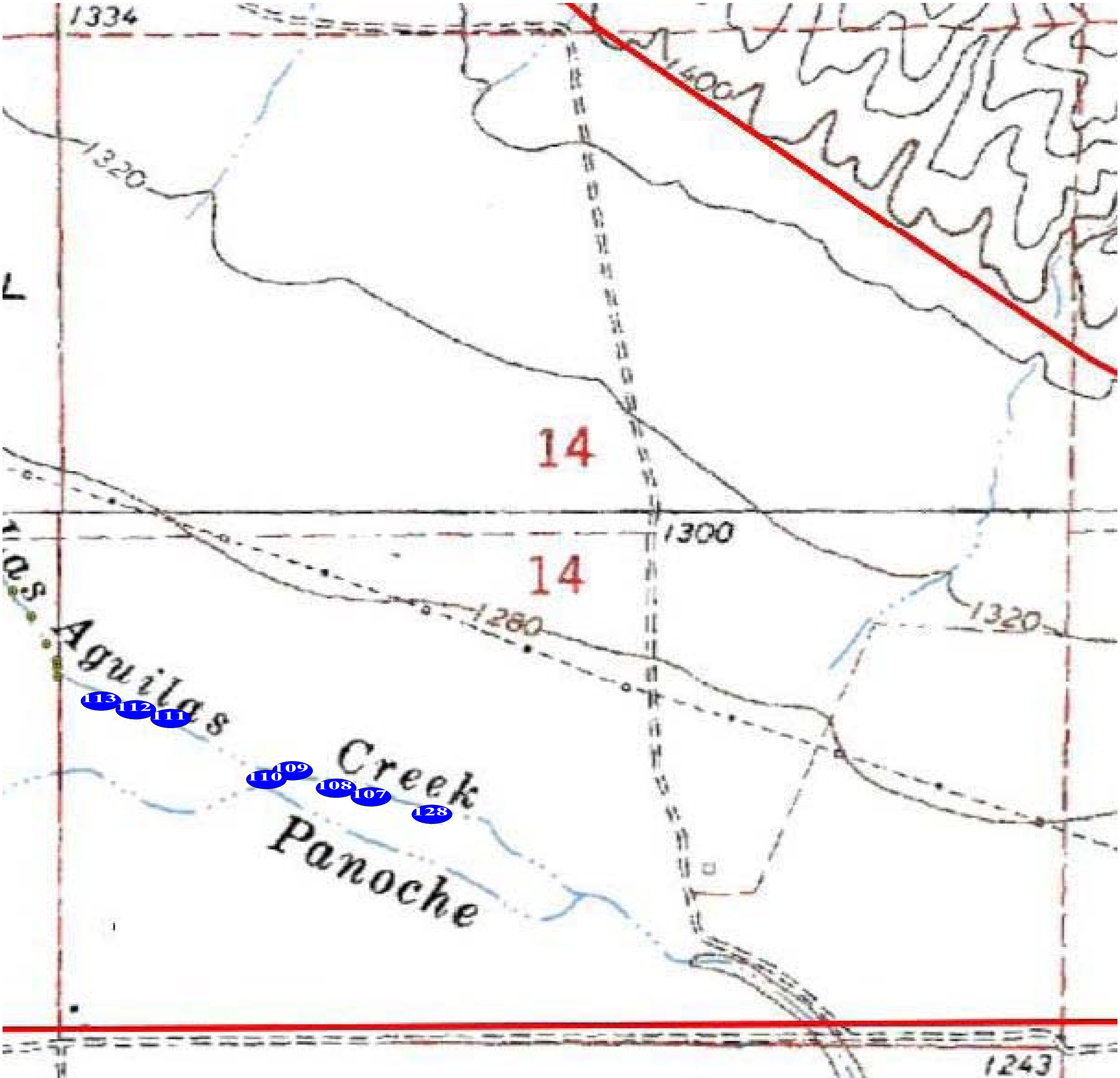
N

750' 0 750'
approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 11

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 11



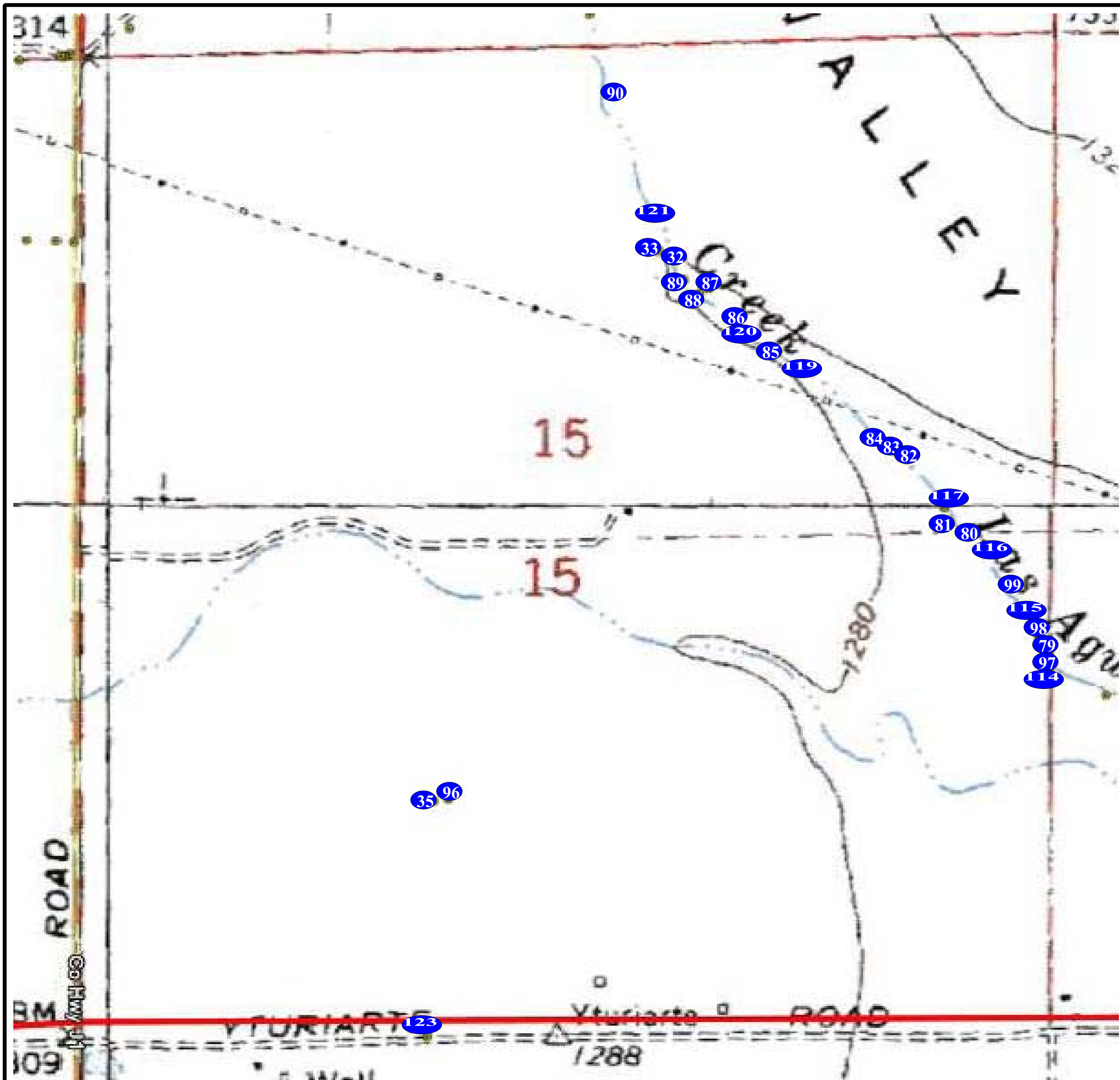
LEGEND

- 68 Sampled Pool
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 14

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 14



LEGEND

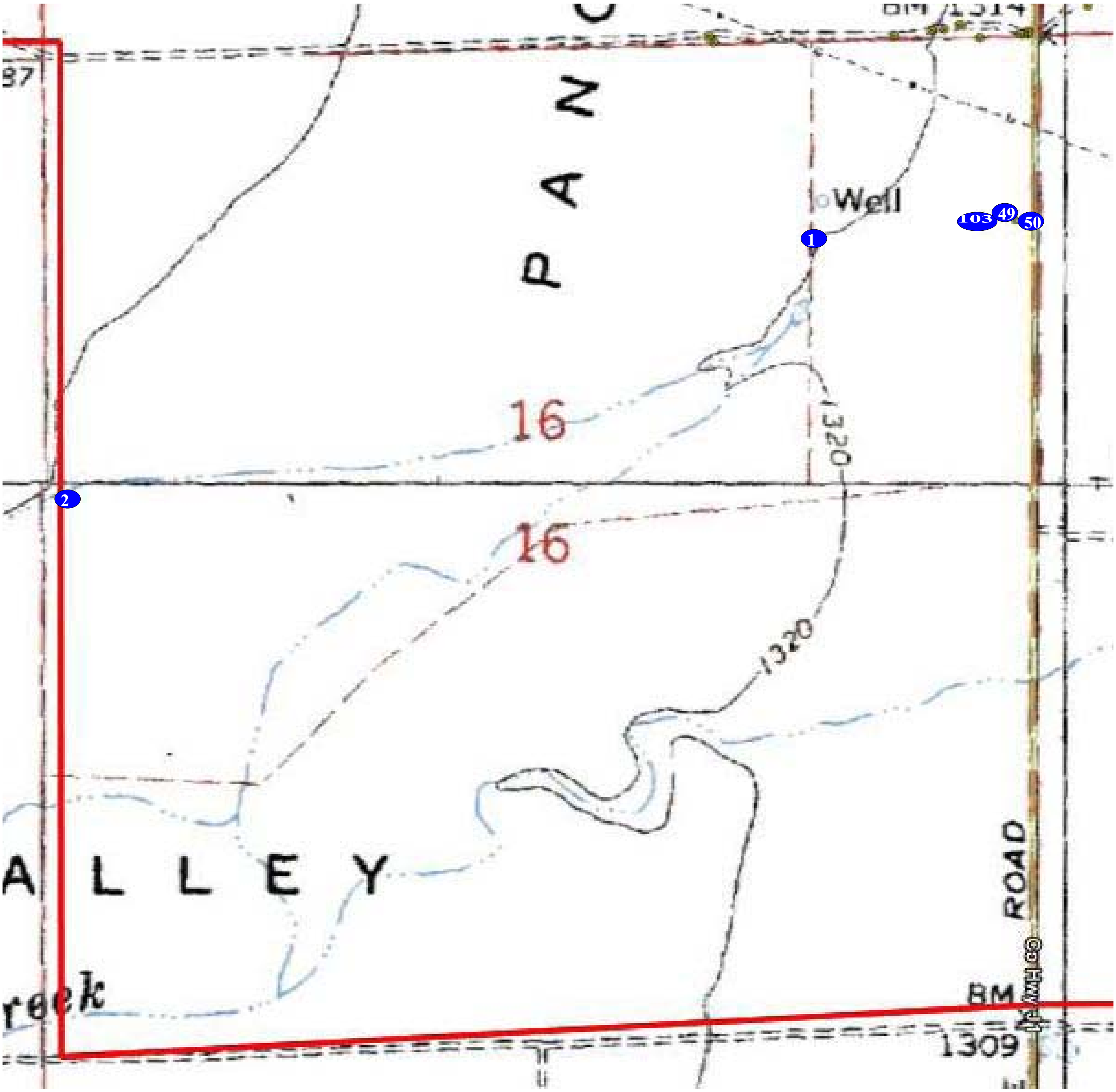
- Sampled Pools
- *Branchinecta lynchi*
- *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

750' 0 750'
approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 15

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 15



LEGEND

- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

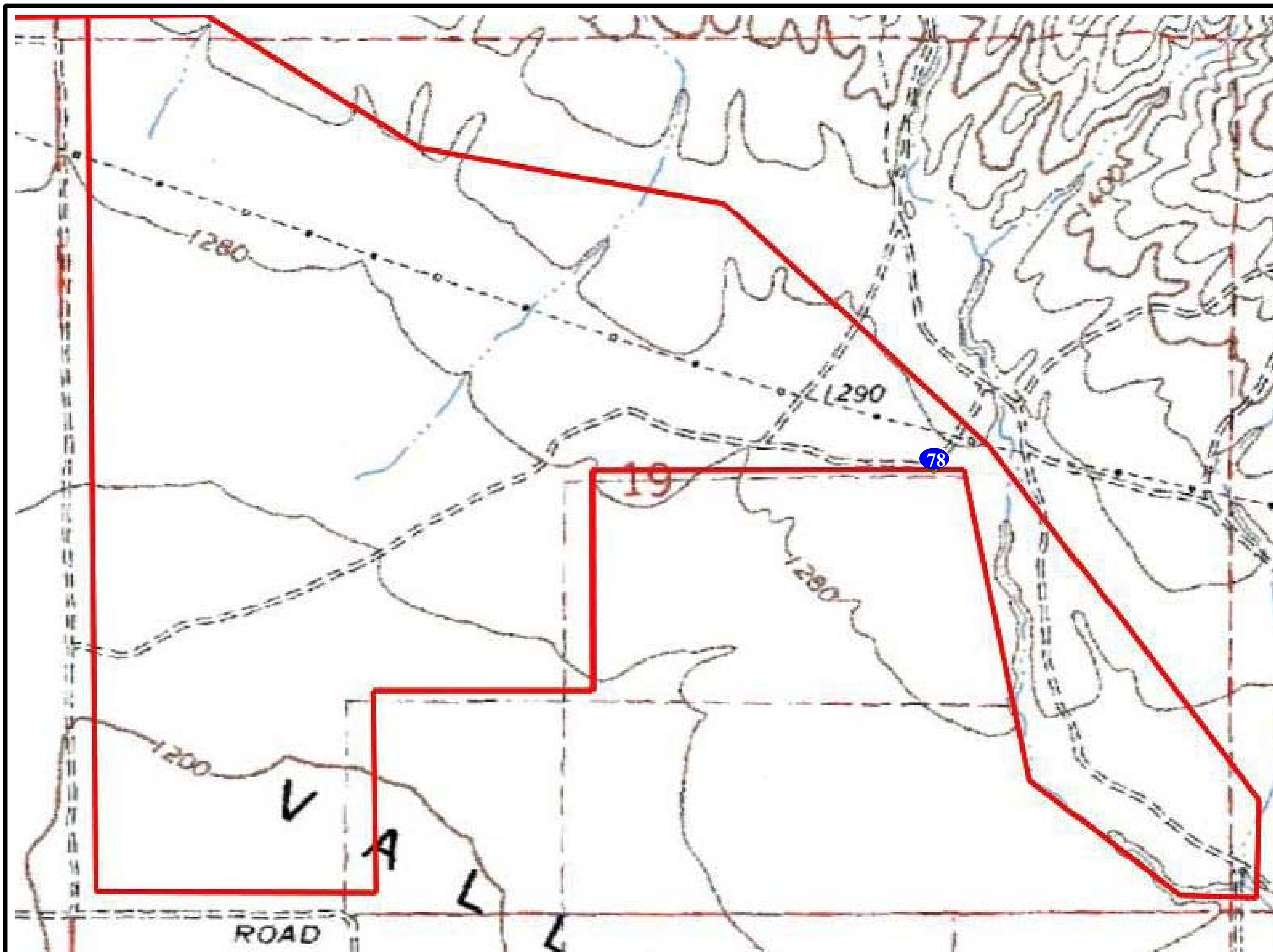
N

750' 0 750'
approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 16

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 16



LEGEND

- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

750' 0 750'
approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 19

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 19

Voucher specimens collected during the wet season survey were submitted in accordance with the *Interim Survey Guidelines* (USFWS 1996) to the CAS by Geoff Cline of LOA on November 8, 2010. Live Oak Associates understands that Kansas Biological Survey will submit a representative sample of each cyst type recovered from the soil samples to either the CAS or LACM, as required by the USFWS guidelines for a protocol level survey.

3.3 Conclusion

Based on the results of the 2009/2010 protocol wet season surveys and 2010 dry season survey, it has been determined that the Federally Threatened vernal pool fairy shrimp (*Branchinecta lynchi*) is present in two adjacent pools, Pool 12 and Pool 13, on the PVSF project site. Pool 12 is a seasonal stock pond constructed from scraped earth bermed up across a shallow swale. Pool 13 is a depression immediately down gradient from Pool 12 presumably formed from the scraping of soil from this area to create the bermed dam of Pool 12. Other habitat sampled during the surveys contained no branchiopods and consisted primarily of ruderal pools associated with compacted depressions in dirt ranch roads or cattle troughs, as well as a few seasonal stock ponds and a number of natural pools forming in swales or drainages. Incidental findings of California tiger salamander occurred in Pool 16 (a seasonal stock pond) during the wet season surveys. Given the above average rainfall during the 2009/2010 rainy season it is doubtful any onsite branchiopod habitat was missed by the protocol survey effort.

I certify that the information in this survey report and attached exhibits fully and accurately represent my work.

Jeff Gurule

Signature: Jeff Gurule. Date: January 14, 2011.

Permit # TE-168924-0

APPENDIX A:
DRY SEASON AUTHORIZATION LETTER

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
81440-2010-CPA-0180

September 14, 2010

Michele Korpos
Senior Project Manager
Live Oak Associates, Inc.
6840 Via Del Oro, Suite 220
San Jose, California 95119

Subject: Authorization to Commence Dry-Season Surveys for Vernal Pool Branchiopods at the Proposed Panoche Valley Solar Farm, San Benito County, California

Dear Ms. Korpos:

We have reviewed your request, dated July 29, 2010, and received by our office by electronic mail on July 30, 2010, to conduct dry-season surveys for federally listed vernal pool branchiopods, including the federally threatened vernal pool fairy shrimp (*Branchinecta lynchi*), for the proposed Panoche Valley Solar Project, San Benito County, California. You are requesting permission to conduct dry-season sampling at 128 pool locations identified during the wet-season surveys performed during the 2009/2010 wet season. The 90-day report for the protocol-level wet-season branchiopod surveys dated August 13, 2010, was received by our office by electronic mail on August 19, 2010. The results of the wet-season surveys identified one pool occupied by vernal pool fairy shrimp. The methods and findings included in the 90-day report for the wet-season surveys for the subject project are currently under review.

You request that the soil collection portion of the sampling be conducted by Davianna Ohlson, Melissa Denena, Jeff Gurule, and/or Austin Pearson under the terms and conditions of their recovery permits (TE1670750-0, TE108681-0, TE168924-0, TE108683-0 respectively) and performed in accordance with the methods described in the U.S. Fish and Wildlife Service's April 1996 *Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods* (Guidelines). In your request, you also request that Christopher Rogers (TE-796284-3) conduct the soil analysis and possible culture of any cysts collected.

The permits identified for Ms. Ohlson, Ms. Denena, and Mr. Pearson expired in December 2009. We do not authorize Davianna Ohlson, Melissa Denena, or Austin Pearson to conduct the proposed dry-season surveys. Christopher Roger's current recovery permit, TE-796284-5, does not authorize the culturing of cysts. We do not authorize Christopher Rogers to culture any cysts identified in the soil samples collected during the dry-season surveys.

Michele Korpos

We hereby authorize Jeff Gurule to conduct the dry-season surveys and Christopher Rogers to conduct the soil sieving and examination and cyst identification to genus. Per section V.h of the Guidelines, each fairy shrimp or tadpole shrimp cyst shall be identified to genus by a qualified biologist and the Service may require an independent review by a crustacean biologist of any vernal pool branchiopod or cyst identification. Further, section V.h states that, for each feature surveyed, if branchiopod cyst identification is made to genus, there are two options: 1) surveys may be suspended if it is agreed that one or more listed species are present or 2) a subsequent complete wet-season sampling survey shall be conducted. Surveys may continue at the remaining features on the project site; however, if all surveys are suspended, it must be assumed that all features are occupied by the listed entity.

We remind Mr. Gurule and Mr. Rogers of their responsibilities in reporting survey results to us, regardless of findings, and suggest that they review the permit for any special conditions that must be met. We request use of the dry-season data sheet available on our website (http://www.fws.gov/ventura/) during the dry-season surveys and that copies of the data sheets be included in future reports on the survey findings. If you have any questions, please contact Christopher Diel of my staff at (805) 644-1766, extension 305.

Sincerely,

Douglass M. Cooper
Deputy Assistant Field Supervisor

APPENDIX B:
DRY SEASON SOIL ANALYSIS REPORT

The University of Kansas

Kansas Biological Survey

8 December 2010

Eric Cherniss
Solargen Energy, Inc.
20400 Stevens Creek Blvd., Suite 740
Cupertino, CA 95014

SUBJECT: Results of Analyses of Soil Samples Collected from the Proposed Panoche Valley Project Site, San Benito County, California.

Dear Mr. Cherniss,

Live Oak Associates conducted a dry season survey of potential special status shrimp habitats at the proposed Panoche Valley project site, located in San Benito County, California. Soil samples were collected from 117 previously identified habitats judged to be suitable for special status shrimp species, and these samples were shipped to Kansas Biological Survey for processing and analyses. Special status shrimp eggs were collected from the soil samples analyzed from two features.

Kansas Biological Survey understands that Live Oak Associates will submit this report and all other pertinent materials and information to the US Fish and Wildlife Service (USFWS), and the California Department of Fish and Game (DFG), as required by the USFWS guidelines for a protocol level survey.

Definitions

For the purpose of this report, special status shrimp are defined to include shrimp species listed as threatened or endangered under the federal Endangered Species Act (ESA) (50 CFR 17.11 for listed animals and various Federal Register notices for proposed species). One special status tadpole shrimp (*Lepidurus packardi*) and two special status fairy shrimp species (*Branchinecta lynchi* and *Branchinecta longiantenna*) have the potential to occur at the proposed project site. In addition, two non-listed fairy shrimp species (*Branchincta lindahli* and *Linderiella occidentalis*) is known from the proposed project vicinity.

Species Accounts

Lepidurus packardi Simon, 1886
Lepidurus packardi, the Vernal Pool Tadpole Shrimp, is federally listed as an endangered species. This tadpole shrimp species is found in vernal pools throughout the Sacramento Valley, to the east side of San Francisco Bay (Rogers, 2001). Typically *Lepidurus packardi* is green in color, but may be mottled with brown in highly turbid water. *Lepidurus packardi* is omnivorous and generally forages on the bottoms of pools in dense vegetation. Tadpole shrimp tend to be

slow growing and are usually collected after the vernal pool has been ponded for 30 days (Rogers, 2001).

Branchinecta lynchi Eng, Belk & Eriksen, 1990
Branchinecta lynchi, the Vernal Pool Fairy Shrimp, is federally listed as a threatened species. This shrimp species is found in vernal pools throughout the Central Valley and western Riverside County in California, and near Medford, Oregon (Eriksen & Belk, 1999). This fairy shrimp species occurs in neutral to slightly alkaline vernal pools throughout the California Central Valley, and in rock outcrop pools along the Interior Coast Ranges, south of the Sacramento River Delta.

Branchinecta longiantenna Eng, Belk, & Eriksen, 1990
Branchinecta longiantenna, or the Longhorn Fairy Shrimp, is federally listed as an endangered species. This species is reported from small, shallow rock outcrop vernal pools, and grassy-bottomed vernal pools. This species of fairy shrimp has an extremely disjunct distribution, and is known only from three locations: a sandstone outcrop vernal pools along the Contra Costa/Alameda County line, a couple of grassy bottomed vernal pools at the Pixley National Wildlife Refuge in Merced County in the San Joaquin Valley, and from a couple of grassy bottomed vernal pools and roadside scrapes on the Carrizo Plain in San Luis Obispo County (Eriksen & Belk, 1999; Rogers, in prep).

Branchinecta lindahli Packard, 1883
This taxon is a common fairy shrimp with no legal status. This fairy shrimp is common in alkaline habitats throughout the western United States and northern Mexico. It typically occurs in pools that are turbid, alkaline or slightly saline, and often ringed with salt grass (*Distichilis* sp.). *Branchinecta lindahli* may be opportunistic, as it is common in a wide variety of artificial habitats, such as bulldozer scrapes, roadside ditches and railroad toe-drains (Eriksen & Belk, 1999; Rogers & Lang, in prep).

Linderiella occidentalis (Dodds, 1923)
The first species recorded from California, the California Linderiella is a common fairy shrimp from vernal pools throughout the California Central Valley and Coast Ranges of California. *Linderiella occidentalis* is typically white and green with red markings. *Linderiella occidentalis* tends to mature later than the *Branchinecta* species and is typical of vernal pools that are inundated for at least 20 days. *Linderiella occidentalis* was originally proposed for listing under the Endangered Species Act and was withdrawn from the proposal in 1995.

Methods

Live Oak Associates collected soil samples from 117 potential special status shrimp habitats at the proposed project site. Each soil sample was placed in a bag, labeled with the locality number, and shipped to the Kansas Biological Survey laboratory for analysis. All potential habitats were identified according to the numbers assigned to them in the field.

Laboratory Analysis

Soil samples were prepared for examination in the laboratory by dissolving the clumps of soil in water and sieving the material through 300- and 150- µm pore size screens. The small size of these screens ensures that the eggs from the shrimp species will be retained. The portion of each sample retained in the screens was dissolved in a brine solution to separate the organic material from the inorganic material. The organic fraction was then examined under a microscope.

Results

Potential special status shrimp eggs were recovered from the soil samples taken from features 12 and 13. The eggs present belong to the genus *Branchinecta* and are most likely *Branchinecta lynchi* as this species was previously identified from feature 12 and we are given to understand that feature 13 is adjacent to this habitat. These analyses are insufficient by themselves to determine that special status shrimp are absent from the other habitat on this site. The results of this survey must be combined with a protocol wet season survey, and concurrence must be sought from the USFWS before any additional determinations can be made.

If you have any questions please call me.

Sincerely,

D. Christopher Rogers
785.864.1714
Crustacean Taxonomist and Ecologist
Kansas Biological Survey
Central Plains Center for Bioassessment
Kansas University, Higuchi Hall
2101 Constant Avenue, Lawrence, KS 66047-3759 USA

References

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Rogers, D.C. 2001. Revision of the Nearctic *Lepidurus* (Notostraca). Journal of Crustacean Biology 21: 991 – 1006.

United States Fish and Wildlife Service. September 19, 1994. Federal Register Final Rule; determination of endangered status for the conservancy fairy shrimp, longhorn fairy shrimp, and the vernal pool tadpole shrimp; and threatened status for the vernal pool fairy shrimp.

Higuchi Hall • 2101 Constant Ave., Room 108 • Lawrence, KS 66047-3759
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APPENDIX C:
POOL COORDINATES

Panoche Solar Farm Pool Locations **Grid: UTM** **Datum: NAD83** **Zone: 10S**

Pool #	Easting	Northing	Altitude
1	689496	4055757	1305 ft
2	688302	4055313	1342 ft
3	689829	4056101	1324 ft
4	689834	4056100	1319 ft
5	689763	4056093	1314 ft
6	689688	4056103	1316 ft
7	689326	4056083	1320 ft
8	688589	4056816	1372 ft
9	688595	4056815	1374 ft
10	689470	4057479	1342 ft
11	689036	4057670	1333 ft
12	688911	4057611	1335 ft
13	688921	4057611	1338 ft
14	687939	4057814	1379 ft
15	687945	4057818	1382 ft
16	688234	4058362	1380 ft
17	688572	4058300	1402 ft
18	689004	4058842	1332 ft
19	689014	4059176	1357 ft
20	688840	4058916	1356 ft
21	689086	4059160	1354 ft
22	689119	4058641	1330 ft
23	689120	4058634	1320 ft
24	689187	4058476	1331 ft
25	689181	4058467	1316 ft
26	689204	4058399	1318 ft
27	689270	4058041	1318 ft
28	689811	4057710	1306 ft
29	689938	4056148	1308 ft
30	690230	4056326	1294 ft
31	691090	4057257	1358 ft
32	690834	4055790	1271 ft
33	690806	4055805	1279 ft
34	690648	4056380	1286 ft
35	690460	4054895	1314 ft
36	689732	4056112	1308 ft
37	689708	4056105	1337 ft
38	689626	4056092	1327 ft
39	686835	4056546	1454 ft
40	689145	4057604	1309 ft
41	689113	4057614	1327 ft
42	689033	4057647	1329 ft
43	688292	4057609	1362 ft
44	689083	4058673	1320 ft

Pool #	Easting	Northing	Altitude
45	689115	4058610	1320 ft
46	689842	4056105	1301 ft
47	689839	4057712	1311 ft
48	690492	4058250	1374 ft
49	689828	4055797	1296 ft
50	689855	4055796	1294 ft
51	689333	4056074	1312 ft
52	686969	4056483	1469 ft
53	686814	4056424	1484 ft
54	686776	4056341	1486 ft
55	686907	4056277	1476 ft
56	688248	4057597	1378 ft
57	688437	4057625	1361 ft
58	688657	4057633	1351 ft
59	689019	4058710	1344 ft
60	689075	4059037	1331 ft
61	689072	4059015	1337 ft
62	689086	4058729	1325 ft
63	689107	4058687	1338 ft
64	689125	4058590	1320 ft
65	689181	4058543	1312 ft
66	689199	4058519	1310 ft
67	689190	4058645	1305 ft
68	689208	4058395	1332 ft
69	689269	4058326	1309 ft
70	689236	4058317	1301 ft
71	689323	4058278	1305 ft
72	689366	4058222	1305 ft
73	689288	4058054	1312 ft
74	689248	4057557	1329 ft
75	689355	4057533	1338 ft
76	689431	4057496	1320 ft
77	689443	4057485	1316 ft
78	696325	4053843	1330 ft
79	691459	4055163	1264 ft
80	691320	4055354	1257 ft
81	691291	4055371	1245 ft
82	691217	4055474	1270 ft
83	691196	4055487	1260 ft
84	691183	4055498	1279 ft
85	691004	4055643	1256 ft
86	690938	4055687	1267 ft
87	690890	4055745	1274 ft
88	690875	4055737	1275 ft

Pool #	Easting	Northing	Altitude
89	690848	4055758	1285 ft
90	690724	4056063	1285 ft
91	690585	4056501	1294 ft
92	689917	4057463	1316 ft
93	691576	4056566	1361 ft
94	691108	4057252	1362 ft
95	689847	4056821	1301 ft
96	690484	4054899	1289 ft
97	691460	4055152	1241 ft
98	691441	4055189	1236 ft
99	691385	4055274	1236 ft
100	686848	4056217	1490 ft
101	689315	4057548	1331 ft
102	689029	4058943	1312 ft
103	689781	4055798	1307 ft
104	687276	4056536	1469 ft
105	689824	4057202	1308 ft
106	689163	4057595	1323 ft
107	691959	4054950	1247 ft
108	691936	4054959	1252 ft
109	691827	4054980	1234 ft
110	691813	4054979	1246 ft
111	691629	4055068	1256 ft
112	691593	4055078	1253 ft
113	691552	4055092	1249 ft
114	691461	4055137	1258 ft
115	691417	4055233	1251 ft
116	691346	4055332	1252 ft
117	691281	4055396	1256 ft
118	691206	4055485	1269 ft
119	691049	4055621	1263 ft
120	690950	4055672	1264 ft
121	690796	4055862	1268 ft
122	690685	4056192	1292 ft
123	690458	4054510	1277 ft
124	689225	4058981	1329 ft
125	689226	4059076	1346 ft
126	689230	4059090	1336 ft
127	689092	4058711	1338 ft
128	692072	4054918	1258 ft

APPENDIX D:
PHOTOS

Photo 1: Looking SW at Pool #12 - a stock pond. Vernal pool fairy shrimp (*Branchinecta lynchi*) were observed in this pool on 3/16/10. The pool to the left, Pool #13, as well as Pool #12 were found to contain *Branchinecta* cysts during dry season surveys. It is assumed the *Branchinecta* cysts are *Branchinecta lynchi*.

Photo 2: Looking SE at Pool #5, a natural vernal pool at the toe of a swale. No shrimp were found in this pool during the 2009/2010 wet season survey or 2010 dry season survey.

Photo 3: LOA Biologist Mr. Jeff Gurule (TE-168924) sampling Pool #50 at the intersection of a ranch road and Little Panoche Road looking east. This pool is an example of the many ruderal pools associated with the ranch roads on the site. No shrimp were found in this pool during the 2009/2010 wet season survey and 2010 dry season survey.

Photo 4: Incidental California tiger salamander observation from Pool #16 on May 11th, 2010.


Photo 5: Looking south across the study area.


Photo 6: Looking north across the study area.

LIVE OAK ASSOCIATES, INC.

an Ecological Consulting Firm

PROTOCOL-LEVEL WET SEASON BRANCHIOPOD SURVEY RESULTS 90-DAY REPORT PANOCHE VALLEY SOLAR FARM SAN BENITO COUNTY, CALIFORNIA (Tracking Number 81440-2010-CPA-0023)

Prepared by:

LIVE OAK ASSOCIATES, INC.

Austin Pearson, B.S., Director of Ecological Services
Jeff Gurule, B.A., Staff Ecologist
Geoffrey Cline, M.S., Staff Ecologist

Prepared for:

SOLARGEN ENERGY
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Eric Cherniss
VP Project Development
20400 Stevens Creek Boulevard, Suite 700
Cupertino, CA 95014

August 13, 2010 PN 1297-06

TABLE OF CONTENTS

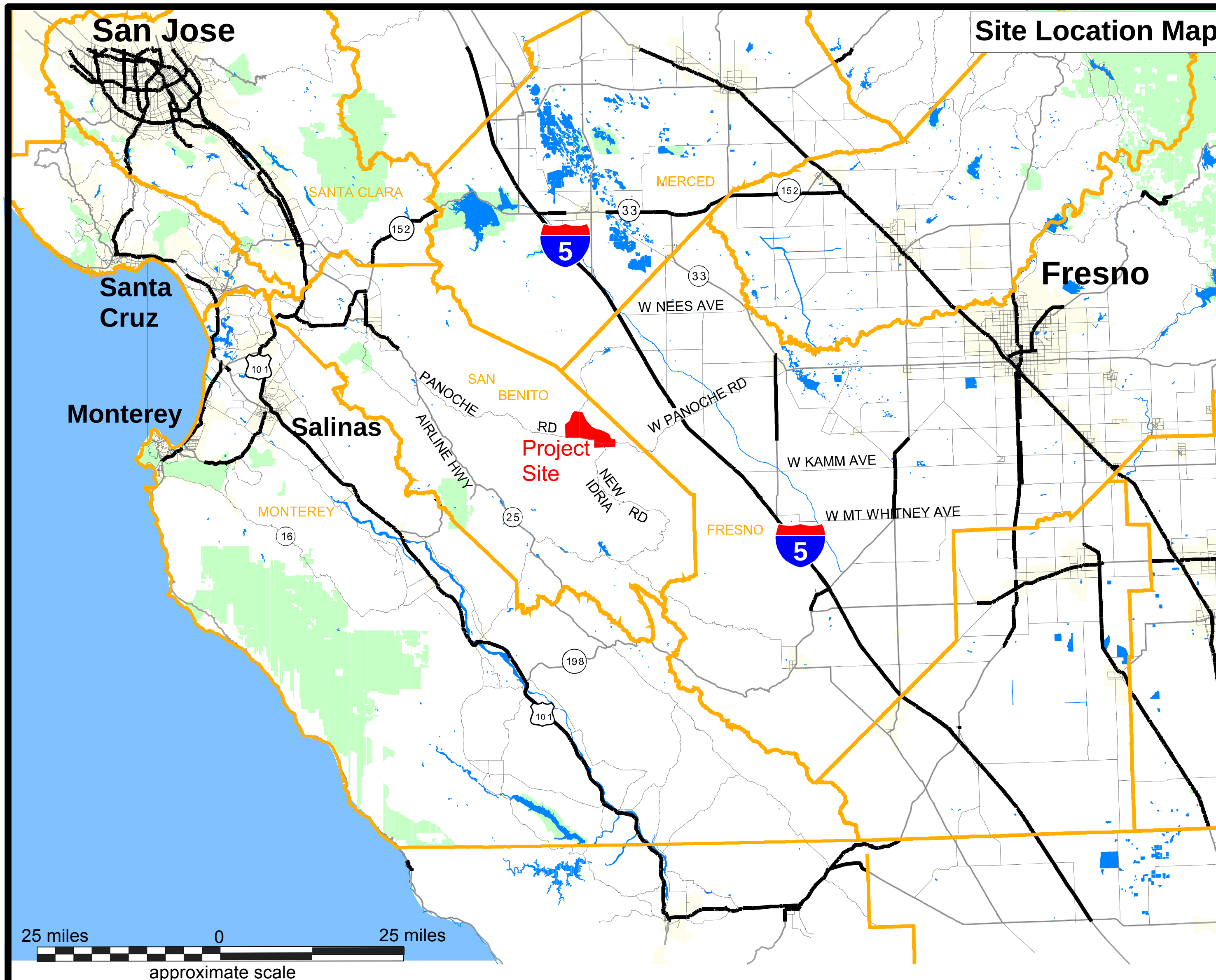
1.0 INTRODUCTION AND SITE DESCRIPTION 1
2.0 METHODS 5
2.1 Wet Season Sampling 5
2.2 USFWS Reporting and Voucher Specimen.. 6
3.0 RESULTS 7
3.1 Wet Season Sampling 7
3.2 USFWS Reporting and Voucher Specimen.. 7
3.3 Conclusion 19
APPENDIX A: AUTHORIZATION LETTERS... 20
APPENDIX B: 2009/2010 WET SEASON SURVEY DATA................................... 23
APPENDIX C: POOL COORDINATES 35
APPENDIX D: PHOTOS 37

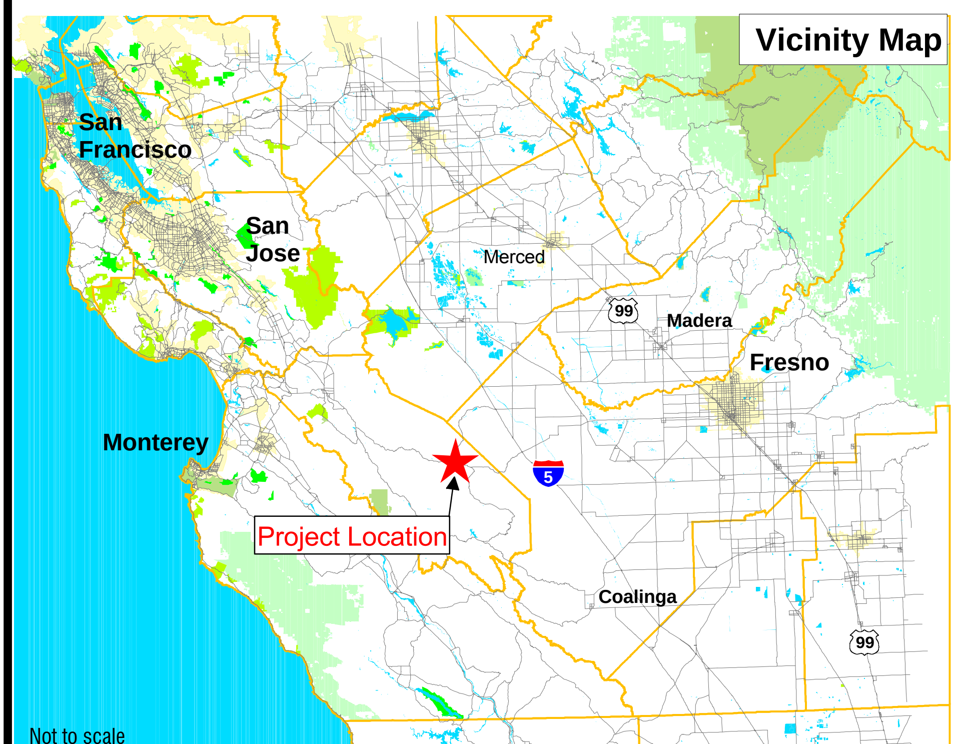
1.0 INTRODUCTION AND SITE DESCRIPTION

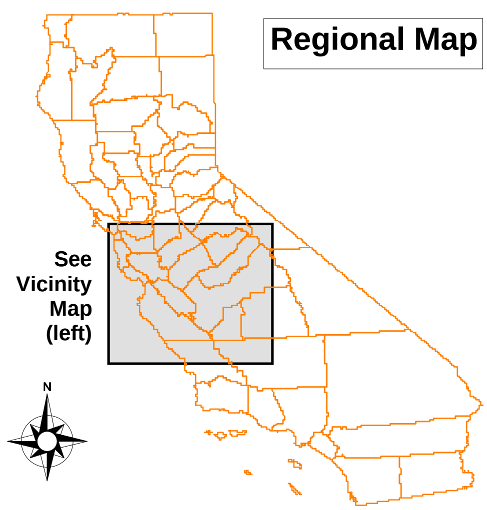
Protocol-level wet-season branchiopod surveys were conducted by Live Oak Associates, Inc. (LOA) on the Panoche Valley Solar Farm (PVSF) project site in San Benito County, California. Surveys consisted of protocol level wet season sampling in 2009/2010. The site or study area consists of approximately 4,885-acres, located in Panoche Valley approximately 15 miles west of Interstate 5 and six miles south of Mercey Hot Springs near the intersection of Panoche Road and Little Panoche Road (Figure 1). The site can be found on the Cerro Colorado, Mercey Hot Springs, Llanada, and Panoche, California U.S.G.S quadrangles, in Sections 3-4, 8-11, and 13-16, Township 15 South, Range 10 East and Section 19, Township 15 South, Range 11 East (Figure 2).

All the parcels within the study area are used for cattle grazing. The site is surrounded by rangeland and bordered to the west by the Gabilan Range and to the east by the Panoche Hills. A number of drainages and creeks are present in the area including the Panoche and Las Aguilas Creeks. The portion of the Valley associated with the proposed project ranges in elevation from approximately 1200 feet National Geodetic Vertical Datum (NGVD) to approximately 1490 feet NGVD.

Thirteen soil types from nine soil series were identified on the project site. The Riverwash soil type is the only soil considered hydric. This soil type is considered hydric due to frequent flooding for long durations or very long durations during the growing season. Riverwash consists of mixed water-washed sand and gravel, occurs along streams or rivers and is often flooded during storm events. Within the study area, Riverwash soils are associated with Panoche Creek and portions of Las Aguilas Creek. The Panoche Creek channel was not considered potential habitat for fairy shrimp or tadpole shrimp due to high flows that periodically scour the creek channel. Ponded areas that were sampled consisted primarily of two types; 1) Hard-packed depressions associated with ranch roads and cattle troughs which were extremely ruderal in nature and were repeatedly disturbed by vehicle traffic and/or cattle, and 2) Natural and artificial depressions within natural swales. Annual precipitation in the general vicinity of the site is highly variable from year to year. Annual rainfall ranges between 9 and 13





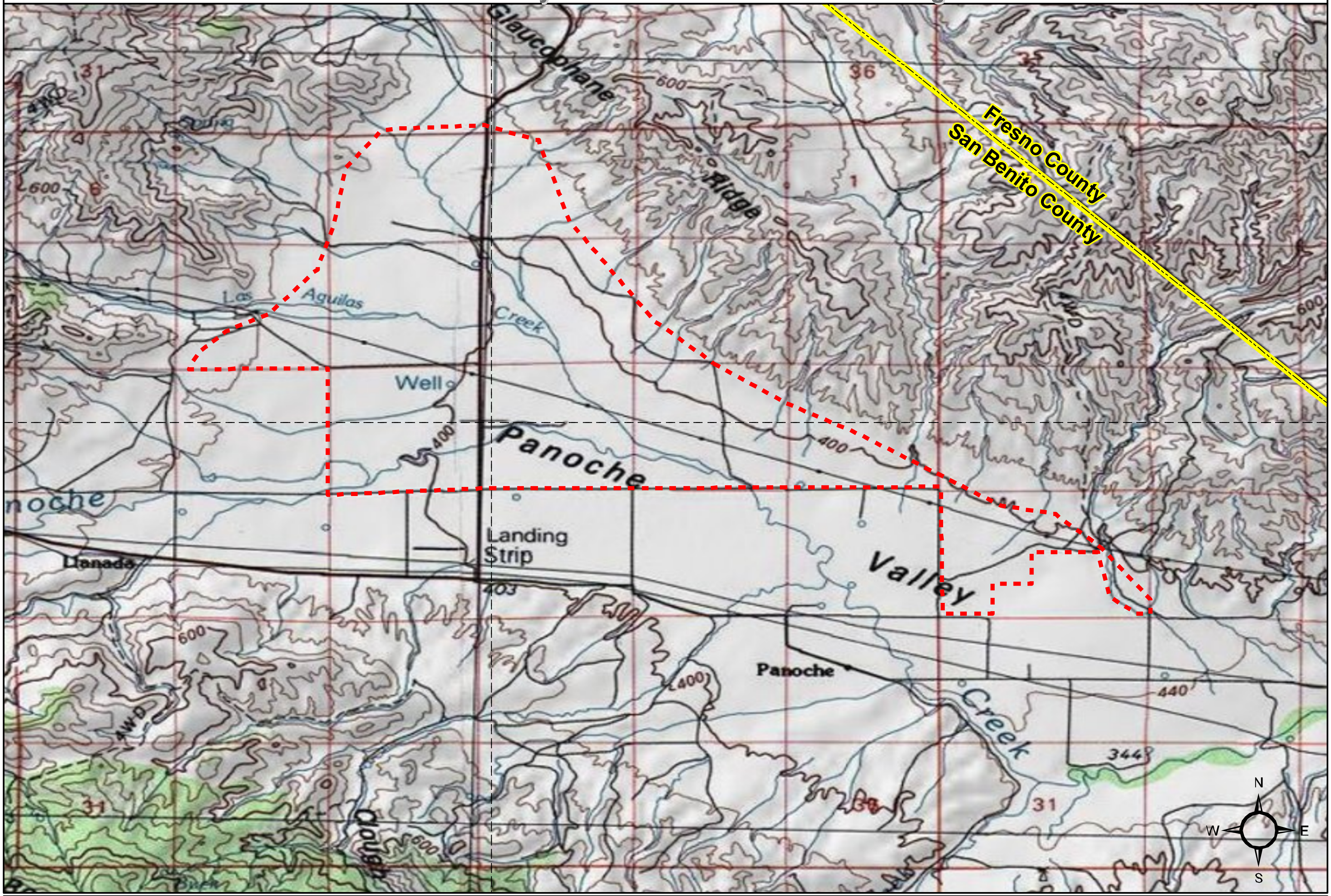


Live Oak Associates, Inc.

Panoche Valley Solar Farm
Vicinity Map

Date	Project #	Figure #
11/11/09	1297-04	1

Panoche Valley Solar Farm   Figure 2



County Boundary   Study Area Boundary   USGS Quads: Cerro Colorado, Mercey Hot Springs, Panoche, Llanada

POWER ENGINEERS

R:\117257_Ponoche\DD\GIS\Applications\QuadMap Print Date: 11/11/2009

1:63,360 1 inch=1 mile

0 1 2 Miles

Solargen Energy

inches, almost 85% of which falls between October and March. During drought years, precipitation totals may only reach 5 inches per year. Storm-water infiltrates the soils of the site, but when field capacity has been reached, gravitational water flows into the creeks and drainages.

2.0 METHODS

In order to determine the presence or absence of shrimp species on the PVSF project site, LOA conducted protocol-level wet-season branchiopod surveys in the winter and spring of 2009/2010. All surveys were conducted in accordance with the *Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Brachiopods* (USFWS 1996).

LOA was authorized to initiate branchiopod surveys by David Pereksta with the U.S. Fish and Wildlife Service (USFWS) on November 24, 2009 (Appendix A). Wet season surveys were conducted throughout winter and spring of 2009/2010.

Jeff Gurule (TE-168924) conducted most of the wet-season pool sampling. Data was recorded in the field by Jeff Gurule and Austin Pearson (TE-108683-0) with the assistance of Geoffrey Cline (an un-permitted LOA biologist) when necessary. Data was recorded on a previously approved data sheet, authorized via email by David Kelly with the USFWS on November 12, 2008 (See Appendix A). The data sheet is an Excel spreadsheet, with data entered in the field directly into the spreadsheet via a PDA. The 2009/2010 wet season data is presented in Appendix B.

2.1 Wet Season Sampling

The *Interim Survey Guidelines* (USFWS 1996) require that protocol-level wet season surveys begin once ponds are inundated with greater than three centimeters after 24 hours of a storm event. Following the initial inundation, ponds must be sampled at least every two weeks for as long as they are inundated or until they have experienced 120 days of continuous inundation, whichever is shorter. However, if ponds dry, then refill, the 120 day period starts anew.

After each substantial rain event the site was monitored to determine if the pools and puddles were inundated. Pools on the site began filling in December 2009 with pools receiving runoff from hard-packed surfaces generally filling first. As such, the sampling of onsite pools and puddles began on December 21, 2009 and continued on January 4, 5, 18, and 19, February 1, 2, 16, and 17, March 2, 3, 16, 17, and 30, April 13, 14, 27, and 28, May 11 and 25, and June 7, 2010.

After significant rain events increased in January and the soils became more saturated, a few pools previously sampled separately combined to form larger pools that were then sampled as one pool. Sampling continued in these now larger combined pools, with data only collected from the aggregate pools. In order to continue to identify the donor pools, the aggregate pools were numbered using the pool numbers of the donor pools (ex. Aggregate Pool Number 24, 25 consisted of donor pools 24 and 25). Each area once occupied by an individual donor pool, now within the boundaries of the aggregate pool, was dip-netted to assure a thorough sampling of the aggregate pools.

2.2 USFWS Reporting and Voucher Specimen

The USFWS requires that a 90-day report be submitted to the appropriate field office (Sacramento USFWS in this case) following the completion of protocol-level branchiopod surveys. Additionally, the USFWS requires that a "Notice of Presence" be submitted upon identifying a federally listed branchiopod species from the project site authorized for sampling within ten working days of the finding. It is also required that a California Natural Diversity Data Base (CNDDB) field survey form be submitted to CDFG for listed species observed on site.

Any federally listed branchiopods collected during the protocol-level surveys must be submitted as voucher specimens to the California Academy of Sciences (CAS) or the Natural Museum of Los Angeles County (LACM). All specimens have to be preserved and submitted according to the CAS or LACM strict standards.

3.0 RESULTS

A total of 128 pools met the criteria for inundation in 2009/2010 and were sampled for branchiopod species (Figure 3). As previously mentioned some of these 128 pools combined after initial sampling events to form larger pools, temporarily reducing the number of actual pools in the sample set. Once the pools were disconnected from each other they were no longer considered a group. The 2009/2010 rainy season totals for the Panoche Weather Station is 14.57 inches, 137% of the yearly average for Panoche, California (California Department of Water Resources, Station PNH, accessed online June 17th, 2010). Even though total precipitation was above average, only one pool experienced an Anostracan hatch.

3.1 Wet Season Sampling

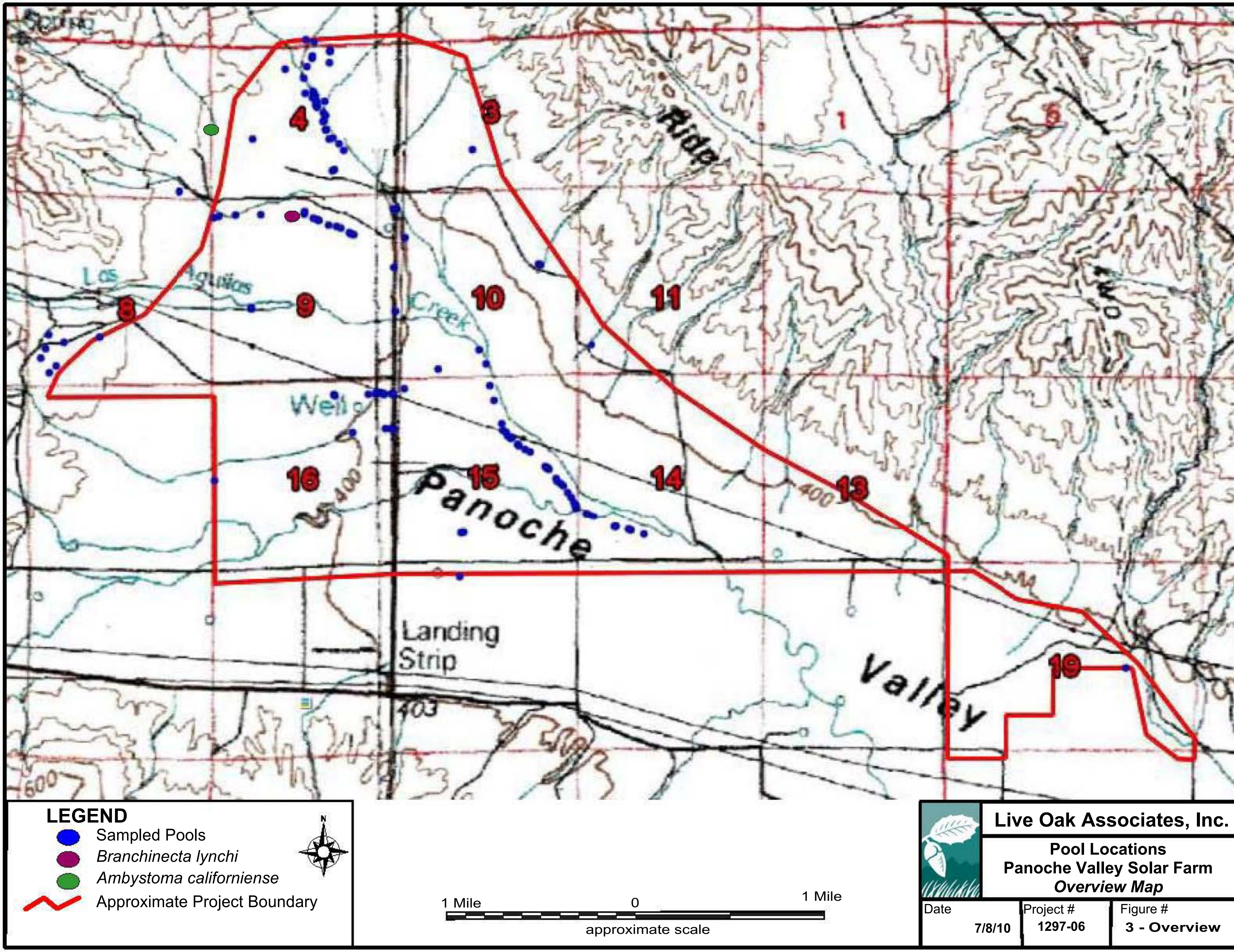
Only one anostracan species, The Federally Threatened vernal pool fairy shrimp (*Branchinecta lynchi*), was detected during 2009/2010 wet season sampling on the PVSF project site. *Branchinecta lynchi* were detected in a single pool (Pool #12) on March 16, 2010. Results of the 2009/2010 wet season Branchiopod surveys are presented in Figures 3 below. Pool #16 was found to contain California tiger salamander larvae (*Ambystoma californiense*), which were observed incidentally. Tadpole shrimp (*lepiduris packerdi*) were not detected on the site. Datasheets are presented in Appendix B. Pool coordinates are presented in Appendix C and photographs of the site, with photo specific information, are located in Appendix D.

3.2 USFWS Reporting and Voucher Specimen

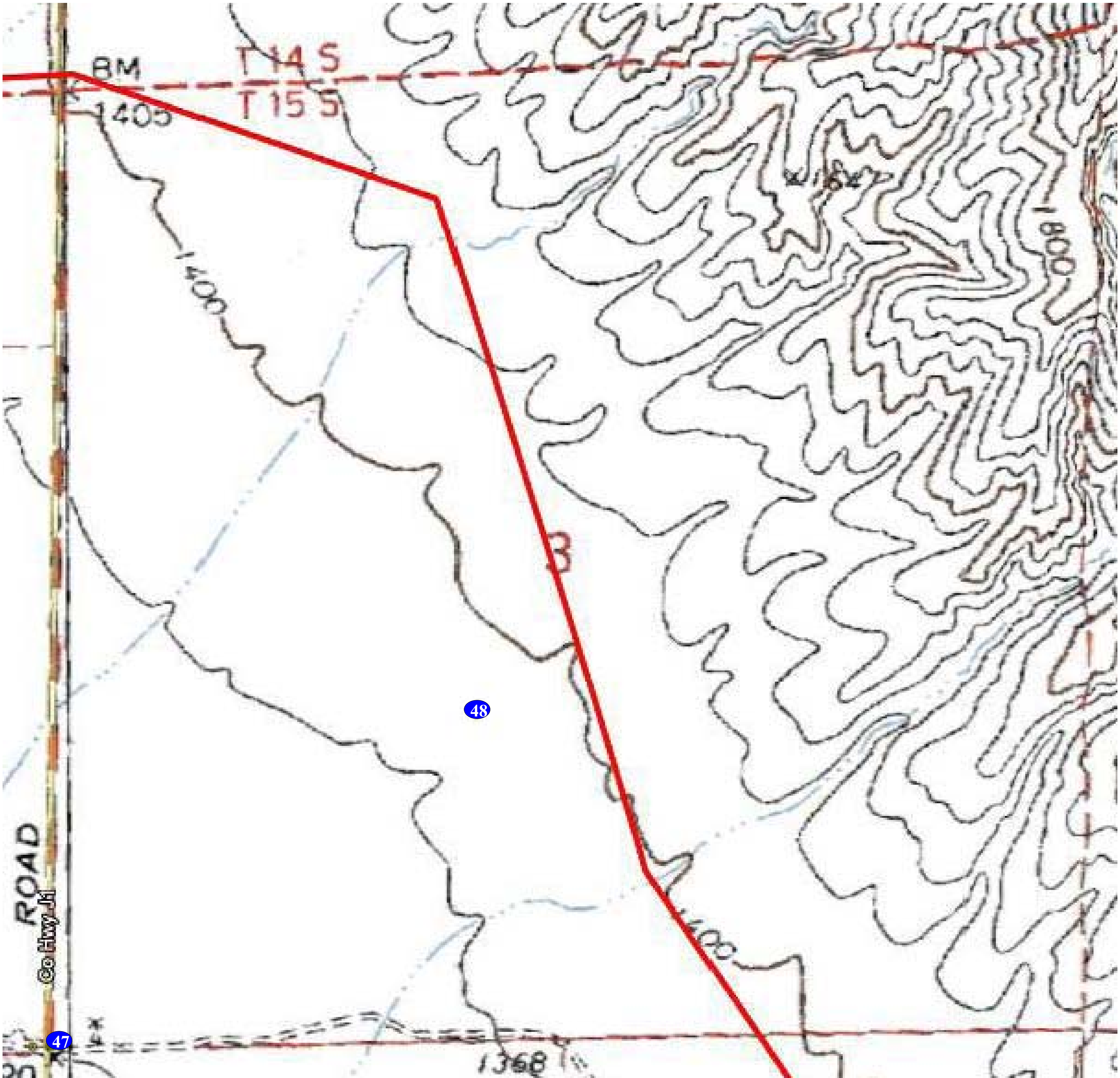
This report serves as the 2009/2010 wet season branchiopod 90-day report for the PVSF project site. Notification of the presence of the Federally Threatened *Branchinecta lynchi* was sent to Christopher Diel at the Ventura, CA Branch of the USFWS via an email on March 24, 2010.

As required by the USFWS, a CNDDB form will be submitted to CDFG in order to document the presence of *Branchinecta lynchi* found during the 2009/2010 wet season surveys.

Voucher specimens will be submitted in accordance with the *Interim Survey Guidelines* (USFWS 1996).



Live Oak Associates, Inc.		
Pool Locations Panoche Valley Solar Farm *Overview Map*		
Date 7/8/10	Project # 1297-06	Figure # 3 - Overview



LEGEND

- 68 Sampled Pool
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

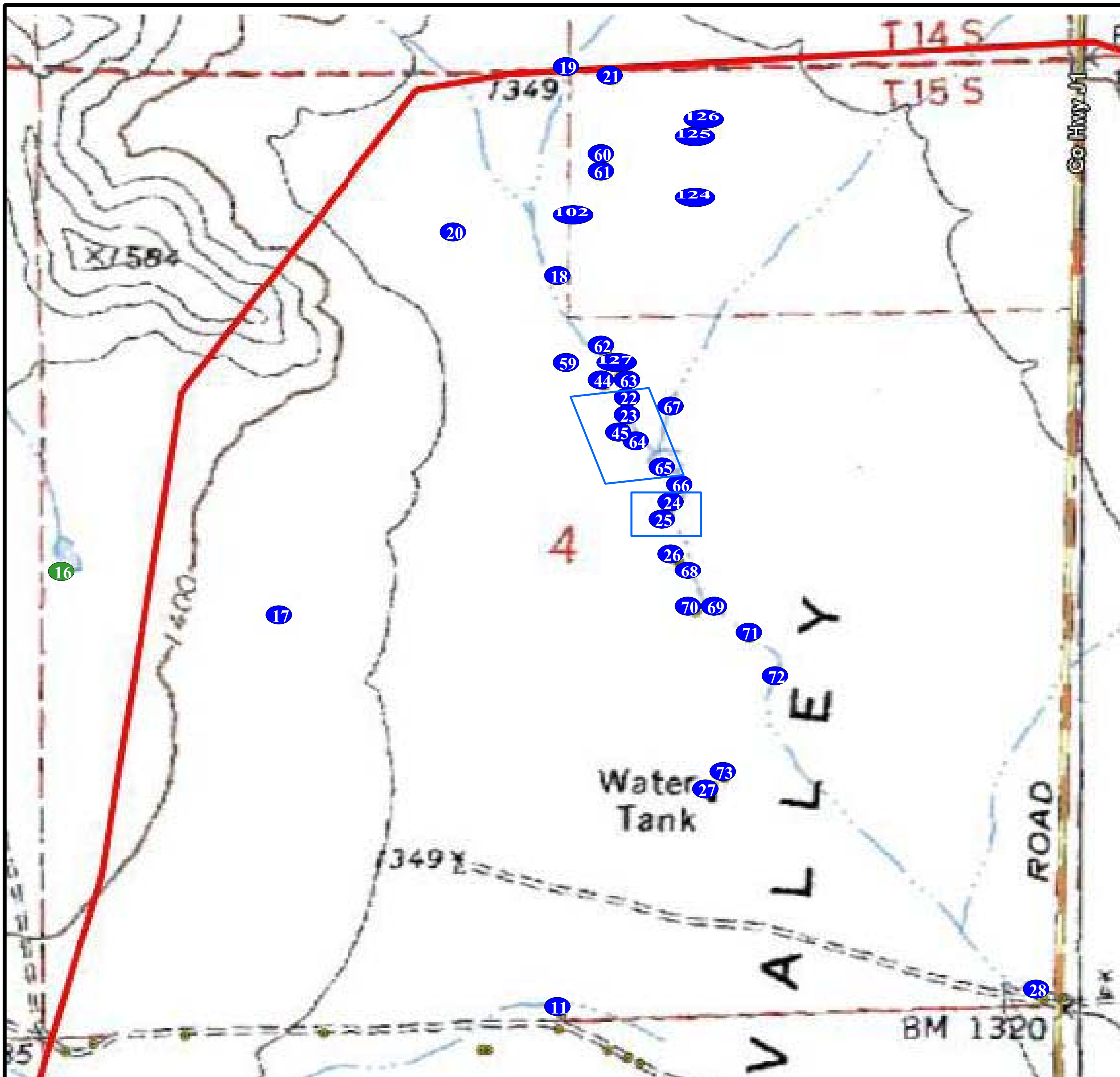
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 3

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 3



LEGEND

- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

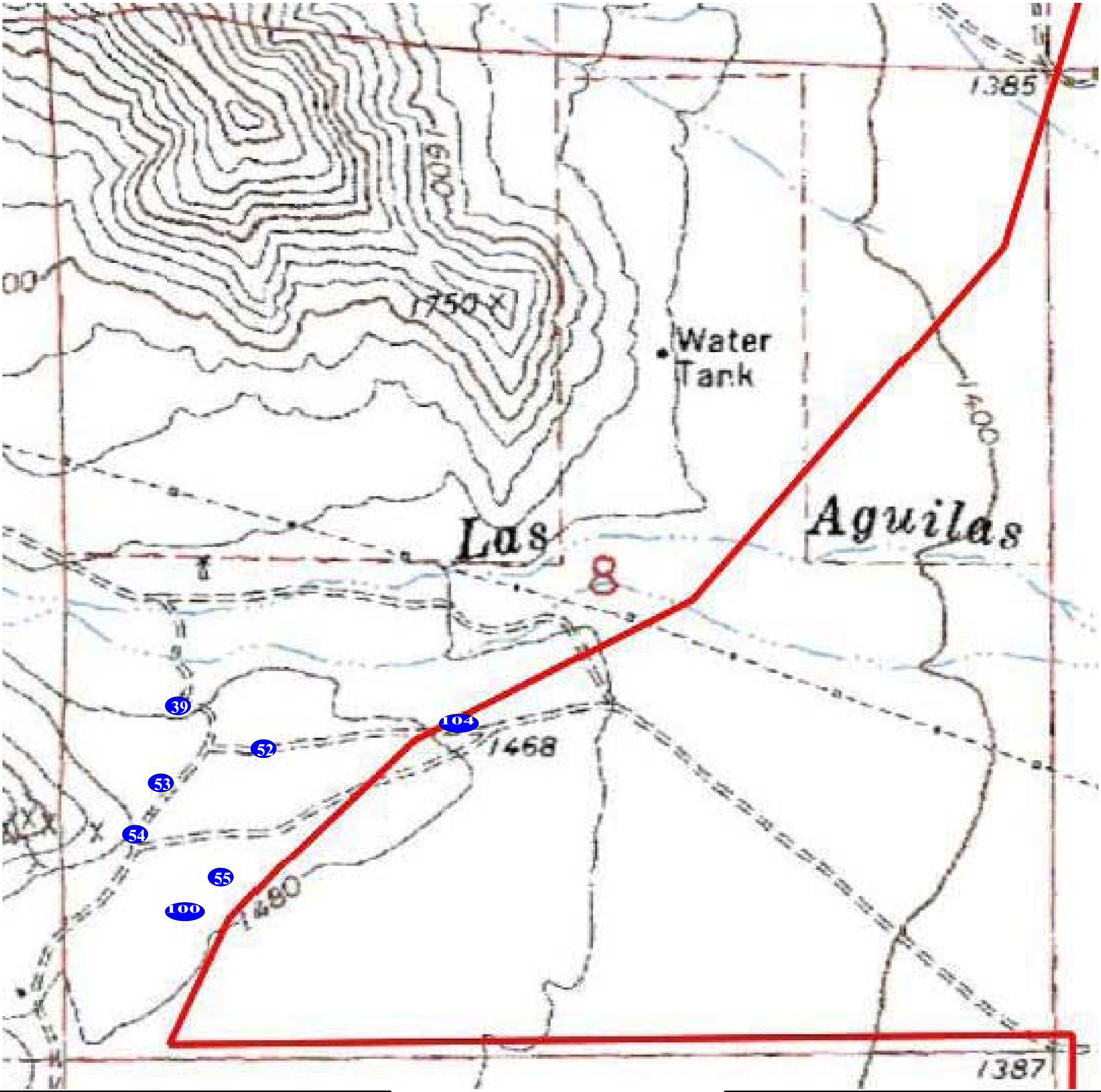
N

750' 0 750'
approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 4

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 4



LEGEND

- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

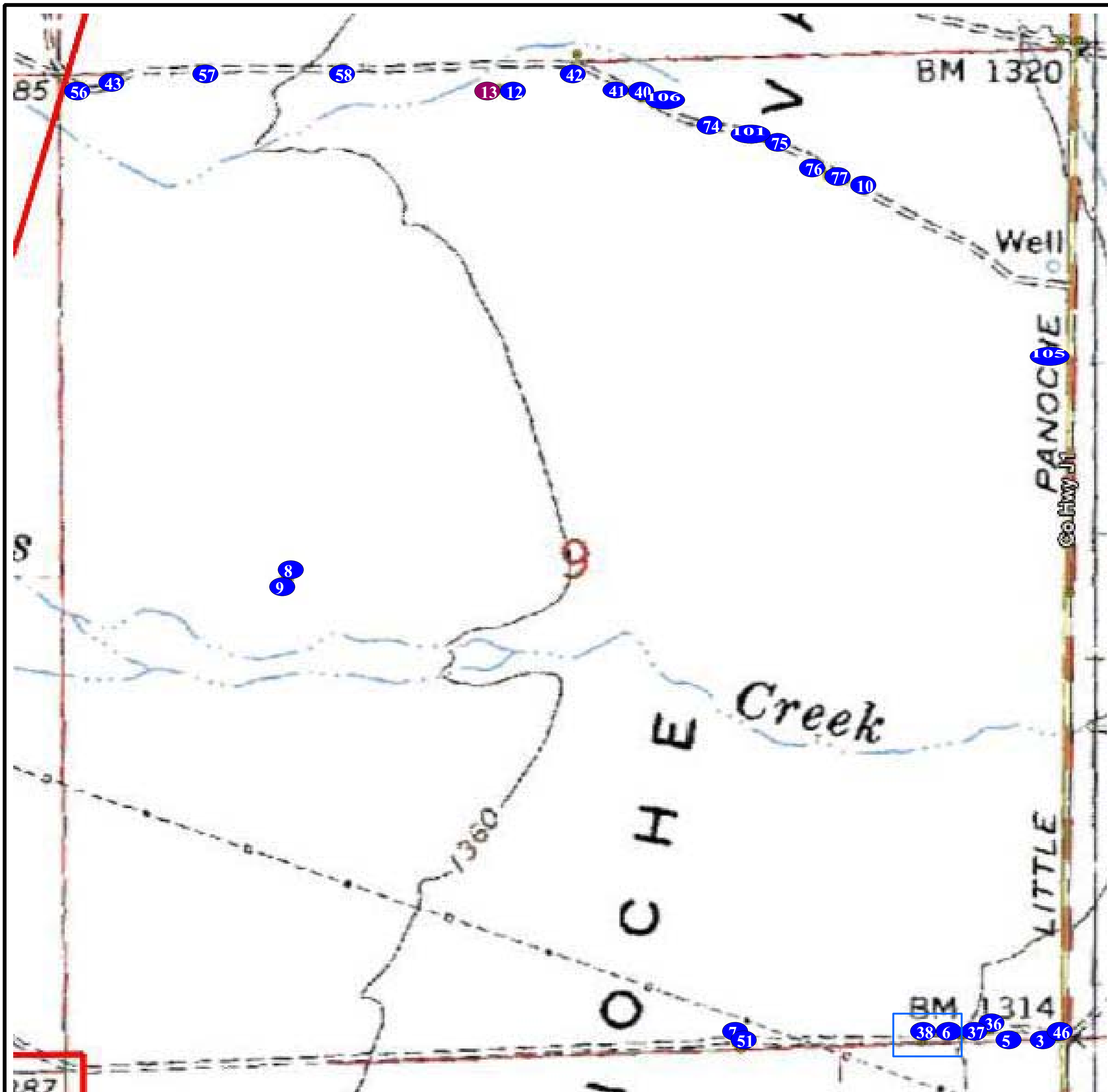
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 8

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 8



LEGEND

68 Sampled Pools

68 *Branchinecta lynchi*

68 *Ambystoma californiense*

Pools Converged Into One Pool

Approximate Project Boundary

N

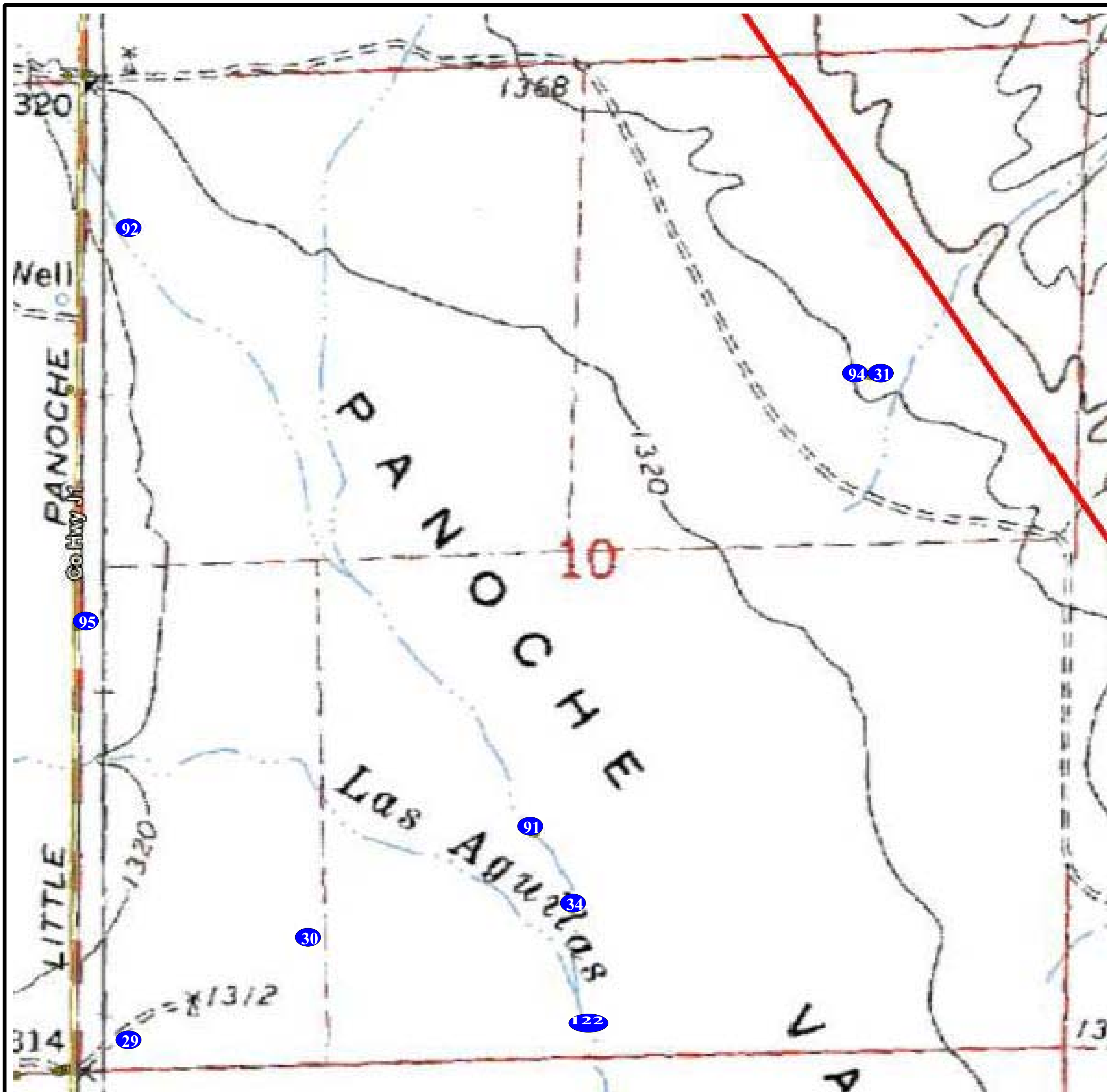
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 9

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 9



LEGEND

- 68 Sampled Pools
- 68 *Branchinecta lynchi*
- 68 *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

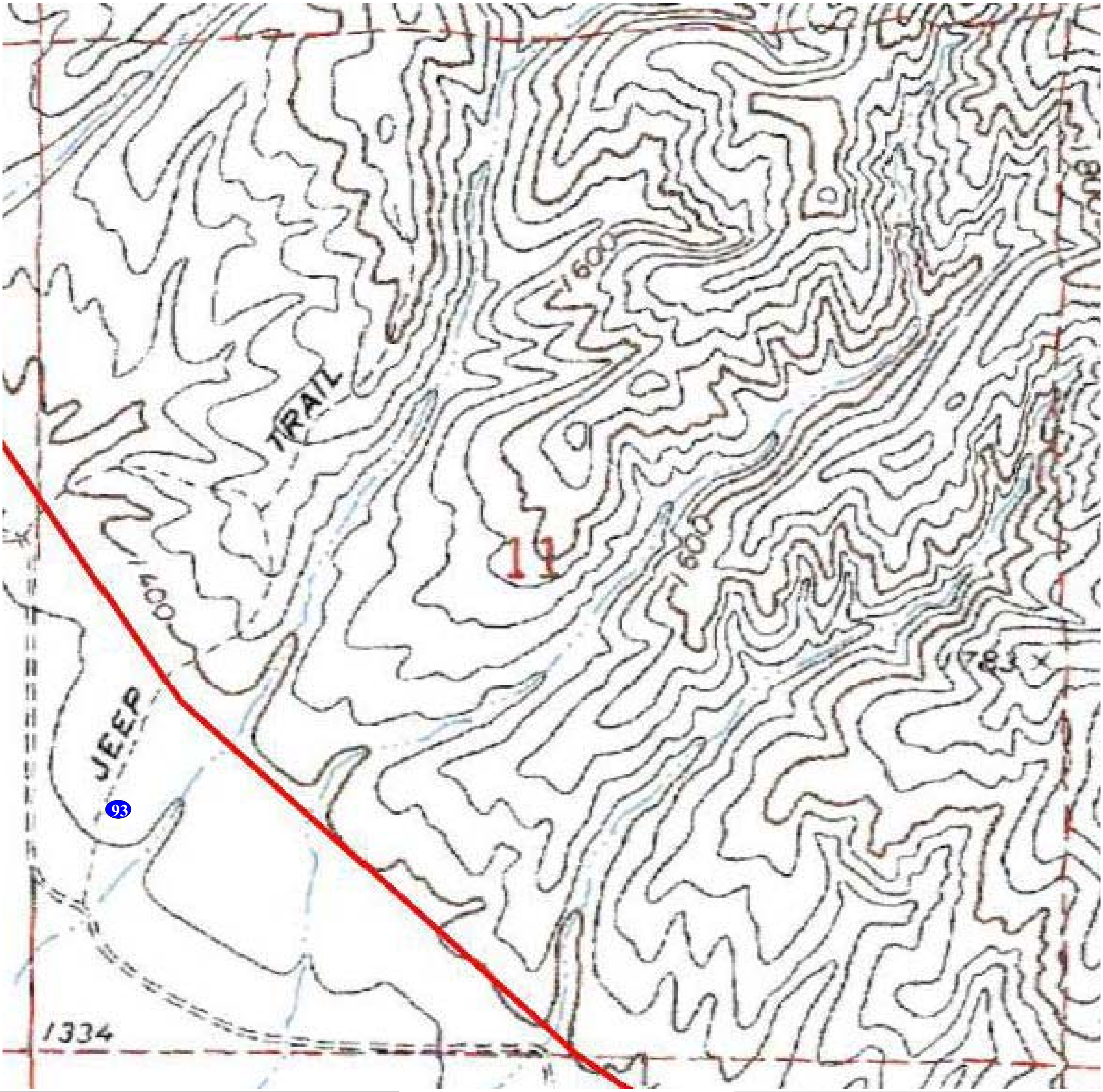
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 10

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 10



LEGEND

68 Sampled Pool

68 *Branchinecta lynchi*

68 *Ambystoma californiense*

Pools Converged Into One Pool

Approximate Project Boundary

N

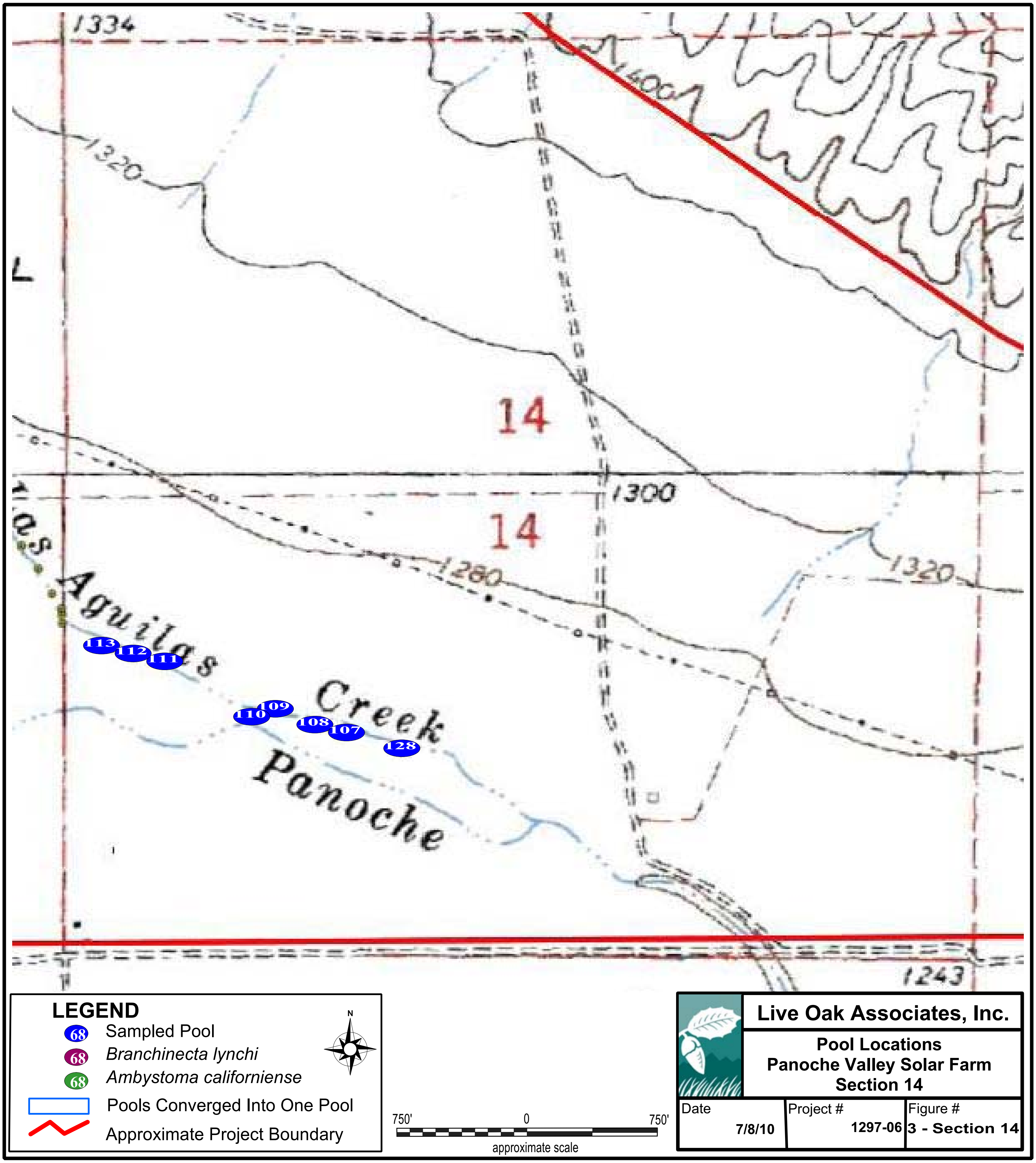
750' 0 750'

approximate scale

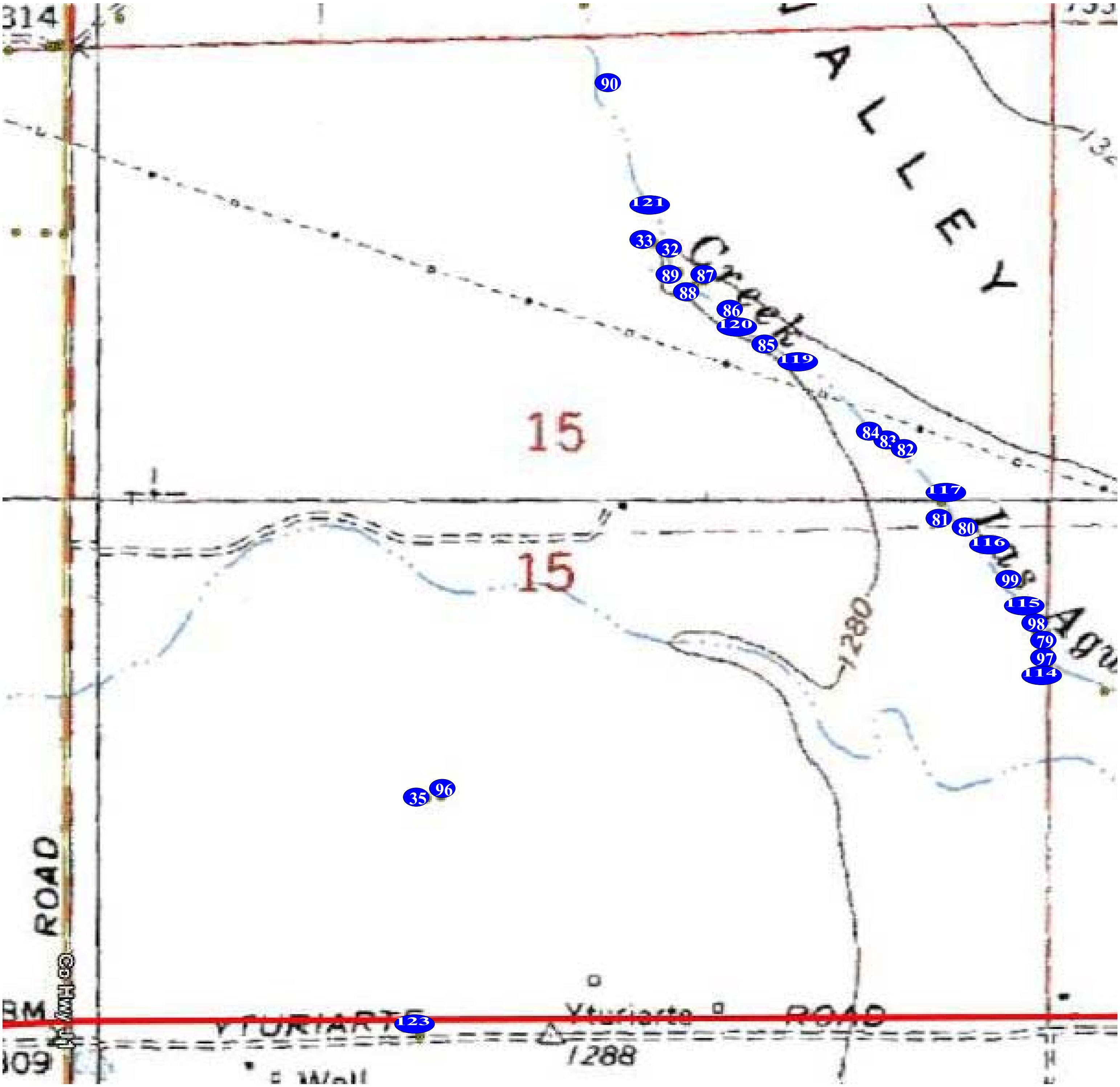
Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 11

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 11



1334
1320
14
1300
14
1280
1320
Aguilas
Creek
Panoche
113
112
111
110
109
108
107
128
1243
LEGEND
68 Sampled Pool
68 *Branchinecta lynchi*
68 *Ambystoma californiense*
Pools Converged Into One Pool
Approximate Project Boundary
N
750'
0
750'
approximate scale
Live Oak Associates, Inc.
Pool Locations
Panoche Valley Solar Farm
Section 14
Date 7/8/10
Project # 1297-06
Figure # 3 - Section 14



LEGEND

68 Sampled Pools

68 *Branchinecta lynchi*

68 *Ambystoma californiense*

Pools Converged Into One Pool

Approximate Project Boundary

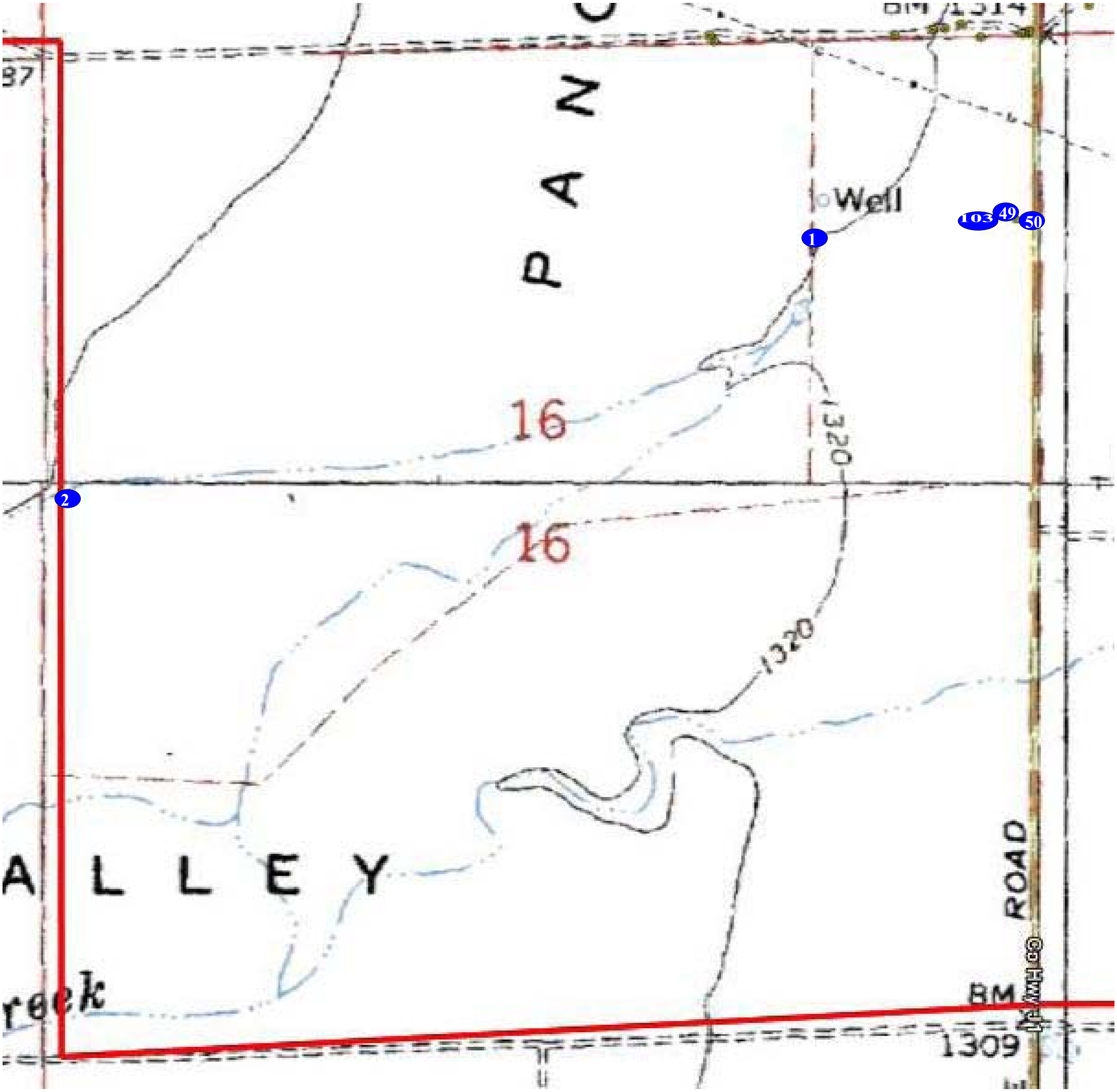
750' 0 750'

approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 15

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 15



LEGEND

68 Sampled Pools
68 *Branchinecta lynchi*
68 *Ambystoma californiense*
Pools Converged Into One Pool
Approximate Project Boundary

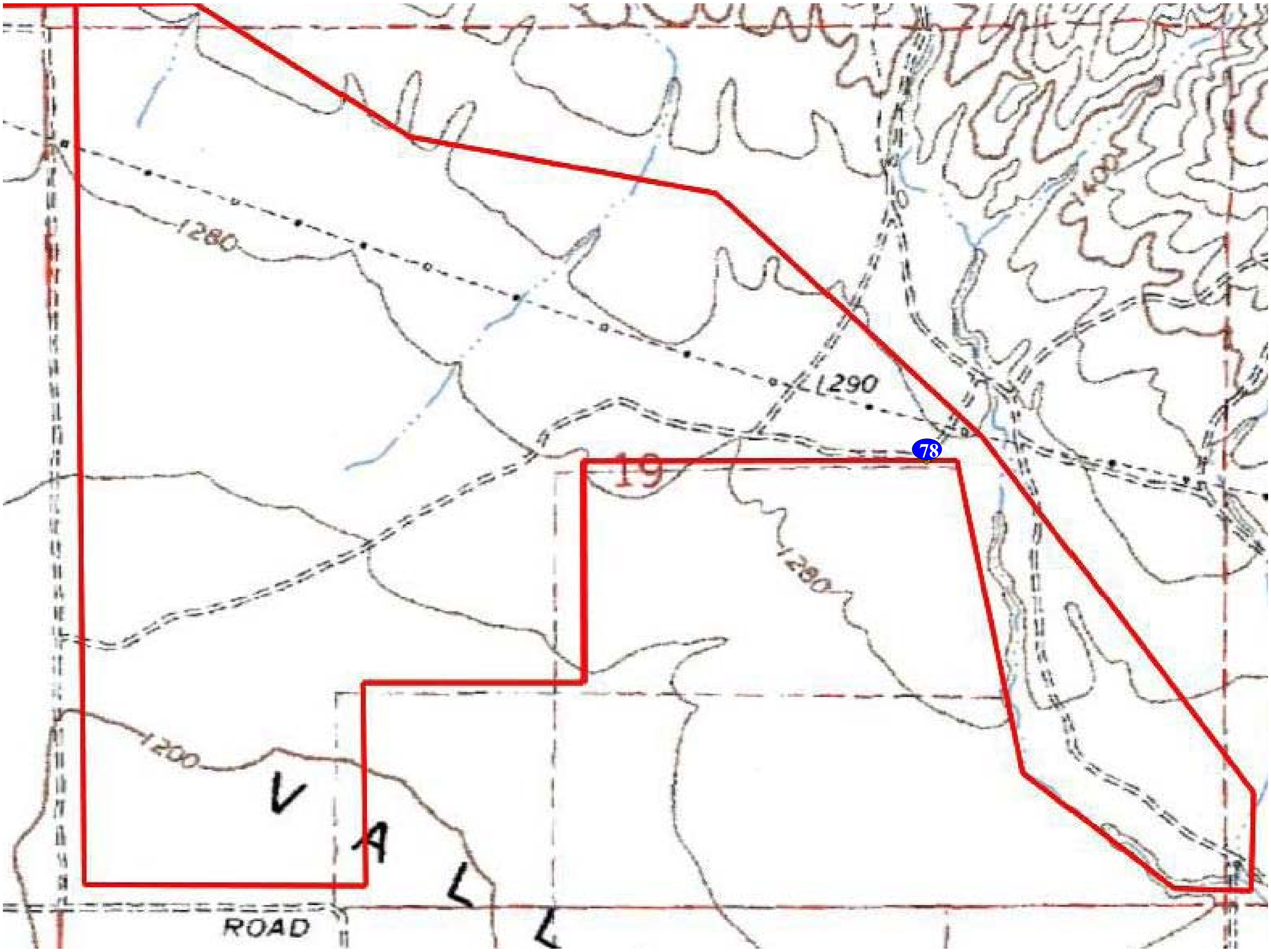
N

750' 0 750'
approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 16

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 16



LEGEND

- Sampled Pools
- *Branchinecta lynchi*
- *Ambystoma californiense*
- Pools Converged Into One Pool
- Approximate Project Boundary

N

750' 0 750'
approximate scale

Live Oak Associates, Inc.

Pool Locations
Panoche Valley Solar Farm
Section 19

Date	Project #	Figure #
7/8/10	1297-06	3 - Section 19

3.3 Conclusion

Based on the results of the 2009/2010 wet season surveys, it has been determined that the Federally Threatened vernal pool fairy shrimp (*Branchinecta lynchi*) is present in one pool (Pool #12) on the PVSF project site. Incidental findings of California tiger salamander occurred in Pool #16 during the Branchiopod surveys.

I certify that the information in this survey report and attached exhibits fully and accurately represent my work.

Jeff Gurule

Signature: Jeff Gurule . Date: August 13, 2010.

Permit # TE-168924

APPENDIX A:
AUTHORIZATION LETTERS

U.S. FISH & WILDLIFE SERVICE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
81440-2010-CPA-0023

November 24, 2009

Michele Korpos
Senior Project Manager
Live Oak Associates, Inc.
6840 Via Del Oro, Suite 220
San Jose, California 95119

Subject: Authorization to Commence Aquatic Surveys for Vernal Pool Branchiopods at the Proposed Panoche Valley Solar Farm, San Benito County, California

Dear Ms. Korpos:

We have reviewed your request, dated November 11, 2009, and received by our office by electronic mail, to conduct aquatic larval surveys for federally listed vernal pool branchiopods, including the federally threatened vernal pool fairy shrimp (*Branchinecta lynchi*). You are requesting permission to conduct wet-season sampling at the proposed Panoche Valley Solar Project, San Benito County, California. The surveys will be conducted by Davianna Ohlson, Melissa Denena, Jeff Gurule, and/or Austin Pearson under the terms and conditions of their recovery permit (TE1670750-0, TE108681-0, TE168924-0, TE108683-0 respectively) and performed in accordance with the methods described in the U.S. Fish and Wildlife Service's Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods, April 1996.

We hereby authorize Davianna Ohlson, Melissa Denena, Jeff Gurule, and Austin Pearson to conduct the wet-season surveys. We remind them of their responsibilities in reporting survey results to us, regardless of findings, and suggest that they review the permit for any special conditions that must be met. If you have any questions, please contact Christopher Diel of my staff at (805) 644-1766, extension 305.

Sincerely,

for David M. Pereksta
Assistant Field Supervisor

Jeff Gurule

From:	David_Kelly@fws.gov
Sent:	Wednesday, November 12, 2008 7:59 AM
To:	Jeff Gurule
Cc:	Elizabeth_Warne@fws.gov; Josh_Hull@fws.gov
Subject:	Re: Branchiopod Survey Data Sheet
Attachments:	Data Sheet Template.xls

Jeff, the data sheet that you presented contains the information that we required in the protocol for the VPb surveys. You are authorized to use this survey form until otherwise notified. Thank you.

David Lee Kelly
Fish and Wildlife Biologist
Recovery Branch
US Fish and Wildlife Service
2800 Cottage Way
Sacramento, CA 95825
Ph. (916) 414-6492

Jeff Gurule <jgurule@loainc.com>

11/11/2008 04:38 PM

To <David_Kelly@fws.gov>

cc

Subject Branchiopod Survey Data Sheet

Hi David,

Last rainy season Live Oak Associates, Inc. conducted branchiopod surveys on three properties in Fresno County with numerous vernal pools on each (the largest containing 92 pools); this resulted in numerous data sheets (over a 1,000 pages of data sheets) submitted with our 90-day reports. Not only were these data sheets difficult to organize and proof, PDF's of the final reports were so huge it was difficult to email them with the data sheets attached. I believe that you expressed interest, yourself, in having us utilize an abbreviated data sheet for ease of handling and reviewing after seeing how many data sheets we had amassed in those surveys.

So, as Live Oak has authorization to conduct 2nd year surveys on properties we surveyed last year, plus additional properties not surveyed last year, I have created an EXCEL template to serve as our data sheet for all surveys conducted this year. I am submitting this template for your approval. I believe using this data sheet will greatly increase efficiency, present the data in a more useful format, and greatly reduce the potential for error.

I have included an explanation of codes that would be used in the Surveyors and Habitat Condition/Land Use columns. This explanation of codes would ultimately be located at the bottom of the EXCEL sheet.

I hope this is acceptable to you or that you have some suggestions on how to further simplify it. I hope to here back from you soon, as weather conditions may necessitate initiation of surveys soon.

Thanks,

Jeff Gurule
Project Manager
Wildlife/Wetland/Plant Ecologist

APPENDIX B:
2009/2010 WET SEASON SURVEY DATA

U.S. Fish and Wildlife Service Vernal Pool Data Sheet Wet Season Protocol Survey 2009/2010
Panoche Valley Solar Farm (1297-06), San Benito County, Cerro Colorado, Mercey Hot Springs, Llanada, & Panoche Quads, Township: 15S, Range: 10E & 11E

Fairy Shrimp ID Sheet 2009/2010
Panoche Valley Solar Farm (1297-06)

Pool #	Surveyers*	Date	Time (24hr)	Water Temp	Air Temp	Depth (cm)	Length (m)	Width (m)	Habitat Conditions/ Land Use*	Number of Shrimp in Pool	Number, Sex, Genus Collected	Notes	Number, Sex, Species IDed	Listed Species (x)	Date Identified	Identified By
1	JG, AP	12/21/09	854	9.0	11.0	7	2.0	1.0	CGH		0	trough pud.				
2	JG, AP	12/21/09	915	9.5	11.0	7	3.0	2.0	CGH		0					
3	JG, AP	12/21/09	931	9.0	11.0	7	3.0	2.0	CGH		0	road				
4	JG, AP	12/21/09	933	9.0	11.0	4	1.5	1.0	CGH		0	road				
5	JG, AP	12/21/09	935	8.5	11.0	11	8.0	2.0	CGH		0	vp				
6	JG, AP	12/21/09	942	9.5	11.0	3	2.0	0.5	CGH		0	rd				
7	JG, AP	12/21/09	947	10.0	11.0	3	2.0	1.0	CGH		0	rd				
8	JG, AP	12/21/09	1017	10.0	11.0	12	25.0	2.0	CGH		0	water tank pot. peren. pool				
9	JG, AP	12/21/09	1020	10.0	11.0	15	4.0	4.0	CGH		0	trough pud.				
10	JG, AP	12/21/09	1031	9.5	11.0	15	4.0	2.0	CGH		0	rd				
11	JG, AP	12/21/09	1037	10.0	11.0	7	2.0	1.0	CGH		0					
12	JG, AP	12/21/09	1040	11.0	11.0	4	0.5	0.5	CGH		0	burm pond				
13	JG, AP	12/21/09	1042	11.0	11.0	5	6.0	3.0	CGH		0					
14	JG, AP	12/21/09	1058	11.5	11.0	10	3.0	2.0	CGH		0	trough pud				
15	JG, AP	12/21/09	1100	12.5	11.0	6	3.0	2.0	CGH		0					
16	JG, AP	12/21/09	1115	11.0	11.0	20	9.0	3.0	CGH		0	burm pond				
17	JG, AP	12/21/09	1122	12.5	11.0	7	4.0	2.0	CGH		0	trough pond				
18	JG, AP	12/21/09	1132	11.5	11.0	10	40.0	2.0	CGH		0					
19	JG, AP	12/21/09	1138	11.0	11.0	7	2.0	1.0	CGH		0					
20	JG, AP	12/21/09	1143	12.5	11.0	6	1.0	0.5	CGH		0					
21	JG, AP	12/21/09	1148	10.0	11.0	20	3.0	1.0	CGH		0					
22	JG, AP	12/21/09	1232	12.5	11.0	10	1.0	0.5	CGH		0					
23	JG, AP	12/21/09	1234	12.5	11.0	15	8.0	1.0	CGH		0					
24	JG, AP	12/21/09	1244	12.0	11.0	21	3.0	2.0	CGH		0					
25	JG, AP	12/21/09	1246	13.0	11.0	10	2.0	1.0	CGH		0					
26	JG, AP	12/21/09	1249	13.0	11.0	14	1.0	0.5	CGH		0					
27	JG, AP	12/21/09	1257	12.5	11.0	12	7.0	2.0	CGH		0	trough pud.				
28	JG, AP	12/21/09	1306	13.5	11.0	8	1.0	0.5	CGH		0	rd				
29	JG, AP	12/21/09	1332	13.0	11.0	10	5.0	2.0	CGH		0	trough pond				
30	JG, AP	12/21/09	1339	13.0	11.0	11	1.5	1,5	CGH		0					
31	JG, AP	12/21/09	1430	13.5	11.0	6	2.0	1.0	CGH		0	trough pud				
32	JG, AP	12/21/09	1451	14.0	11.0	7	4.0	2.0	CGH		0					
33	JG, AP	12/21/09	1453	13.0	11.0	14	13.0	4.0	CGH		0					
34	JG, AP	12/21/09	1502	13.5	11.0	13	6.0	5.0	CGH		0					
35	JG, AP	12/21/09	1550	13.0	11.0	11	3.0	2.0	CGH		0	trough pud				
1	JG, GC	1/4/10	1124	14.0	11.0	7	5.0	2.0	CGH		0	trough pud				
2	JG, GC	1/4/10	1137	14.0	11.0	3	1.0	1.0	CGH		0					
3	JG, GC	1/4/10	1149	14.0	11.0	8	4.0	2.0	CGH		0	rd				
4	JG, GC	1/4/10	1150	15.0	11.0	4	2.0	1.5	CGH		0	rd				
5	JG, GC	1/4/10	1157	15.0	11.0	10	7.5	2.0	CGH		0	vp				
6	JG, GC	1/4/10	1205	15.5	11.0	6	5.5	1.0	CGH		0	rd				
7	JG, GC	1/4/10	1219	17.0	11.0	3	4.0	2.0	CGH		0	rd side				
8	JG, GC	1/4/10	1430	16.5	11.0	12	45.0	5.0	CGH		0	water tank pot. peren. pool				
9	JG, GC	1/4/10	1426	16.5	11.0	15	6.0	5.0	CGH		0	trough pud				
10	JG, GC	1/4/10	1346	15.0	11.0	12	4.0	2.0	CGH		0	rd				
11	JG, GC	1/4/10	1403	15.5	11.0	6	1.0	0.5	CGH		0					
12	JG, GC	1/4/10	1412			0			CGH		0					
13	JG, GC	1/4/10	1412	13.0	11.0	4	7.0	3.0	CGH		0	Hoof pocks				
14	JG, GC	1/4/10	1444	17.5	11.0	9	4.5	2.0	CGH		0	trough pud				
15	JG, GC	1/4/10	1447	16.0	11.0	7	4.0	2.0	CGH		0					
16	JG, GC	1/4/10	1454	16.5	11.0	19	9.5	4.0	CGH		0	burm pond				
17	JG, GC	1/4/10	1500	13.5	11.0	9	5.5	2.0	CGH		0	trough pond				
18	JG, GC	1/4/10	1510	16.0	11.0	13	42.5	2.0	CGH		0					
19	JG, GC	1/4/10	1524	13.0	11.0	7	1.5	1.5	CGH		0					

20	JG, GC	1/4/10	1520	15.0	11.0	5	4.0	2.0	CGH		0	rd side				
21	JG, GC	1/4/10	1528	14.5	9.0	18	4.0	1.0	CGH		0	rd side				
22	JG, GC	1/4/10	1540	13.5	9.0	5	1.0	0.5	CGH		0					
23	JG, GC	1/4/10	1541	15.0	9.0	7	8.0	1.0	CGH		0					
24	JG, GC	1/4/10	1557	14.5	9.0	15	5.0	2.0	CGH		0					
25	JG, GC	1/4/10	1557	11.5	9.0	7	3.0	1.5	CGH		0					
26	JG, GC	1/4/10	1601	11.5	9.0	5	4.5	1.0	CGH		0					
27	JG, GC	1/4/10	1607	13.0	9.0	14	8.0	7.0	CGH		0	trough pud				
28	JG, GC	1/4/10	1607			0			CGH		0	Dry				
36	JG, GC	1/4/10	1202	16.0	11.0	6	7.0	2.0	CGH		0	rd				
37	JG, GC	1/4/10	1207	15.0	11.0	5	6.0	2.0	CGH		0	rd				
38	JG, GC	1/4/10	1211	16.0	11.0	5	3.0	1.3	CGH		0	rd side				
39	JG, GC	1/4/10	1330	17.0	11.0	7	15.0	1.5	CGH		0	rd side				
40	JG, GC	1/4/10	1358	16.0	11.0	5	2.0	1.0	CGH		0	rd				
41	JG, GC	1/4/10	1400	17.0	11.0	4	4.0	2.0	CGH		0	rd				
42	JG, GC	1/4/10	1406	16.5	11.0	7	7.0	1.0	CGH		0	rd				
44	JG, GC	1/4/10	1538	14.0	9.0	5	2.0	0.5	CGH		0	rd				
45	JG, GC	1/4/10	1520	15.0	9.0	13	15.0	2.0	CGH		0					
28	JG, GC	1/5/10	1144	12.5	10.0	5	1.0	0.5	CGH		0	rd				
29	JG, GC	1/5/10	1121	8.0	10.0	10	5.5	3.0	CGH		0	trough pud				
30	JG, GC	1/5/10	1130	12.0	10.0	10	2.0	2.0	CGH		0					
31	JG, GC	1/5/10	1210	12.5	10.0	6	2.0	1.5	CGH		0	trough pud				
32	JG, GC	1/5/10	1254	14.0	14.0	4	2.0	0.5	CGH		0					
33	JG, GC	1/5/10	1259	16.0	14.0	14	16.0	3.0	CGH		0					
34	JG, GC	1/5/10	1315	15.0	14.0	15	8.0	5.0	CGH		0					
35	JG, GC	1/5/10	1403	16.0	14.0	13	4.5	4.0	CGH		0	trough pud				
46	JG, GC	1/5/10	1109	11.0	10.0	6	6.0	1.5	TT		0	rd				
47	JG, GC	1/5/10	1139	10.5	10.0	13	2.5	2.0	TT		0	rd				
48	JG, GC	1/5/10	1154	13.5	10.0	7	18.0	4.0	CGH		0	trough pud				
1	JG, GC	1/18/10	1214	9.5	9	8	18	13	CGH		0	trough pud				
2	JG, GC	1/18/10	1224	9.5	9	20	10	5	CGH		0					
3	JG, GC	1/18/10	1251	9.5	9	12	5	3	CGH		0	3,4.46 1 way flow connection				
4	JG, GC	1/18/10	1253	9.5	9	5	2.5	2.5	CGH		0	3,4.46 1 way flow connection				
5	JG, GC	1/18/10	1256	9.5	9	20	28	5	CGH		0	5,36,37 1 way flow connection				
7	JG, GC	1/18/10	1312	9.5	9	10	20	3.5	CGH		0					
8	JG, GC	1/18/10	1416	9.5	9	10	32	4	CGH		0					
9	JG, GC	1/18/10	1418	9.5	9	20	6.5	5.5	CGH		0					
10	JG, GC	1/18/10	1349	9.5	9	20	15	3	CGH		0					
11	JG, GC	1/18/10	1359	9.5	9	14	13	11	CGH		0					
12	JG, GC	1/18/10	1403	9.5	9	14	10	8	CGH		0					
13	JG, GC	1/18/10	1405	9.5	9	18	35	13	CGH		0					
14	JG, GC	1/18/10	1429	9.5	9	18	9	6	CGH		0					
15	JG, GC	1/18/10	1431	9.5	9	10	12	11	CGH		0					
16	JG, GC	1/18/10	1440	9.5	9	40	20	14	CGH		0					
17	JG, GC	1/18/10	1447	9.5	9	8	5	3	CGH		0					
18	JG, GC	1/18/10	1515	9.5	9	17	180	5	CGH		0					
19	JG, GC	1/18/10	1458	9.5	9	15	23	7	CGH		0					
20	JG, GC	1/18/10	1508	9.5	9	10	32	7	CGH		0					
21	JG, GC	1/18/10	1500	9.5	9	25	125	3	CGH		0					
37	JG, GC	1/18/10	1259	9.5	9	12	29	3	CGH		0	5,36,37 1 way flow connection				
38	JG, GC	1/18/10	1308	9.5	9	8	12	2	CGH		0					
39	JG, GC	1/18/10	1333	9.5	9	20	23	9	CGH		0					
40	JG, GC	1/18/10	1354	9.5	9	17	7.5	3	CGH		0					
41	JG, GC	1/18/10	1355	9.5	9	9	11	5	CGH		0					
42	JG, GC	1/18/10	1358	9.5	9	14	10	1	CGH		0					
46	JG, GC	1/18/10	1255	9.5	9	20	11	4	CGH		0	3,4.46 1 way flow connection				
36,6	JG, GC	1/18/10	1257	9.5	9	14	33	5	CGH		0	pools connected				
22	JG, GC	1/19/10	932	7	7	10	3	1	CGH		0					
23	JG, GC	1/19/10	933	7	7	15	11	2	CGH		0					

26	JG, GC	1/19/10	945	7	7	14	17	3	CGH		0					
27	JG, GC	1/19/10	953	7	7	27	15	15	CGH		0					
28	JG, GC	1/19/10	1030	7	7	15	9	4	CGH		0					
29	JG, GC	1/19/10	1142	7	7	14	7	4	CGH		0					
30	JG, GC	1/19/10	1129	7	7	25	3	3	CGH		0					
31	JG, GC	1/19/10	1050	7	7	15	4	4	CGH		0					
32	JG, GC	1/19/10	1113	7	7	34	9	4.5	CGH		0					
33	JG, GC	1/19/10	1115	7	7	35	29	8	CGH		0					
34	JG, GC	1/19/10	1105	7	7	39	13	9	CGH		0					
35	JG, GC	1/19/10	1225	7	7	17	5.5	4.5	CGH		0					
44	JG, GC	1/19/10	929	7	7	10	3	1	CGH		0					
45	JG, GC	1/19/10	936	7	7	19	20	2.5	CGH		0					
47	JG, GC	1/19/10	1029	7	7	19	4.5	4	CGH		0					
48	JG, GC	1/19/10	1037	7	7	10	4	4	CGH		0					
24,25	JG, GC	1/19/10	940	7	7	27	33	2.5	CGH		0	two pools connected				
1	JG, GC	2/1/10	1232	17	17	6	1.5	1.5	CGH		0					
2	JG, GC	2/1/10	1242	12	17	25	7	4	CGH		0					
3	JG, GC	2/1/10	1259	17	17	10	5	3	CGH		0					
4	JG, GC	2/1/10	1258	17	17	5	2.5	2	CGH		0					
5	JG, GC	2/1/10	1304	15	17	20	9	4.5	CGH		0					
6	JG, GC	2/1/10	1310	16.5	17	8	9	1.5	CGH		0					
7	JG, GC	2/1/10	1314	17	17	8	13	3	CGH		0					
8	JG, GC	2/1/10	1417	14	15	12	45	3	CGH		0					
9	JG, GC	2/1/10	1418	13	15	19	7.5	6	CGH		0					
10	JG, GC	2/1/10	1711	12.5	14	16	8	3	CGH		0					
11	JG, GC	2/1/10	1441	14.5	14	13	8	6	CGH		0					
12	JG, GC	2/1/10	1434	11.5	15	30	16	10	CGH		0					
13	JG, GC	2/1/10	1435	16	15	14	35	16	CGH		0					
14	JG, GC	2/1/10	1357	17.5	17	9	10	5.5	CGH		0					
15	JG, GC	2/1/10	1356	13	17	15	6	4.5	CGH		0					
16	JG, GC	2/1/10	1450	14	14	40	23	16	CGH		0					
17	JG, GC	2/1/10	1454	15	14	8	4	2	CGH		0					
18	JG, GC	2/1/10	1501	15.5	14	19	60	3	CGH		0					
19	JG, GC	2/1/10	1510	15	14	9	3	3	CGH		0					
20	JG, GC	2/1/10	1505	16	14	9	5	3	CGH		0					
21	JG, GC	2/1/10	1516	14	14	26	15	1.5	CGH		0					
22	JG, GC	2/1/10	1604	14.5	14	6	2	1	CGH		0					
23	JG, GC	2/1/10	1606	15	14	15	8	1	CGH		0					
26	JG, GC	2/1/10	1628	11	14	33	24	3	CGH		0					
27	JG, GC	2/1/10	1651	14	14	16	9	8	CGH		0					
36	JG, GC	2/1/10	1303	16.5	17	7	13	4.5	CGH		0					
37	JG, GC	2/1/10	1308	16.5	17	8	13	2.5	CGH		0					
38	JG, GC	2/1/10	1312	17	17	10	6	2	CGH		0					
39	JG, GC	2/1/10	1346	15.5	17	15	21	2.5	CGH		0					
40	JG, GC	2/1/10	1701	13	14	13	2	2	CGH		0					
41	JG, GC	2/1/10	1700	13.5	14	9	6	4.5	CGH		0					
42	JG, GC	2/1/10	1439	16	14	7	8	2	CGH		0					
43	JG, GC	2/1/10	1407	16	15	7	2	2	CGH		0	rd				
44	JG, GC	2/1/10	1556	14	14	6	1.5	0.5	CGH		0					
45	JG, GC	2/1/10	1607	15	14	13	16	2.5	CGH		0					
46	JG, GC	2/1/10	1256	16.5	17	8	8	2	CGH		0					
49	JG, GC	2/1/10	1251	16	17	10	4	0.5	CGH		0	rd				
50	JG, GC	2/1/10	1254	16	17	6	1.5	1.5	CGH		0	rd				
51	JG, GC	2/1/10	1316	16.5	17	5	4	2.5	CGH		0	rd				
52	JG, GC	2/1/10	1327	16.5	17	5	2	1.5	CGH		0	rd				
53	JG, GC	2/1/10	1339	16.5	17	8	3	2	CGH		0	rd				
54	JG, GC	2/1/10	1340	17	17	4	4	1	CGH		0	rd				
55	JG, GC	2/1/10	1342	18	17	5	2	1.5	CGH		0					
56	JG, GC	2/1/10	1405	16.5	15	6	1.5	1	CGH		0	rd				

57	JG, GC	2/1/10	1409	16	15	6	2	2	CGH		0	rd				
58	JG, GC	2/1/10	1427	16	15	9	6	1.5	CGH		0					
59	JG, GC	2/1/10	1459	16	14	9	4	2	CGH		0					
60	JG, GC	2/1/10	1520	16	14	70	32	24	CGH		6	collected unk invert				
61	JG, GC	2/1/10	1540	16	14	9	3	1	CGH		0					
62	JG, GC	2/1/10	1554	16	14	10	3.5	1	CGH		0					
63	JG, GC	2/1/10	1558	14.5	14	22	16	2	CGH		0					
64	JG, GC	2/1/10	1609	15	14	8	17	2.5	CGH		0					
65	JG, GC	2/1/10	1612	13	14	70+	73	35	CGH		0					
66	JG, GC	2/1/10	1616	14.5	14	11	2.5	2	CGH		0					
67	JG, GC	2/1/10	1621	14.5	14	9	14	0.25	CGH		0					
68	JG, GC	2/1/10	1630	14.5	14	9	14	2.5	CGH		0					
69	JG, GC	2/1/10	1634	12.5	14	23	27	21	CGH		0					
70	JG, GC	2/1/10	1636	14.5	14	9	9	2	CGH		0					
71	JG, GC	2/1/10	1645	12	14	25	82	3	CGH		0					
72	JG, GC	2/1/10	1647	13	14	33	59	6	CGH		0					
73	JG, GC	2/1/10	1439	13	14	6	3	2	CGH		0					
74	JG, GC	2/1/10	1703	13	14	7	5	2	CGH		0	rd				
75	JG, GC	2/1/10	1705	13	14	8	4	3	CGH		0	rd				
76	JG, GC	2/1/10	1707	13.5	14	6	3	1	CGH		0	rd				
77	JG, GC	2/1/10	1709	14	14	9	2	2	CGH		0	rd				
24,25	JG, GC	2/1/10	1626	13.5	14	30	38	3	CGH		0	combo				
28	JG, GC	2/2/10	1439	18	18	9	3	3	CGH		0					
29	JG, GC	2/2/10	1448	13.5	18	13	6.5	4	CGH		0					
30	JG, GC	2/2/10	1350	11	18	31	3	3	CGH		0					
31	JG, GC	2/2/10	1420	17	18	15	3	2	CGH		0					
32	JG, GC	2/2/10	1220	14	18	17	7	4	CGH		0					
33	JG, GC	2/2/10	1222	9	18	55	31	8	CGH		0					
34	JG, GC	2/2/10	1330	14	18	30	13	7	CGH		0					
35	JG, GC	2/2/10	1520	17.5	18	11	4	4	CGH		0					
47	JG, GC	2/2/10	1438	16	18	13	2.5	2	CGH		0					
48	JG, GC	2/2/10	1429	16	18	7	3	2	CGH		0					
78	JG, GC	2/2/10	1026	11.5	18	8	2.5	2	CGH		0					
79	JG, GC	2/2/10	1129	14.5	18	10	3	1	CGH		0					
80	JG, GC	2/2/10	1134	9.5	18	55	20	5	CGH		0					
81	JG, GC	2/2/10	1137	11.5	18	8	6	2.5	CGH		0					
82	JG, GC	2/2/10	1143	18	18	5	3	1	CGH		0					
83	JG, GC	2/2/10	1145	17.5	18	6	3	1	CGH		0					
84	JG, GC	2/2/10	1147	15	18	14	1.5	2	CGH		0					
85	JG, GC	2/2/10	1156	14.5	18	20	30	2.5	CGH		0					
86	JG, GC	2/2/10	1201	15	18	17	12	2.5	CGH		0					
87	JG, GC	2/2/10	1211	17.5	18	9	1.5	1.5	CGH		0					
88	JG, GC	2/2/10	1213	12	18	47	8	5.5	CGH		0					
89	JG, GC	2/2/10	1216	13.5	18	30	13.5	4	CGH		0					
90	JG, GC	2/2/10	1302	16	18	25	30	12	CGH		0					
91	JG, GC	2/2/10	1337	19	18	10	3	1.5	CGH		0					
92	JG, GC	2/2/10	1400	17.5	18	11	10	7	CGH		0	trough pud				
93	JG, GC	2/2/10	1409	16	18	9	4	4	CGH		0	trough pud				
94	JG, GC	2/2/10	1419	19	18	9	1.5	1	CGH		0					
95	JG, GC	2/2/10	1445	18.5	18	7	16	0.5	CGH		0					
96	JG, GC	2/2/10	1026	14	18	13	4	4	CGH		0	trough pud				
2	JG, GC	2/16/10	1453	16.5	18.5	30	9.5	5	CGH		0					
3	JG, GC	2/16/10	1537	19	18.5	9	4	2.5	CGH		0					
4	JG, GC	2/16/10	1538	20	18.5	4	2	1.5	CGH		0					
5	JG, GC	2/16/10	1535	20.5	18.5	21	10	4	CGH		0					
6	JG, GC	2/16/10	1531	20	18.5	7	5	1.5	CGH		0					
7	JG, GC	2/16/10	1527	21	18.5	5	5	2.5	CGH		0					
8	JG, GC	2/16/10	1627	16	18.5	12	45	2.5	CGH		0					
9	JG, GC	2/16/10	1629	17	18.5	19	7	7	CGH		0					

10	JG, GC	2/16/10	1547	17	18.5	17	6	2.5	CGH		0					
11	JG, GC	2/16/10	1611	15	18.5	19	8	6	CGH		0					
12	JG, GC	2/16/10	1617	18	18.5	33	17	15	CGH		0					
13	JG, GC	2/16/10	1615	20	18.5	18	38	19	CGH		0					
14	JG, GC	2/16/10	1640	16	18.5	18	6	5	CGH		0					
15	JG, GC	2/16/10	1642	19	18.5	9	6.5	9	CGH		0					
16	JG, GC	2/16/10	1651	18	18.5	40	24.5	17	CGH		0					
17	JG, GC	2/16/10	1655	14.5	18.5	6	3	1	CGH		0					
36	JG, GC	2/16/10	1534	20	18.5	11	6	3	CGH		0					
37	JG, GC	2/16/10	1533	20	18.5	11	6	2	CGH		0					
38	JG, GC	2/16/10	1529	18.5	18.5	5	3	1.5	CGH		0					
39	JG, GC	2/16/10	1517	21.5	18.5	10	21	3	CGH		0					
40	JG, GC	2/16/10	1604	19	18.5	11	1.5	1	CGH		0					
41	JG, GC	2/16/10	1606	19	18.5	6	4	4	CGH		0					
42	JG, GC	2/16/10	1609	17.5	18.5	5	2	1	CGH		0					
46	JG, GC	2/16/10	1539	20	18.5	7	5	2	CGH		0					
49	JG, GC	2/16/10	1444	20.5	18.5	6	2	0.25	CGH		0					
53	JG, GC	2/16/10	1505	18.5	18.5	7	2.5	2	CGH		0					
54	JG, GC	2/16/10	1507	20	18.5	4	3	1	CGH		0					
55	JG, GC	2/16/10	1514	21	18.5	4	2	1.5	CGH		0					
58	JG, GC	2/16/10	1621	18	18.5	6	3	0.75	CGH		0					
74	JG, GC	2/16/10	1555	20	18.5	7	5	2.5	CGH		0					
75	JG, GC	2/16/10	1551	19.5	18.5	7	4	2	CGH		0					
76	JG, GC	2/16/10	1549	19	18.5	4	2.5	0.75	CGH		0					
78	JG, GC	2/16/10	1353	21	18.5	10	2.5	2	CGH		0					
79	JG, GC	2/16/10	1421	20	18.5	15	5	1.5	CGH		0					
97	JG, GC	2/16/10	1419	22	18.5	6	1.5	0.5	CGH		0					
98	JG, GC	2/16/10	1422	22.5	18.5	5	3	0.5	CGH		0					
99	JG, GC	2/16/10	1425	22.5	18.5	9	4	1	CGH		0					
100	JG, GC	2/16/10	1510	20	18.5	9	2.5	2	CGH		0					
101	JG, GC	2/16/10	1553	20	18.5	5	6.5	1	CGH		0					
18	JG, GC	2/17/10	1112	16	19	13	52	4	CGH		0					
19	JG, GC	2/17/10	1125	16	19	14	3	3	CGH		0					
20	JG, GC	2/17/10	1120	19	19	9	4	3	CGH		0					
21	JG, GC	2/17/10	1128	13.5	19	23	9.5	2	CGH		0	collected unk invert				
22	JG, GC	2/17/10	1208	20	19	11	1.5	0.75	CGH		0					
23	JG, GC	2/17/10	1210	20.5	19	11	7	1.5	CGH		0					
26	JG, GC	2/17/10	1231	12.5	19	33	25	5	CGH		0					
27	JG, GC	2/17/10	1248	21	19	7	9	6	CGH		0					
28	JG, GC	2/17/10	1500	21	19	8	3	2	CGH		0					
29	JG, GC	2/17/10	1455	17	19	11	6.5	4.5	CGH		0					
30	JG, GC	2/17/10	1635	13	19	33	3.5	3.5	CGH		0					
31	JG, GC	2/17/10	1518	22	19	5	2	1	CGH		0					
32	JG, GC	2/17/10	1618	22	19	19	7	3	CGH		0					
33	JG, GC	2/17/10	1620	13.5	19	51	31	9	CGH		0					
34	JG, GC	2/17/10	1630	16	19	31	14	9	CGH		0					
44	JG, GC	2/17/10	1205	20	19	9	2	0.33	CGH		0					
45	JG, GC	2/17/10	1212	21	19	12	17	3.5	CGH		0					
47	JG, GC	2/17/10	1501	20.5	19	12	3	3	CGH		0					
48	JG, GC	2/17/10	1510	21.5	19	8	4	2	CGH		0					
59	JG, GC	2/17/10	1103	17.5	19	9	5	2	CGH		0					
60	JG, GC	2/17/10	1145	12.5	19	70+	31	26	CGH		0					
62	JG, GC	2/17/10	1202	19.5	19	11	5	1.5	CGH		0					
63	JG, GC	2/17/10	1203	17	19	27	19	2.5	CGH		0					
64	JG, GC	2/17/10	1214	21	19	7	10	2	CGH		0					
65	JG, GC	2/17/10	1217	17.5	19	70+	75	36	CGH		0	unk invert				
66	JG, GC	2/17/10	1226	16.5	19	15	4	2	CGH		0					
68	JG, GC	2/17/10	1233	20	19	7	14	2.5	CGH		0					
69	JG, GC	2/17/10	1237	16.5	19	14	25	19	CGH		0					

70	JG, GC	2/17/10	1235	21.5	19	7	6	1.5	CGH		0					
71	JG, GC	2/17/10	1240	17	19	26	80	4	CGH		0					
72	JG, GC	2/17/10	1245	13.5	19	36	56	5	CGH		0					
73	JG, GC	2/17/10	1250	21	19	4	1	1	CGH		0					
80	JG, GC	2/17/10	1532	14.5	19	43	17	5	CGH		0					
81	JG, GC	2/17/10	1534	22	19	15	12	4	CGH		0					
82	JG, GC	2/17/10	1538	23.5	19	8	5	1.5	CGH		0					
83	JG, GC	2/17/10	1540	23.5	19	8	5.5	1.5	CGH		0					
84	JG, GC	2/17/10	1542	22.5	19	13	17	2	CGH		0					
85	JG, GC	2/17/10	1550	20	19	19	24	2.5	CGH		0					
86	JG, GC	2/17/10	1610	20	19	17	12	2	CGH		0					
88	JG, GC	2/17/10	1615	15.5	19	44	8	6	CGH		0					
89	JG, GC	2/17/10	1617	19.5	19	21	12	5	CGH		0					
90	JG, GC	2/17/10	1626	22.5	19	22	30	12	CGH		0					
92	JG, GC	2/17/10	1643	18	19	13	12	7	CGH		0					
93	JG, GC	2/17/10	1523	21	19	7	4	3	CGH		0					
96	JG, GC	2/17/10	1444	18	19	17	6	5	CGH		0					
102	JG, GC	2/17/10	1200	25	19	4	6	1	CGH		0					
24,25	JG, GC	2/17/10	1228	12	19	30	39	3	CGH		0					
1	JG, AP	3/2/10	1238	14	12	6	1	1			0					
2	JG, AP	3/2/10	1246	13	12	34	7	3			0					
3	JG, AP	3/2/10	1311	14	12	11	4	3			0					
4	JG, AP	3/2/10	1308	14	12	5	1.5	1			0					
5	JG, AP	3/2/10	1314	13.5	12	25	9	4			0					
6	JG, AP	3/2/10	1319	14	12	9	5	1			0					
7	JG, AP	3/2/10	1410	15.5	12	8	11	2			0					
8	JG, AP	3/2/10	1518	15	12	16	19	2			0					
9	JG, AP	3/2/10	1520	14	12	20	5	4			0					
10	JG, AP	3/2/10	1426	15	12	20	7	2			0					
11	JG, AP	3/2/10	1448	15	12	22	7	6			0					
12	JG, AP	3/2/10	1450	13	12	35	4	8			0					
13	JG, AP	3/2/10	1453	14	12	18	32	9			0					
14	JG, AP	3/2/10	1553	13.5	12	18	5	4			0					
15	JG, AP	3/2/10	1551	15	12	10	7	6			0					
16	JG, AP	3/2/10	1604	13	12	57	23	21			0	1 cts larva				
17	JG, AP	3/2/10	1418	13.5	12	8	3	1			0					
36	JG, AP	3/2/10	1316	14	12	9	7	2			0					
37	JG, AP	3/2/10	1318	14	12	6	9	2			0					
38	JG, AP	3/2/10	1413	15.5	12	12	3	2			0					
39	JG, AP	3/2/10	1358	15	12	16	18	4			0					
40	JG, AP	3/2/10	1442	15	12	16	2	2			0					
41	JG, AP	3/2/10	1444	15	12	12	3	2			0					
42	JG, AP	3/2/10	1446	15	12	9	7	1			0					
43	JG, AP	3/2/10	1529	14	12	7	2	1			0					
46	JG, AP	3/2/10	1304	14	12	8	6	1			0					
49	JG, AP	3/2/10	1212	13.5	12	17	18	1			0					
50	JG, AP	3/2/10	1218	13.5	12	7	4	0.5			0					
51	JG, AP	3/2/10	1412	16.5	12	3	1.5	1.1			0					
52	JG, AP	3/2/10	1344	16	12	6	2	2			0					
53	JG, AP	3/2/10	1346	17	12	10	4	3			0					
54	JG, AP	3/2/10	1348	17.5	12	8	6	1			0					
55	JG, AP	3/2/10	1354	17	12	10	5	2			0					
56	JG, AP	3/2/10	1533	14	12	6	2	0.5			0					
57	JG, AP	3/2/10	1501	15	12	7	3	2			0					
58	JG, AP	3/2/10	1458	14.5	12	9	5	1			0					
74	JG, AP	3/2/10	1438	15	12	10	5	2			0					
75	JG, AP	3/2/10	1432	15.5	12	9	4	2			0					
76	JG, AP	3/2/10	1429	15	12	6	3	1			0					
77	JG, AP	3/2/10	1430	15	12	10	1	1			0					

100	JG, AP	3/2/10	1353	16.5	12	11	2	2			0					
101	JG, AP	3/2/10	1434	15.5	12	7	7	2			0					
103	JG, AP	3/2/10	1230	14	12	10	2	1	cgh		0	rd				
104	JG, AP	3/2/10	1403	16	12	9	4	4	cgh		0					
105	JG, AP	3/2/10	1421	15	12	10	14	8	cgh		0					
106	JG, AP	3/2/10	1441	15	12	9	4	1.5			0	rd				
18	JG, AP	3/3/10	1359	11.5	10	25	44	1.5			0					
19	JG, AP	3/3/10	1410	11	10	18	5	1			0					
20	JG, AP	3/3/10	1406	12	10	10	4	3			0					
21	JG, AP	3/3/10	1414	11	10	33	15	1			0					
26	JG, AP	3/3/10	1520	11	10	41	22	2			0					
27	JG, AP	3/3/10	1552	13.5	10	17	8	4			0					
28	JG, AP	3/3/10	1211	12	10	12	3	2			0					
29	JG, AP	3/3/10	1224	12	10	12	5	2			0					
30	JG, AP	3/3/10	1134	10	10	37	3	3			0					
31	JG, AP	3/3/10	1155	10	10	8	2	1			0					
32	JG, AP	3/3/10	1056	9	10	20	6	3			0					
33	JG, AP	3/3/10	1101	9.5	10	50+	30	8			0					
34	JG, AP	3/3/10	1125	9.5	10	40	11	4			0					
35	JG, AP	3/3/10	1330	13	10	4	3	1			0					
44	JG, AP	3/3/10	1454	12	10	11	2	0.5			0					
47	JG, AP	3/3/10	1209	10	10	18	3	2			0					
59	JG, AP	3/3/10	1356	12.5	10	13	11	5			0					
60	JG, AP	3/3/10	1420	10	10	50+	29	y			0					
61	JG, AP	3/3/10	1428	11	10	14	3	1			0					
62	JG, AP	3/3/10	1448	12.5	10	20	4	1			0					
63	JG, AP	3/3/10	1452	11.5	10	31	18	2			0					
66	JG, AP	3/3/10	1511	12.5	10	18	3	1			0					
67	JG, AP	3/3/10	1506	12	10	6	7	0.5			0					
68	JG, AP	3/3/10	1523	14	10	13	12	2			0					
69	JG, AP	3/3/10	1526	11.5	10	45	37	20			0					
70	JG, AP	3/3/10	1530	14	10	11	9	1			0					
71	JG, AP	3/3/10	1534	11	10	32	72	2			0					
72	JG, AP	3/3/10	1540	11	10	43	55	4			0					
73	JG, AP	3/3/10	1554	13.5	10	14	3	2			0					
78	JG, AP	3/3/10	903	7.5	10	13	2	2			0					
79	JG, AP	3/3/10	952	9	10	20	5	1			0					
80	JG, AP	3/3/10	1013	9	10	49	16	4			0					
81	JG, AP	3/3/10	1017	9	10	22	10	3			0					
82	JG, AP	3/3/10	1022	10	10	11	6	1			0					
83	JG, AP	3/3/10	1027	10	10	14	5	1			0					
84	JG, AP	3/3/10	1028	10	10	23	16	2			0					
85	JG, AP	3/3/10	1036	9.5	10	34	34	3			0					
86	JG, AP	3/3/10	1041	9.5	10	30	23	2			0					
88	JG, AP	3/3/10	1045	8.5	10	47	7	5			0					
89	JG, AP	3/3/10	1054	9	10	33	17	4			0					
90	JG, AP	3/3/10	1115	9.5	10	30	30	7			0					
91	JG, AP	3/3/10	1129	10	10	14	3	1			0					
92	JG, AP	3/3/10	1215	12	10	5	3	2			0					
93	y	3/3/10	1150	10	10	12	3	2			0					
94	JG, AP	3/3/10	1156	10	10	9	1	1			0					
95	JG, AP	3/3/10	1220	12.5	10	12	17	1			0					
96	JG, AP	3/3/10	1333	12.5	10	16	4	4			0					
97	JG, AP	3/3/10	950	9	10	13	3	1			0					
98	JG, AP	3/3/10	954	9	10	12	16	1			0					
99	JG, AP	3/3/10	957	9	10	18	19	0.5			0					
102	JG, AP	3/3/10	1432	12	10	11	5	1			0					
107	JG, AP	3/3/10	924	8.5	10	10	4	1	cgh		0	swale				
108	JG, AP	3/3/10	926	8.5	10	13	3	0.5	cgh		0	swale				

109	JG, AP	3/3/10	929	9	10	12	3	1	cgh		0	swale				
110	JG, AP	3/3/10	931	8.5	10	19	9	1	cgh		0	swale				
111	JG, AP	3/3/10	934	9	10	15	11	1	cgh		0	swale				
112	JG, AP	3/3/10	936	9	10	16	8	1	cgh		0	swale				
113	JG, AP	3/3/10	938	9	10	17	4	1	cgh		0	swale				
114	JG, AP	3/3/10	942	9	10	12	10	1	cgh		0	swale				
115	JG, AP	3/3/10	956	9	10	8	3	0.5	cgh		0	swale				
116	JG, AP	3/3/10	1000	9	10	15	8	1	cgh		0	swale				
117	JG, AP	3/3/10	1019	9	10	7	15	1	cgh		0	swale				
118	JG, AP	3/3/10	1025	10	10	11	3	1	cgh		0	swale				
119	JG, AP	3/3/10	1034	9.5	10	17	48	3	cgh		0	swale				
120	JG, AP	3/3/10	1039	10	10	12	20	0.5	cgh		0	swale				
121	JG, AP	3/3/10	1110	9.5	10	23	26	8	cgh		0	swale				
122	JG, AP	3/3/10	1121	10	10	15	40	8	cgh		0	swale				
123	JG, AP	3/3/10	1337	13	10	9	5	4	cgh		0	swale				
124	JG, AP	3/3/10	1436	12.5	10	15	3	1	cgh		0	swale				
125	JG, AP	3/3/10	1440	12.5	10	14	5	1	cgh		0	swale				
126	JG, AP	3/3/10	1442	13	10	13	5	0.5	cgh		0	swale				
127	JG, AP	3/3/10	1450	12.5	10	15	5	1	cgh		0	swale				
2,23,45,64,65	JG, AP	3/3/10	1500	10	10	100+	140	40			0	pools combined				
24,25	JG, AP	3/3/10	1514	11.5	10	35	34	2			0					
2	JG, GC	3/16/10	1045	12.5	21	33	7	5								
3	JG, GC	3/16/10	1139	20	21	6	4	2								
5	JG, GC	3/16/10	1132	16	21	13	10	3								
8	JG, GC	3/16/10	1308	24.5	21	14	53	4								
9	JG, GC	3/16/10	1310	20	21	11	6.5	5								
10	JG, GC	3/16/10	1148	17	21	14	4.5	2								
11	JG, GC	3/16/10	1158	16	21	16	6	5								
12	JG, GC	3/16/10	1203	12.5	21	30	17	10		100s	4,Male,Branc		4, Male, *Branchinecta Lynchi*	x	3/18/2010	JG
13	JG, GC	3/16/10	1200	18	21	17	32	13								
14	JG, GC	3/16/10	1319	17	21	14	6	6								
15	JG, GC	3/16/10	1321	24.5	21	5	3.5	2								
16	JG, GC	3/16/10	1330	19	21	50	25	5				2 CTS Larva				
18	JG, GC	3/16/10	1045	24	21	13	47	2								
19	JG, GC	3/16/10	1409	19	21	12	1	0.5								
21	JG, GC	3/16/10	1411	19	21	24	7	2								
26	JG, GC	3/16/10	1530	16.5	21	21	24	3								
27	JG, GC	3/16/10	1607	23	21	7	7	5								
29	JG, GC	3/16/10	1626	21.5	21	11	7	4								
37	JG, GC	3/16/10	1130	21	21	4	7	5								
39	JG, GC	3/16/10	1109	18	21	5	14	2.5								
41	JG, GC	3/16/10	1154	22	21	3	3	2.5								
42	JG, GC	3/16/10	1156	22	21	3	2	0.5								
47	JG, GC	3/16/10	1635	20	21	13	3	2								
59	JG, GC	3/16/10	1350	24.5	21	6	2	1								
60	JG, GC	3/16/10	1416	13	21	75+	35	27								
62	JG, GC	3/16/10	1443	27	21	6	3	0.5								
63	JG, GC	3/16/10	1445	20	21	23	16	2								
66	JG, GC	3/16/10	1516	15	21	9	2.5	5								
68	JG, GC	3/16/10	1535	23.5	21	7	10	2								
69	JG, GC	3/16/10	1541	24	21	15	23	17								
70	JG, GC	3/16/10	1603	25	21	5	3	0.5								
71	JG, GC	3/16/10	1545	16	21	30	81	4								
72	JG, GC	3/16/10	1601	19	21	30	60	5								
74	JG, GC	3/16/10	1152	22	21	3	7	5								
23,45,64,65	JG, GC	3/16/10	1455	14	21	75+	103	84								
24,25	JG, GC	3/16/10	1519	20	21	21	34	2.5								
30	JG, GC	3/17/10	1144	13	21	32	3.5	3.5								
33	JG, GC	3/17/10	1122	11.5	21	75+	33	7.5								

34	JG, GC	3/17/10	1137	13	21	30	11.5	8								
80	JG, GC	3/17/10	1050	12	21	23	7	3.5								
81	JG, GC	3/17/10	1055	19	21	7	3.5	1.5								
85	JG, GC	3/17/10	1105	14	21	18	30	2.5								
85	JG, GC	3/17/10	1118	18	21	11	6	2.5								
86	JG, GC	3/17/10	1109	16	21	14	9	2								
88	JG, GC	3/17/10	1113	11	21	37	7	4.5								
89	JG, GC	3/17/10	1116	13	21	22	10	3.5								
90	JG, GC	3/17/10	1130	13	21	25	29	12								
92	JG, GC	3/17/10	1211	22	21	6	6	6								
96	JG, GC	3/17/10	1228	19	21	15	4	4								
2	JG,AP	3/30/10	1007	14	13	19	4	3		0						
8	JG,AP	3/30/10	1057	15	13	8	17	2		0						
12	JG,AP	3/30/10	1049	13	13	21	11	5		0						
13	JG,AP	3/30/10	1043	15	13	8	13	4		0						
14	JG,AP	3/30/10	1105	13.5	13	3	2	0.5		0						
16	JG,AP	3/30/10	1115	13.5	13	45	21	12		0		10 cts larva				
24	JG,AP	3/30/10	1206	16.5	13	6	2	1		0						
25	JG,AP	3/30/10	1208	13.5	13	16	14	2		0						
26	JG,AP	3/30/10	1211	14	13	20	18	2		0						
29	JG,AP	3/30/10	1252	17.5	13	10	5	2		0						
30	JG,AP	3/30/10	1310	17	13	19	3	3		0						
33	JG,AP	3/30/10	1327	13	13	65	25	10		0						
34	JG,AP	3/30/10	1315	16.5	13	20	8	7		0						
60	JG,AP	3/30/10	1128	12	13	71	25	15		0						
63	JG,AP	3/30/10	1145	15.5	13	15	8	1		0						
69	JG,AP	3/30/10	1216	15	13	15	4	3		0		all hoof prints				
71	JG,AP	3/30/10	1219	14.5	13	19	66	2		0						
72	JG,AP	3/30/10	1225	14.5	13	23	29	3		0						
80	JG,AP	3/30/10	1349	19	13	4	2	1		0						
85	JG,AP	3/30/10	1340	19	13	12	14	1		0						
88	JG,AP	3/30/10	1334	14.5	13	34	4	4		0						
89	JG,AP	3/30/10	1333	17	13	15	6	1		0						
90	JG,AP	3/30/10	1320	17.5	13	20	21	9		0						
45,64,65	JG,AP	3/30/10	1152	12.5	13	75+	88	32		0						
1	GC,JG	4/13/10	1355	27.5	16	5	3	1								
2	GC,JG	4/13/10	1405	19	16	26	10	4								
3	GC,JG	4/13/10	1456	21.5	16	10	6	3								
4	GC,JG	4/13/10	1457	21.5	16	8	4	3								
5	GC,JG	4/13/10	1454	21	16	20	22	4.5								
6	GC,JG	4/13/10	1448	27.5	16	7	10	2								
7	GC,JG	4/13/10	1445	25	16	9	15	3								
8	GC,JG	4/13/10	1602	19.5	16	13	60	3								
9	GC,JG	4/13/10	1604	19.5	16	15	5.5	5								
10	GC,JG	4/13/10	1511	24	16	21	10	3								
11	GC,JG	4/13/10	1545	22	16	9	5	4								
12	GC,JG	4/13/10	1548	27.5	16	25	16	8								
13	GC,JG	4/13/10	1546	21	16	11	22	8								
14	GC,JG	4/13/10	1612	19.5	16	15	6	4.5								
15	GC,JG	4/13/10	1617	22	16	7	9	5.5								
16	GC,JG	4/13/10	1621	18	16	40	24	15				Clam shrimp, 4 CTS				
17	GC,JG	4/13/10	1633	19.5	16	6	5	2								
18	GC,JG	4/13/10	1638	19.5	16	14	52	2								
19	GC,JG	4/13/10	1646	17.5	16	16	5	4								
20	GC,JG	4/13/10	1644	19	16	8	5	3								
21	GC,JG	4/13/10	1648	13.5	16	26	16	1.5								
29	GC,JG	4/13/10	1500	23.5	16	14	6.5	4								
36	GC,JG	4/13/10	1452	27.5	16	15	27	4								
37	GC,JG	4/13/10	1450	27.5	16	15	14	2.5								

38	GC,JG	4/13/10	1447	25	16	10	8	2.5								
39	GC,JG	4/13/10	1423	27	16	17	24	7								
40	GC,JG	4/13/10	1523	22	16	18	2.5	2.5								
41	GC,JG	4/13/10	1524	22.5	16	7	6	5								
42	GC,JG	4/13/10	1544	22.5	16	10	9	4								
43	GC,JG	4/13/10	1610	20	16	8	1.5	1								
46	GC,JG	4/13/10	1458	25.5	16	7	9.5	3								
49	GC,JG	4/13/10	1350	23.5	16	11	13	0.5								
50	GC,JG	4/13/10	1347	26	16	12	70	2								
50	GC,JG	4/13/10	1347	26	16	12	70	2								
52	GC,JG	4/13/10	1420	27	16	5	4	4								
53	GC,JG	4/13/10	1426	27.5	16	9	3	2								
54	GC,JG	4/13/10	1428	27.5	16	8	9	2								
55	GC,JG	4/13/10	1433	26	16	10	5	2.5								
56	GC,JG	4/13/10	1608	20	16	6	1.5	0.5								
57	GC,JG	4/13/10	1611	20	16	9	1	1								
60	GC,JG	4/13/10	1654	14	16	75+	28	23								
61	GC,JG	4/13/10	1700	17	16	7	2	0.5								
74	GC,JG	4/13/10	1520	25	16	10	7	3								
75	GC,JG	4/13/10	1517	26	16	9	6	3.5								
76	GC,JG	4/13/10	1515	25.5	16	9	7	1								
77	GC,JG	4/13/10	1513	25	16	12	3	3								
100	GC,JG	4/13/10	1430	26	16	10	3	2.5								
101	GC,JG	4/13/10	1518	25.5	16	9	9	2								
104	GC,JG	4/13/10	1416	27.5	16	6	5	5								
106	GC,JG	4/13/10	1522	23.5	16	13	5	2								
22	GC,JG	4/14/10	1000	14	15	7	2	0.5								
23	GC,JG	4/14/10	1001	14.5	15	12	7	1								
24	GC,JG	4/14/10	1031	13.5	15	16	15	3								
25	GC,JG	4/14/10	1033	12	15	18	12	1.5								
26	GC,JG	4/14/10	1035	14	15	20	20.5	2								
27	GC,JG	4/14/10	1113	15.5	15	18	9	8								
28	GC,JG	4/14/10	1641	19	15	7	2	1								
30	GC,JG	4/14/10	1618	16	15	23	2.5	2.5								
32	GC,JG	4/14/10	1556	18	15	20	7	5								
33	GC,JG	4/14/10	1557	13	15	63	30	8								
34	GC,JG	4/14/10	1610	16	15	30	10	7								
35	GC,JG	4/14/10	1657	16.5	15	9	4	3								
44	GC,JG	4/14/10	958	14	15	9	2	0.5								
47	GC,JG	4/14/10	1642	19.5	15	18	3	3								
62	GC,JG	4/14/10	954	16	15	6	2.5	0.5								
63	GC,JG	4/14/10	956	12.5	15	17	14.5	1.5								
68	GC,JG	4/14/10	1045	12.5	15	13	13	2								
69	GC,JG	4/14/10	1052	17.5	15	10	20	3								
70	GC,JG	4/14/10	1054	17	15	9	7.5	1								
71	GC,JG	4/14/10	1100	14	15	22	71	3								
72	GC,JG	4/14/10	1105	14.5	15	21	33	4.5								
73	GC,JG	4/14/10	1115	20.5	15	6	1.5	0.5								
78	GC,JG	4/14/10	1432	21.5	15	13	3	3								

79	GC,JG	4/14/10	1513	19	15	12	5	1.5								
85	GC,JG	4/14/10	1542	20	15	16	24	2								
86	GC,JG	4/14/10	1547	18	15	17	11	2								
88	GC,JG	4/14/10	1549	16.5	15	26	5	4								
89	GC,JG	4/14/10	1555	19.5	15	21	10	3.5								
90	GC,JG	4/14/10	1604	20	15	13	25	9								
91	GC,JG	4/14/10	1613	18	15	15	4	2								
92	GC,JG	4/14/10	1644	17.5	15	10	6	5								
95	GC,JG	4/14/10	1649	20	15	14	44	1.5								
96	GC,JG	4/14/10	1659	18.5	15	15	5	5								
97	GC,JG	4/14/10	1512	19	15	12	3.5	1.5								
98	GC,JG	4/14/10	1514	21	15	7	6.5									
99	GC,JG	4/14/10	1524	20	15	13	10	0.5								
109	GC,JG	4/14/10	1500	21.5	15	11	3	1								
111	GC,JG	4/14/10	1502	20	15	10	4	1								
112	GC,JG	4/14/10	1505	20.5	15	10	9	1								
113	GC,JG	4/14/10	1508	18	15	15	6	1.5								
114	GC,JG	4/14/10	1511	19	15	9	8	1								
115	GC,JG	4/14/10	1522	19	15	10	4	0.5								
116	GC,JG	4/14/10	1526	20	15	7	2.5	0.5								
123	GC,JG	4/14/10	1703	19	15	9	4	2.5								
128	GC,JG	4/14/10	1454	22	15	10	5	1								
45,64,65	GC,JG	4/14/10	1002	12	15	75+	86	83								
2	GC, JG	4/27/10	1418	20	24	16	4	3								
5	GC, JG	4/27/10	1450	21	24	14	8	3								
7	GC, JG	4/27/10	1445	23	24	4	1	0.5								
8	GC, JG	4/27/10	1517	23	24	7	59	4								
10	GC, JG	4/27/10	1456	26	24	9	3.5	2								
12	GC, JG	4/27/10	1504	22	24	21	12	8.5								
16	GC, JG	4/27/10	1539	18.5	24	39	21	14			Clam Shrimp	5 CTS				
18	GC, JG	4/27/10	1600	21.5	24	9	12	0.5								
21	GC, JG	4/27/10	1605	21	24	15	3	1								
24	GC, JG	4/27/10	1636	21	24	11	4	1.5								
26	GC, JG	4/27/10	1638	21	24	10	15	1.5								
42	GC, JG	4/27/10	1501	23	24	6	2	1								
60	GC, JG	4/27/10	1608	18	24	75+	26	23								
65	GC, JG	4/27/10	1620	17	24	75+	72	30								
71	GC, JG	4/27/10	1640	21	24	16	55	2								
72	GC, JG	4/27/10	1645	21	24	12	25.5	3								
29	GC, JG	4/28/10	1036	13.5	11	11	6.5	3.5								
30	GC, JG	4/28/10	1019	12	11	15	2	2								
32	GC, JG	4/28/10	1003	12	11	55	24	7								
34	GC, JG	4/28/10	1017	12	11	21	8	5.5								
35	GC, JG	4/28/10	1045	13.5	11	11	5.5	5								
88	GC, JG	4/28/10	957	12.5	11	14	3	2.5								
90	GC, JG	4/28/10	1011	12.5	11	11	10	4								
16	AP	5/11/10	815	8	9	23	14	7				17 cts larva, 3"-4"				
33	AP	5/11/10	936	10	12	30	20	4								
60	AP	5/11/10	833	10	9	40+	25	14								
65	AP	5/11/10	850	11	9	50+	63	27								
108	AP	5/11/10	758	9.5	9	7	18	3								
112	AP	5/11/10	745	8	9	9	7	4								
60	AP	5/25/10	825	13	14	40+	20	14								
65	AP	5/25/10	850	13	14	50+	54	22								
60	AP	6/7/10	810	19.5	23	35	19	10								
65	AP	6/7/10	832	20	23	50	51	20								

* JG=Jeff Gurule; GC=Geoff Cline; AP=Austin Pearson
CGH=Cattle Grazing Heavy

APPENDIX C:
POOL COORDINATES

Panoche Solar Farm Pool Locations **Grid: UTM** **Datum: NAD83** **Zone: 10S**

Pool #	Easting	Northing	Altitude
1	689496	4055757	1305 ft
2	688302	4055313	1342 ft
3	689829	4056101	1324 ft
4	689834	4056100	1319 ft
5	689763	4056093	1314 ft
6	689688	4056103	1316 ft
7	689326	4056083	1320 ft
8	688589	4056816	1372 ft
9	688595	4056815	1374 ft
10	689470	4057479	1342 ft
11	689036	4057670	1333 ft
12	688911	4057611	1335 ft
13	688921	4057611	1338 ft
14	687939	4057814	1379 ft
15	687945	4057818	1382 ft
16	688234	4058362	1380 ft
17	688572	4058300	1402 ft
18	689004	4058842	1332 ft
19	689014	4059176	1357 ft
20	688840	4058916	1356 ft
21	689086	4059160	1354 ft
22	689119	4058641	1330 ft
23	689120	4058634	1320 ft
24	689187	4058476	1331 ft
25	689181	4058467	1316 ft
26	689204	4058399	1318 ft
27	689270	4058041	1318 ft
28	689811	4057710	1306 ft
29	689938	4056148	1308 ft
30	690230	4056326	1294 ft
31	691090	4057257	1358 ft
32	690834	4055790	1271 ft
33	690806	4055805	1279 ft
34	690648	4056380	1286 ft
35	690460	4054895	1314 ft
36	689732	4056112	1308 ft
37	689708	4056105	1337 ft
38	689626	4056092	1327 ft
39	686835	4056546	1454 ft
40	689145	4057604	1309 ft
41	689113	4057614	1327 ft
42	689033	4057647	1329 ft
43	688292	4057609	1362 ft
44	689083	4058673	1320 ft
45	689115	4058610	1320 ft
46	689842	4056105	1301 ft
47	689839	4057712	1311 ft
48	690492	4058250	1374 ft
49	689828	4055797	1296 ft
50	689855	4055796	1294 ft
51	689333	4056074	1312 ft
52	686969	4056483	1469 ft
53	686814	4056424	1484 ft
54	686776	4056341	1486 ft
55	686907	4056277	1476 ft
56	688248	4057597	1378 ft
57	688437	4057625	1361 ft
58	688657	4057633	1351 ft
59	689019	4058710	1344 ft
60	689075	4059037	1331 ft
61	689072	4059015	1337 ft
62	689086	4058729	1325 ft
63	689107	4058687	1338 ft
64	689125	4058590	1320 ft
65	689181	4058543	1312 ft
66	689199	4058519	1310 ft
67	689190	4058645	1305 ft
68	689208	4058395	1332 ft
69	689269	4058326	1309 ft
70	689236	4058317	1301 ft
71	689323	4058278	1305 ft
72	689366	4058222	1305 ft
73	689288	4058054	1312 ft
74	689248	4057557	1329 ft
75	689355	4057533	1338 ft
76	689431	4057496	1320 ft
77	689443	4057485	1316 ft
78	696325	4053843	1330 ft
79	691459	4055163	1264 ft
80	691320	4055354	1257 ft
81	691291	4055371	1245 ft
82	691217	4055474	1270 ft
83	691196	4055487	1260 ft
84	691183	4055498	1279 ft
85	691004	4055643	1256 ft
86	690938	4055687	1267 ft
87	690890	4055745	1274 ft
88	690875	4055737	1275 ft
89	690848	4055758	1285 ft
90	690724	4056063	1285 ft
91	690585	4056501	1294 ft
92	689917	4057463	1316 ft
93	691576	4056566	1361 ft
94	691108	4057252	1362 ft
95	689847	4056821	1301 ft
96	690484	4054899	1289 ft
97	691460	4055152	1241 ft
98	691441	4055189	1236 ft
99	691385	4055274	1236 ft
100	686848	4056217	1490 ft
101	689315	4057548	1331 ft
102	689029	4058943	1312 ft
103	689781	4055798	1307 ft
104	687276	4056536	1469 ft
105	689824	4057202	1308 ft
106	689163	4057595	1323 ft
107	691959	4054950	1247 ft
108	691936	4054959	1252 ft
109	691827	4054980	1234 ft
110	691813	4054979	1246 ft
111	691629	4055068	1256 ft
112	691593	4055078	1253 ft
113	691552	4055092	1249 ft
114	691461	4055137	1258 ft
115	691417	4055233	1251 ft
116	691346	4055332	1252 ft
117	691281	4055396	1256 ft
118	691206	4055485	1269 ft
119	691049	4055621	1263 ft
120	690950	4055672	1264 ft
121	690796	4055862	1268 ft
122	690685	4056192	1292 ft
123	690458	4054510	1277 ft
124	689225	4058981	1329 ft
125	689226	4059076	1346 ft
126	689230	4059090	1336 ft
127	689092	4058711	1338 ft
128	692072	4054918	1258 ft

APPENDIX D:
PHOTOS

Photo 1: Looking SW at Pool #12 - a stock pond. Vernal pool fairy shrimp (*Branchinecta lynchi*) were observed in this pool on 3/16/10.

Photo 2: Looking SE at Pool #5, a natural vernal pool at the toe of a swale. No shrimp were observed in this pool during the 09/10 wet season survey.

Photo 3: LOA Biologist Mr. Jeff Gurule (TE-168924) sampling Pool #50 at the intersection of a ranch road and Little Paonoche Road looking east. This pool is an example of the many ruderal pools associated with the ranch roads on the site. No shrimp were observed in this pool during the 09/10 wet season survey.

Photo 4: Incidental California tiger salamander observation from Pool #16 on May 11th, 2010.

Photo 5: Looking south across the study area.

Photo 6: Looking north across the study area.

LIVE OAK ASSOCIATES, INC.
an Ecological Consulting Firm

August 13, 2010

Douglass Cooper
Fish and Wildlife Service
2493 Portola Road, Suite B
Ventura, California 93003

RE: Non-Protocol Branchiopod Survey Results, Solargen Energy, Panoche Valley Mitigation Parcels.

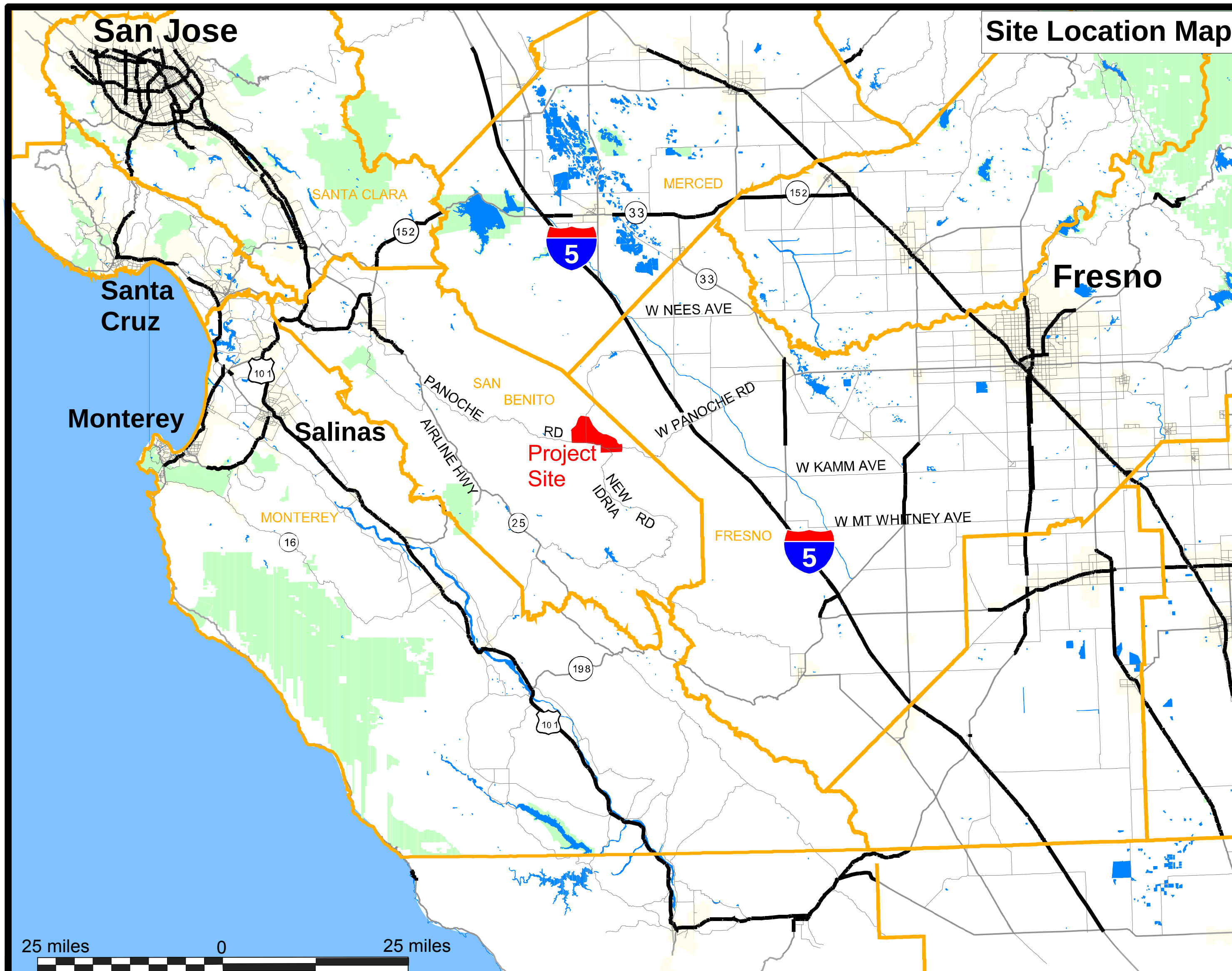
Douglass:

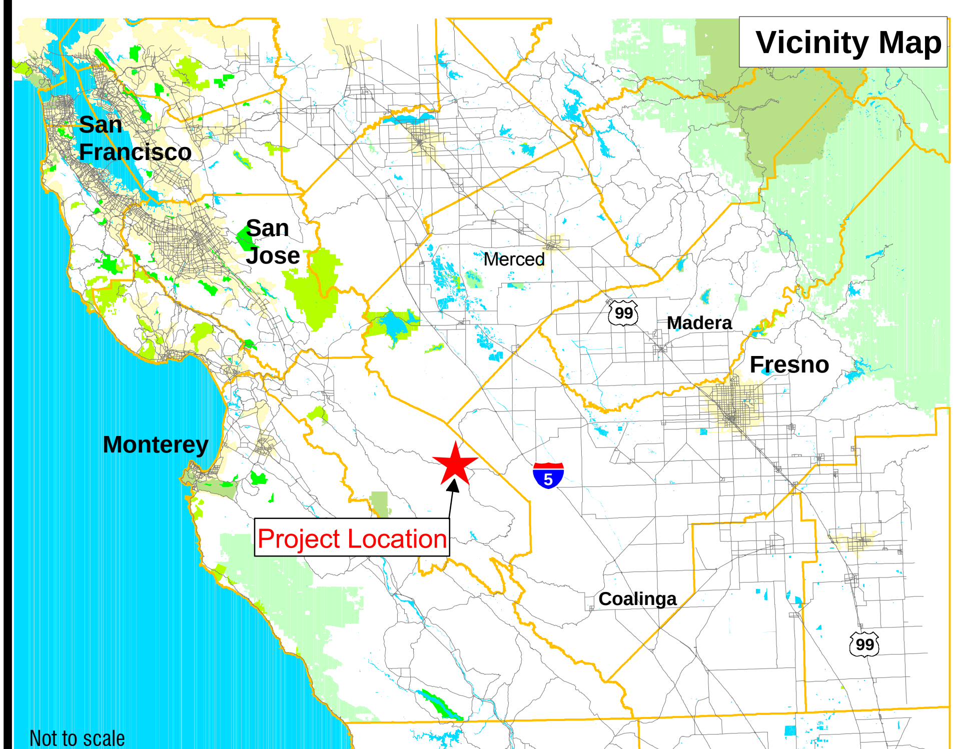
This letter serves the purpose of the 90-day survey report, as required by the U.S. Fish and Wildlife Service (USFWS), for the results of a non-protocol reconnaissance Brachiopod survey conducted on approximately 10,300 acres of property for the Solargen Energy solar project in Panoche Valley, CA. The survey site is located in east-central San Benito County and southwest Fresno County, approximately 8 miles west of Interstate 5, less than 1 mile south of Mercey Hot Springs, east of Pinnacles National Monument, and north of Panoche Road, along Little Panoche Road (Figure 1). The site can be found on the Cerro Colorado, Mercey Hot Springs, Llanada, and Panoche, California U.S.G.S quadrangles, in Sections 19, 30, and 31 of Township 14 south, Range 11 east; Section 21-27 and 32-36 of Township 14 south, Range 10 east; Sections 1-8 and 11-14 of Township 15 south, Range 10 east; Sections 6, 7, 19, and 20 of Township 15 south, Range 11 east (Figure 2).

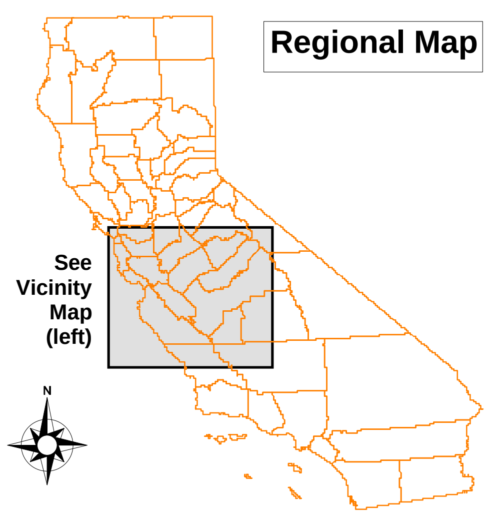
On April 14th, 2010, Live Oak Associates, Inc. (LOA) biologist Mr. Jeff Gurule (TE-168924-0), assisted by Mr. Geoff Cline (an un-permitted LOA biologist), surveyed the site for federally listed vernal pool crustaceans. The proposed survey was deemed acceptable via a phone conversation between Michele Korpos, LOA Panoche Project Manager, and Chris Diel of the Ventura USFWS office on April 9, 2010 with the understanding that maps delineating the survey area would be sent by Ms. Korpos and a written authorization would be issued by the USFWS after review of the proposed survey area. However, apparently the maps were never received by Mr. Diel and no written authorization was issued. In discussing this issue with Mr. Diel on August 2, 2010, the consensus was that since the surveys were non-protocol surveys conducted on a single day late in the season, the lack of a formal authorization was not concerning.

Methods

Mr. Gurule and Mr. Cline selected pools to sample as directed by LOA biologist Michele Korpos, who mapped pools potentially suitable for vernal pool crustaceans during the course of other biological surveys of the study area. The sampling method was consistent with USFWS



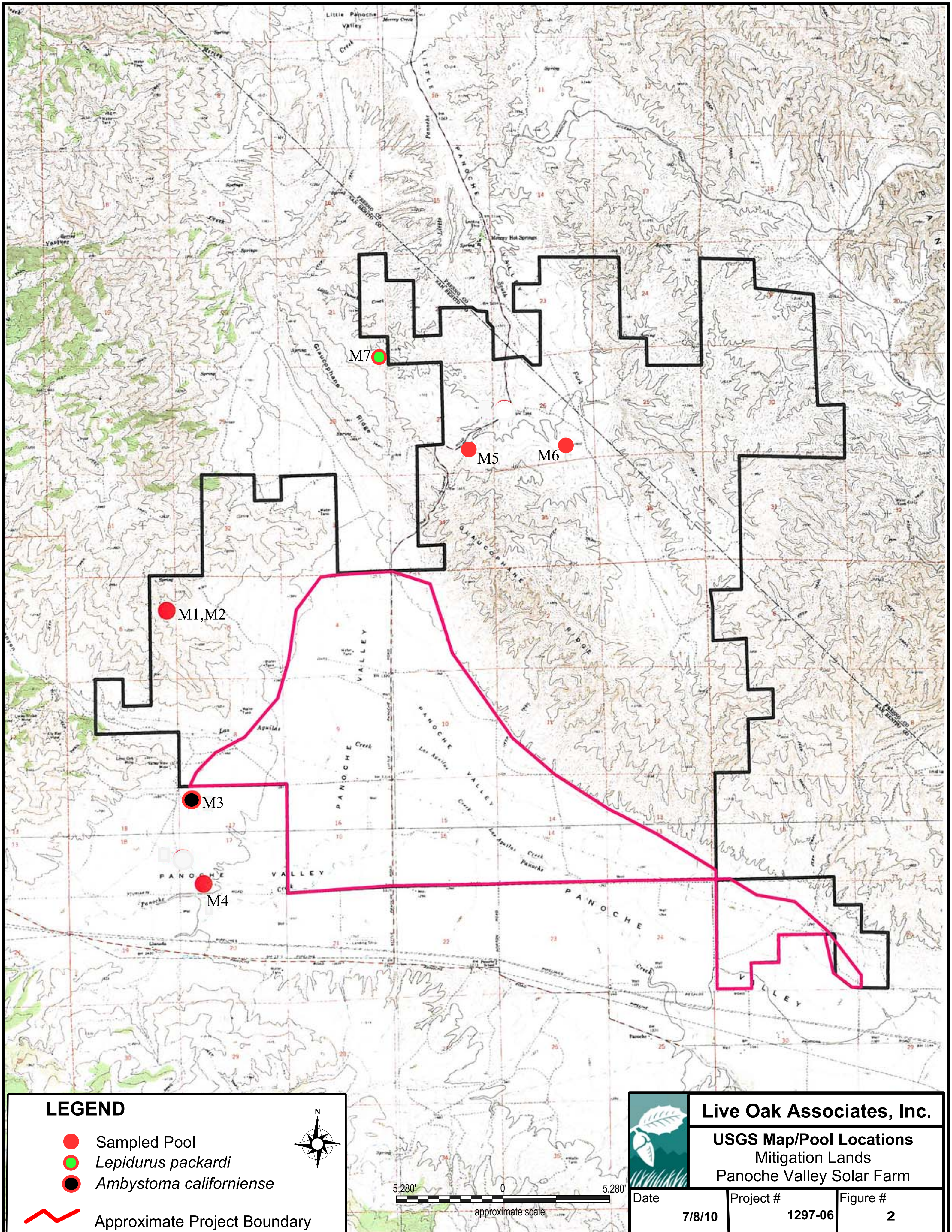




Live Oak Associates, Inc.

Panoche Valley Solar Farm
Vicinity Map

Date	Project #	Figure #
11/11/09	1297-04	1


M7
M5
M6
M1,M2
M3
M4
LEGEND
Sampled Pool
Lepidurus packardi
Ambystoma californiense
Approximate Project Boundary
N
5,280'
0
5,280'
approximate scale
Live Oak Associates, Inc.
USGS Map/Pool Locations
Mitigation Lands
Panoche Valley Solar Farm
Date
7/8/10
Project #
1297-06
Figure #
2

Recovery Permit requirements. Each pool was thoroughly sampled with a dip net. Pool characteristics and aquatic species observed were recorded on a previously approved data sheet, authorized via email by David Kelly with the USFWS on November 12, 2008 (See Attachment A). The data sheet is formatted to an Excel spreadsheet, with data entered in the field directly into the spreadsheet via a PDA. Pool location coordinates were collected using a Garmin Rino 120 handheld GPS unit.

Results

Mr. Gurule and Mr. Cline sampled seven pools. Pool locations are presented in Figure 2, survey results are presented in Attachment B, and Lat. Long. coordinates of each sampled pool are presented in Attachment C. Branchiopods were found in one of the seven pools surveyed (Pool M7). Individuals were netted, observed, identified as vernal pool tadpole shrimp (*Lepidurus packardi*), photographed, and released. Additionally, California tiger salamander larvae (*Ambystoma californiense*) were netted in Pool M3. Photos are presented in Attachment D.

Discussion

The discovery of the Federally Endangered *L. packardi* is significant. This represents a fairly substantial range extension of the species. Prior to this discovery, no populations of *L. packardi* were known in San Benito County or western Fresno County (CNDDB 2010 and Draft Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon 2004).

Although the April 14th, 2010 survey found *L. packardi* in one pool (Pool M7), this single day of surveying does not provide sufficient evidence of the absence of other branchiopods, including listed branchiopods such as the *Branchiata lynchi*, from the site. There remains the possibility that had protocol level surveys been conducted, federally listed anostracans such as *B. lynchi* may have been found in some pools of the site.

Please feel free to contact me with any further questions or comments.

Sincerely,

Jeff Gurule
Senior Project Manager
Staff Ecologist

I certify that the information in this survey report and attached exhibits fully and accurately represent my work.

Jeff Gurule, Permit # TE-168924-0

Signature:__________________________. Date: August 13, 2010.

ATTACHMENT A:
DATA SHEET AUTHORIZATION

Jeff Gurule

From:	David_Kelly@fws.gov
Sent:	Wednesday, November 12, 2008 7:59 AM
To:	Jeff Gurule
Cc:	Elizabeth_Warne@fws.gov; Josh_Hull@fws.gov
Subject:	Re: Branchiopod Survey Data Sheet
Attachments:	Data Sheet Template.xls

Jeff, the data sheet that you presented contains the information that we required in the protocol for the VPb surveys. You are authorized to use this survey form until otherwise notified. Thank you.

David Lee Kelly
Fish and Wildlife Biologist
Recovery Branch
US Fish and Wildlife Service
2800 Cottage Way
Sacramento, CA 95825
Ph. (916) 414-6492

Jeff Gurule <jgurule@loainc.com>

11/11/2008 04:38 PM

To <David_Kelly@fws.gov>
cc
Subject Branchiopod Survey Data Sheet

Hi David,

Last rainy season Live Oak Associates, Inc. conducted branchiopod surveys on three properties in Fresno County with numerous vernal pools on each (the largest containing 92 pools); this resulted in numerous data sheets (over a 1,000 pages of data sheets) submitted with our 90-day reports. Not only were these data sheets difficult to organize and proof, PDF's of the final reports were so huge it was difficult to email them with the data sheets attached. I believe that you expressed interest, yourself, in having us utilize an abbreviated data sheet for ease of handling and reviewing after seeing how many data sheets we had amassed in those surveys.

So, as Live Oak has authorization to conduct 2nd year surveys on properties we surveyed last year, plus additional properties not surveyed last year, I have created an EXCEL template to serve as our data sheet for all surveys conducted this year. I am submitting this template for your approval. I believe using this data sheet will greatly increase efficiency, present the data in a more useful format, and greatly reduce the potential for error.

I have included an explanation of codes that would be used in the Surveyors and Habitat Condition/Land Use columns. This explanation of codes would ultimately be located at the bottom of the EXCEL sheet.

I hope this is acceptable to you or that you have some suggestions on how to further simplify it. I hope to here back from you soon, as weather conditions may necessitate initiation of surveys soon.

Thanks,

Jeff Gurule
Project Manager
Wildlife/Wetland/Plant Ecologist

ATTACHMENT B:
DATA SHEET

U.S. Fish and Wildlife Service Vernal Pool Data Sheet Wet Season Non-Protocol Survey 2010 Panoche Valley Mitigation Land (1297-06), San Benito County, Cerro Colorado, Mercey Hot Springs, Llanada, & Panoche Quads, Township: 15S, Range: 10E & 11E													**Fairy Shrimp ID Sheet 2010 Panoche Valley Mitigation Land (1297-06)**					
Pool #	Surveyers*	Date	Time (24hr)	Water Temp	Air Temp	Depth (cm)	Length (m)	Width (m)	Habitat Conditions/ Land Use*	Number of Shrimp in Pool	Number, Sex, Genus Collected	Notes	Number, Sex, Species IDed	Listed Species (x)	Date Identified	Identified By	Comments
M1	JG,GC	4/14/10	1147	14	15	29	5	5	CGM			mitigation pond					
M2	JG,GC	4/14/10	1150	12.5	15	53	9	5	CGM			mitigation pond					
M3	JG,GC	4/14/10	1223	13	15	75+	69	34	CGM			mitigation pond, clam shrimp,5 CTS					
M4	JG,GC	4/14/10	1251	11	15	75+	57	24	CGM			mitigation pond, clam shrimp					
M5	JG,GC	4/14/10	1717	19	15	25	12.5	10	CGM			mitigation pool					
M6	JG,GC	4/14/10	1735	19	15	10	11	5.5	CGM			mitigation pool					
M7	JG,GC	4/14/10	1818	19	15	13	60	29	CGM	100s	100s of *Lepidurus packardi*	mitigation pool, 100's tadpole shrimp	No tadpole shrimp collected. See Appendix C for photos	x	4/14/2010	JG	

* JG=Jeff Gurule; GC=Geoff Cline
CGM=Cattle Grazing Moderate

ATTACHMENT C:
POOL UTM COORDINATES

Panoche Solar Farm Pool Locations   Grid: UTM   Datum: NAD83   Zone: 10S

Pool #	Easting	Northing	Altitude
M1	686801	4058372	1663 ft
M2	686757	4058366	1656 ft
M3	686887	4055826	1433 ft
M4	687076	4054586	1376 ft
M5	690899	4061045	1443 ft
M6	692421	4061098	1419 ft
M7	689604	4062415	1438 ft

ATTACHMENT D:
PHOTOS

View Looking North of Pool 135 (Tadpole Shrimp Pool)

Tadpole Shrimp

View Looking West Over Survey Area, No Pools in Vicinity.

View Looking East Over Survey Area, No Pools in Vicinity.

View Looking South Over Survey Area, Pool M4 in background out of site.

June 17, 2010

Eric Cherniss
Vice President of Project Development
Solargen Energy, Inc.
20400 Stevens Creek Blvd., Suite 700
Cupertino, CA 95014

Subject: Early spring rare plant surveys for the Panoche Valley Solar Farm project in San Benito County, California (PN 1297-04b)

Dear Eric:

Live Oak Associates, Inc. (LOA), has completed a focused early spring survey for special status plants (i.e., plants designated as endangered, threatened, or rare (CDFG 2010) and plants listed by the California Native Plant Society (2009)) on 4,717 acres of the Panoche Valley Solar Farm site (hereafter referred to as "study area") located along Little Panoche Road in San Benito County, California. Specifically, this survey was conducted to determine whether or not special status plants that would bloom in March or April were present within the study area in 2010.

Site Location and Existing Conditions

The project site occurs on the floor of Panoche Valley between the Gabilan Range to the west and the Panoche Hills to the east. The survey area is generally bounded to the west, north, and east by open space and rangelands and to the south by Yturiarte Road (Figure 1). Surrounding lands consist of rangelands used for cattle grazing.

The early spring 2010 study area included valley floor topography (i.e., areas generally of less than 5% slope) within all or portions of Sections 3, 4, 5, 8, 9, 10, 11, 13, 14, 15, and 16, of Township 15 south, Range 10 east, and Section 19 of Township 15 south, Range 11 east (Figure 2). Habitats present within this area include relatively flat rangelands and gentle slopes dominated by moderately saline clay soils, the beds and banks of seasonally flowing arroyo-like creeks (Panoche Creek, for example, which flowed throughout most of the survey period), and many ephemeral drainages and low swales that were repeatedly charged by runoff events. Various disturbance intensities associated with cattle grazing provide further microhabitat variation for plants. Rainfall amounts in 2010 were estimated by local measurement to be nearly 200% of the long-term average, providing an excellent environment for plant growth and flowering, and thus allowing the opportunity to compile a reasonably complete inventory of the study area's plant assemblage.

Literature Search and Botanical Survey

A literature search was conducted in order to identify special status plant species that may potentially occur within the study area's available habitats. A search of the California Natural Diversity Database and review of environmental documentation for area projects uncovered 22 potentially occurring special status plants. Consultation with local California Department of Fish and Game botanists, Mr. Dave Hacker and Ms. Ellen Cypher, and with a local Bureau of Land Management botanist, Mr. Ryan O'Dell, yielded one additional potentially occurring special status species (*Caulanthus californicus*) that was included in the search list (Table 1). Of these 23 species, 19 have flowering periods (i.e., optimal survey times) that fall within the March-April period chosen for the early spring botanical survey. This includes San Joaquin woollythreads (*Monolopia congdonii*) and California jewelflower (*Caulanthus californicus*), species that are federally listed as endangered. Based upon the expected phenologies suggested within the published literature, it was decided that the presence or absence of eight potentially occurring special status species (*Astragalus macrodon*, *Atriplex vallicola*, *Blepharizonia plumosa*, *Cordylanthus mollis* ssp. *hispidus*, *Deinandra halliana*, *Eriogonum vestitum*, *Navarretia nigelliformis* ssp. *radians*, and *Trichostema ovatum*) would be determined by additional surveys conducted during their blooming period in May-July 2010. None of the search species listed in Table 1 were detected within the study area during an August-October 2009 botanical survey (LOA, 2009).

Table 1. Special status plant species that could potentially occur within the 4,717-acre Panoche Valley Solar Farm study area. Blooming period is taken from CNPS (2010).

Species	Status*	Habitat	Blooming Period
Santa Clara thorn-mint *Acanthomintha lanceolata* Annual herb	CNPS 4	Chaparral, woodland, rocky, often serpentine	March-June
Forked fiddleneck *Amsinckia vernicosa* var. *furcata* Annual herb	CNPS 4	Woodland, grassland	February-May
California androsace *Androsace elongata* ssp. *acuta* Annual herb	CNPS 4	Chaparral, woodland, meadows and seeps, grassland	March-June
Salinas milk-vetch *Astragalus macrodon* Perennial herb	CNPS 4	Chaparral, woodland, grassland	April-July
Crownscale *Atriplex coronata* var. *coronata* Annual herb	CNPS 4	Chenopod scrub, grasslands, and vernal pools, alkaline soils	March–October

Table 2 (cont'd). Special status plant species that could potentially occur within the 4,717-acre Panoche Valley Solar Farm study area. Blooming period is taken from CNPS (2010).

Species	Status*	Habitat	Blooming Period
Lost Hills crownscale *Atriplex vallicola* Annual herb	CNPS 1B	Chenopod scrub, grasslands, and vernal pools, alkaline soils.	April–August
Big tarplant *Blepharizonia plumosa* Annual herb	CNPS 1B	Dry areas in grasslands	July–October
Round-leaved filaree *California macrophylla* Annual herb	CNPS 1B	Woodland, grassland	March-May
California jewelflower *Caulanthus californicus* Perennial herb	FE, CNPS 1B	grasslands (non-alkaline), flats	March-May
Lemmon's jewelflower *Caulanthus coulteri* var. *lemmonii* Perennial herb	CNPS 1B	Pinyon-juniper woodland, grassland	March-May
Hispid bird's-beak *Cordylanthus mollis* ssp. *hispidus* Annual herb	CNPS 1B	Meadows and seeps, playas, grasslands, often damp, alkaline	June–September
Hall's tarplant *Deinandra halliana* Annual herb	CNPS 1B	Chenopod scrub, grassland, clay soils	April-May
Gypsum-loving larkspur *Delphinium gypsophilum* ssp. *gypsophilum* Perennial herb	CNPS 4	Chenopod scrub, grassland, clay soils	February-May
Recurved larkspur *Delphinium recurvatum* Perennial herb	CNPS 1B	Chenopod scrub, grassland, alkaline	March-June
Idria buckwheat *Eriogonum vestitum* Annual herb	CNPS 4	Grasslands, open slopes	April–August
Pale yellow layia *Layia heterotricha* Annual herb	CNPS 1B	Pinyon-juniper woodland, alkaline grassland, clay	March-June

Table 3 (cont'd). Special status plant species that could potentially occur within the 4,717-acre Panoche Valley Solar Farm study area. Blooming period is taken from CNPS (2010).

Species	Status*	Habitat	Blooming Period
Panoche peppergrass *Lepidium jaredii* ssp. *album* Annual herb	CNPS 1B	Grassland, washes and alluvial fans	February-June
Serpentine leptosiphon *Leptosiphon ambiguus* Annual herb	CNPS 4	Grassland, often on serpentine soil	March-June
Showy golden madia *Madia radiata* Annual herb	CNPS 1B	Woodland, grassland	March-May
San Joaquin woollythreads *Monolopia congdonii* Annual herb	FE, CNPS 1B	Chenopod scrub, grassland, sandy	February-May
Shining navarretia *Navarretia nigelliformis* ssp. *radians* Annual herb	CNPS 1B	Woodland, grassland, vernal pools	May-July
Chaparral ragwort *Senecio aphanactis* Annual herb	CNPS 2	Woodland, chaparral	January-April
San Joaquin bluecurls *Trichostema ovatum* Annual herb	CNPS 4	Chenopod scrub, grasslands	July–October

***Status Codes**

California Native Plant Society (CNPS) list designations

1B: Plants Rare, Threatened, or Endangered in California and elsewhere
2: Plants Rare, Threatened, or Endangered in California but more common elsewhere
4: Plants of limited distribution – a watch list

Survey Methods

Known nearby populations of potentially occurring special status plant species were visited in order to develop a search image for these special status species and to verify that the timing of on-site survey work would coincide with the period in which these species can be readily seen and are separable from common local species. Reference populations chosen for observation were all located at elevations similar to the study area and within 10 miles of the study area. Reference populations visited in March included forked fiddleneck, recurved larkspur, showy golden madia, San Joaquin woollythreads, and chaparral ragwort. Reference populations visited in April included San Joaquin woollythreads, Santa Clara thorn-mint, Lemmon's jewelflower, and gypsum-loving larkspur. These visits consistently supported the chosen period for the survey as being within the anthesis period of potentially occurring special status species.

Focused special status plant species surveys were conducted by LOA botanists Neal Kramer and Jim Paulus, and LOA ecologists Davinna Ohlson, Nathan Hale, Jessica Celis, Geoff Cline, Molly Goble, and Pamela Peterson, using the same methodology as described for the fall 2009 survey (LOA 2009). In summary, the survey team walked the entire site in evenly-spaced transects, ensuring 100% visual coverage, during the species' blooming period when they would be evident and most identifiable. Emphasis was placed on areas more likely to support suitable habitat for the target species. All vascular plant species observed were recorded in a field notebook. The survey was floristic, striving to identify all species to the level of taxa needed to separate occurring species from the potentially occurring special status species identified during the literature review (Appendices A and B). The survey methodology is consistent with survey protocols outlined by the CNPS and complied with the most recent California Department of Fish and Game guidelines (Appendix C). Surveys were conducted from March 8 through April 9, 2010.

Results: Plant Species Present in March-April 2010

Results of the March-April 2010 botanical survey, which was conducted at the height of the annual growing season, indicate much greater diversity is present than was suggested by the fall 2009 survey alone. The 2010 survey added 137 species to the study area total (202 species as of April 9, see Appendix A). Annuals comprise nearly 100% of the standing vegetation, with the few occurring shrubs confined to the beds and banks of Panoche Creek and Los Aguilas Creek. Non-native species are clearly dominant throughout the study area. Native plant dominance was found only at the patch (below subcommunity) grain.

No federal or state listed plant species were found within the study area. No species that could be confused with either San Joaquin woollythreads or California caulanthus, the two federally-endngered species having the potential to occur on the site, were present in 2010. The survey detected seven populations classifiable as the CNPS List 1B species recurved larkspur (*Delphinium recurvatum*), one populations of the CNPS List 4 gypsum-loving larkspur, and three populations of the CNPS List 4 serpentine leptosiphon (Figure 2). Special status plant identifications in the field, and the mapping of populations, were performed by one of the two LOA botanists who participated in all surveys.

Plants classifiable as recurved larkspur were widely scattered in very small groups, with three of the seven mapped occurrences consisting of a single individual and no occurrence of greater than 20 individuals. A technical memorandum prepared by Dr. Paulus discusses non-characteristic traits common to these plants, including weak sepal coloration, and variations that suggest these plants may be hybrids of *D. recurvatum* with the locally occurring, less sensitive gypsum-loving larkspur (*D. gypsophilum* ssp. *gypsophilum*) and foothill larkspur (*D. hesperium* ssp. *pallescens*) (Appendix D).

Gypsum-loving larkspur was found at one scattered occurrence in Section 19. Unlike the plants in Sections 4 and 8, where the plants could not be separated from recurved larkspur, these plants fit well within the expected species characteristics of gypsum-loving larkspur. Individuals appear to be confined rather narrowly to north or northwest-facing slopes associated with gully habitats that are available only at the fringe of the study area. Larkspurs, which are perennial within the study area, would be difficult to relocate due to their large, deep-seated root systems and possibly narrow habitat requirements.

Serpentine leptosiphon occurred in 2010 in impressive displays totaling several tens of thousands of plants within the study area. Comparatively little is known about the regional distribution of this species. It may reside chiefly in the seedbank for long periods, waiting for a relatively wet climate such as experienced in the spring of 2010. Because it is an annual species, it is possible that avoidance of serpentine leptosiphon during project implementation could be achieved by stockpiling of the topsoil for seedbank relocation to a reserve area.

If ground disturbance activities begin more than three to five years past the date of this survey, then the site should be resurveyed to evaluate any changes in habitat conditions and determine the presence or absence of the target species on the site.

If you have any questions regarding our findings, please contact Rick Hopkins at rhopkins@loainc.com or (408) 281-5885 at your earliest convenience.

Sincerely,

Davinna Ohlson

Davinna Ohlson, M.S.
Senior Project Manager
Plant/Wildlife Ecologist

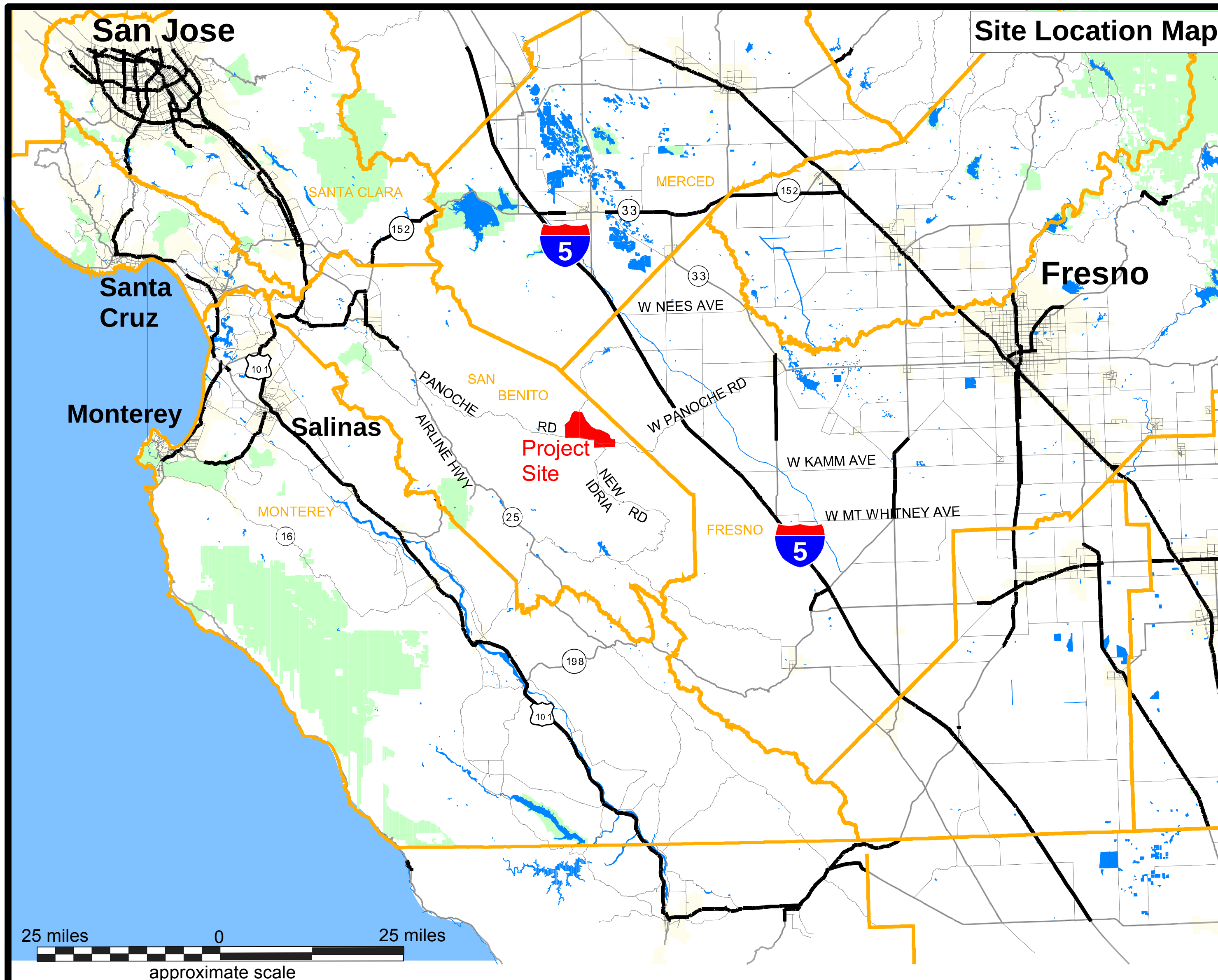
Enclosures

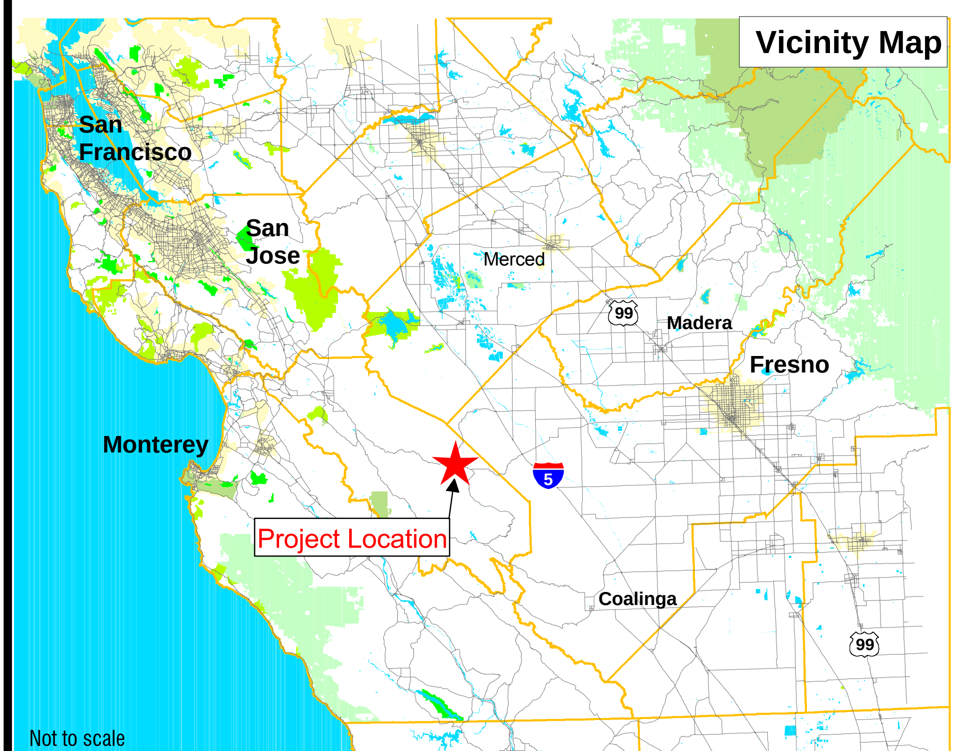
References

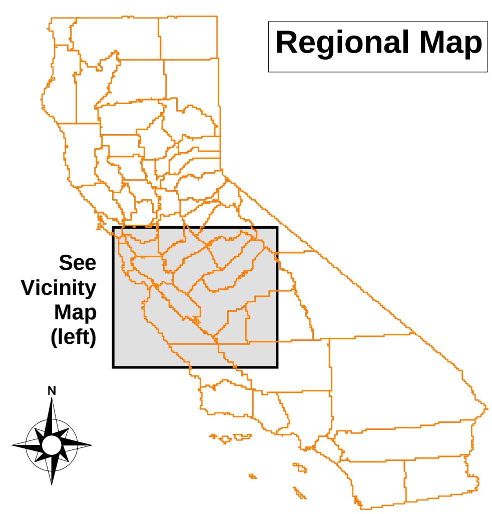
California Department of Fish and Game, Natural Diversity Database, 2010. Special Vascular Plants, Bryophytes and Lichens List (revised January 2010). The Resources Agency, State of California, Sacramento.

California Native Plant Society. 2009. Inventory of Rare and Endangered Vascular Plants of California (7th Edition). Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. California Native Plant Society. Sacramento, CA.

Live Oak Associates, 2009. Late summer/early fall rare plant surveys for the Panoche Valley Solar Farm project in San Benito County, California. Letter from D. Ohlson to E. Cherniss, dated November 24, 2009.



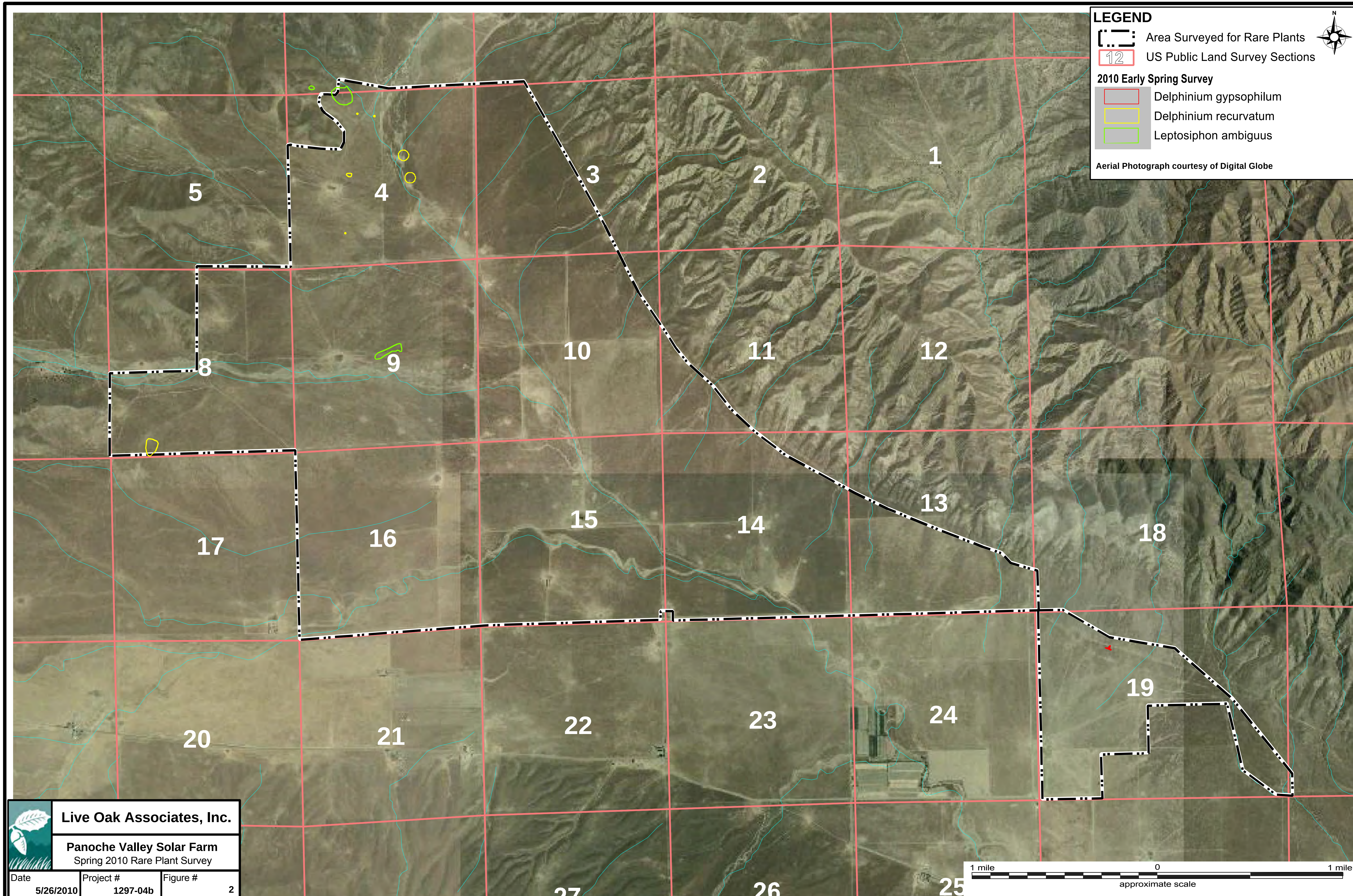




Live Oak Associates, Inc.

Panoche Valley Solar Farm
Vicinity Map

Date	Project #	Figure #
11/11/09	1297-04	1


LEGEND
Area Surveyed for Rare Plants
12
US Public Land Survey Sections
2010 Early Spring Survey
Delphinium gypsophilum
Delphinium recurvatum
Leptosiphon ambiguus
Aerial Photograph courtesy of Digital Globe
N
1
2
3
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24
25
26
27
1 mile
0
1 mile
approximate scale
Live Oak Associates, Inc.
Panoche Valley Solar Farm
Spring 2010 Rare Plant Survey
Date
5/26/2010
Project #
1297-04b
Figure #
2

APPENDIX A: VASCULAR PLANTS OF THE STUDY AREA

The plants species listed below were observed on the Panoche Valley solar farm site during the field survey conducted by Live Oak Associates in March and April 2010. The U.S. Fish and Wildlife Service wetland indicator status of each plant has been shown following its common name.

OBL - Obligate
FACW - Facultative Wetland
FAC - Facultative
FACU - Facultative Upland
UPL - Upland
+/- - Higher/lower end of category
NI - No investigation

Scientific Name	Common Name	Wetland Status
ALLIACEAE - Allium Family		
Allium crispum	crinkled onion	UPL
Allium howellii var. *howellii*	Howell's onion	UPL
APIACEAE - Carrot Family		
Lomatium dissectum var. *multifidum*	carrot leaved biscut root	UPL
Lomatium utriculatum	common lomatium	UPL
Sanicula bipinnatifida	purple sanicle, snakeroot	UPL
Sanicula crassicaulis	Pacific sanicle, gamble weed	UPL
Tauschia hartwegii	Harweg's umbrellawort/tauschia	UPL
ASTERACEAE - Sunflower Family		
Achyrachaena mollis	blow wives	UPL
Ambrosia acanthicarpa	annual bursage	UPL
Artemisia californica	California sagebrush	UPL
*Centaurea melitensis**	tocalote	UPL
Centaurea sp.*	knapweed/thistle	UPL
Ericameria sp.	goldenbush	UPL
Ericameria cuneata	cliff/rock/wedgeleaf goldenbush	UPL
Ericameria linearifolia	interior/narrow-leaf goldenbush	UPL
Hemizonia sp.	Kellogg's tarweed	UPL
Heterotheca oregona var. rudis	inland Oregon golden aster	UPL
*Hypochaeris glabra**	smooth cat's ear	UPL
Isocoma menziesii var. vernonioides	coastal isocoma, coast goldenbush	FACW
Lasthenia californica	coast/California/common goldfields	UPL
Layia platyglossa	common tidy-tips	UPL
Layia sp.	tidy-tips	FAC/FACW
Logfia filaginoides	logfia	UPL
Malacothrix coulteri	snakes head	UPL
*Matricaria matricarioides**	pineapple weed	FACU
Microseris sp.	microseris	UPL
Microseris douglasii ssp. *douglasii*	Douglas' silverpuffs	UPL
Microseris cf. *sylvatica*	sylvan scorzonella	UPL
Monolopia major	cupped monolopia	UPL

Monolopia stricta	Crum's monolopia	UPL
Psilocarphus brevissimus var. brevissimus	dwarf woolly-heads	OBL
Senecio flaccidus var. douglasii	Douglas' groundsel/shrubby butterweed	UPL
*Senecio vulgaris**	common groundsel	NI*
*Sonchus oleraceus**	common sow thistle	NI*
Stephanomeria sp.		UPL
Tragopogon sp.	salsify, goatsbeard	UPL
Uropappus lindleyi	silverpuffs	UPL
BORAGINACEAE - Borage Family		
Amsinckia menziesii var. intermedia	common fiddleneck	UPL
Amsinckia menziesii var. menziesii	Menzies' /small-flowered fiddleneck	UPL
Amsinckia tessellata	devil's lettuce, checker fiddleneck	UPL
Cryptantha decipiens	gravelbar cryptantha	UPL
Cryptantha flaccida	flaccid cryptantha	UPL
Heliotropium curassavicum	seaside/salt heliotrope	OBL
Pectocarya linearis ssp. ferocula	slender winged combseed	UPL
Pectocarya penicillata	winged combseed	UPL
Phacelia ciliata	Great Valley phacelia	UPL
Plagiobothrys acanthocarpus	adobe popcornflower	OBL
Plagiobothrys canescens	valley popcornflower	UPL
Plagiobothrys humistratus	dwarf popcornflower	OBL
Plagiobothrys nothofulvus	rusty popcornflower	FAC
Plagiobothrys stipitatus var. micranthus	stocked popcornflower	OBL
BRASSICACEAE - Mustard Family		
Athysanus pusillus	common sandweed, dwarf athysanus	UPL
*Brassica nigra**	black mustard	UPL
*Brassica tournefortii**	Asian mustard	UPL
*Capsella bursa-pastoris**	shepherd's purse	FAC-
*Descurainia sp.**	tansymustard	UPL
*Descurainia sophia**	flixweed, tansymustard	UPL
*Eruca vesicaria**	garden rocket	UPL
Guillenia lasiophylla	California mustard	UPL
*Hirschfeldia incana**	summer mustard	UPL
Lepidium dictyotum var. acutidens	alkali peppergrass	OBL
Lepidium dictyotum var. dictyotum	alkali peppergrass	OBL
Lepidium nitidum var. nitidum	shining peppergrass	UPL
Raphanus raphanistrum	painted charlock/wild raddish	UPL
*Sinapis arvensis**	charlock	UPL
*Sisymbrium irio**	London rocket	UPL
*Sisymbrium orientale**	oriental mustard	UPL
Thysanocarpus curvipes	lacepod/fringe pod, ribbed fringepod	UPL
Tropidocarpum gracile	slender keel fruit, dobie pod	UPL
CARYOPHYLLACEAE - Pink Family		
*Herniaria hirsuta var. cinerea**	herniaria	UPL
*Spergularia rubra**	red sandspurry	FAC-
Stellaria media	common chickweed	FACU
Stellaria nitens	shiny chickweed	UPL
CHENOPODIACEAE - Goosefoot Family		
*Atriplex cf. semibaccata**	Australian saltbush	FAC
Atriplex polycarpa	cattle/allscale/desert saltbush	UPL

*Salsola tragus**	Russian thistle, tumbleweed	FACU
CONVOLVULACEAE - Morning-Glory or Bindweed Family		
*Convolvulus arvensis**	bindweed, orchard morningglory	UPL
CRASSULACEAE - Stonecrop Family		
Crassula connata	pigmy weed	UPL
EUPHORBIACEAE - Spurge Family		
Eremocarpus setigerus	turkey mullein, dove weed	UPL
FABACEAE - Legume Family		
Astragalus gambelianus	Gambell's dwarf milkvetch	UPL
Astragalus oxyphysus	Mt. Diablo milkvetch, Diablo locoweed	UPL
Lotus strigosus	hairy lotus	UPL
Lotus wrangelianus	California lotus	UPL
Lupinus albifrons var. *albifrons*	silver bush lupine	UPL
Lupinus bicolor	miniature lupine, Lindley's annual lupine	UPL
Lupinus microcarpus var. *microcarpus*	gully/chick lupine	UPL
Lupinus succulentus	arroyo lupine	UPL
Medicago sp.	burclover	N/A
*Medicago lupulina**	black medic	FAC
*Medicago polymorpha**	burclover	UPL
*Melilotus indicus**	sour clover, Indian melilot	FAC
Trifolium sp.	clover	N/A
Trifolium albopurpureum var. albopurpureum	Indian clover	UPL
Trifolium ciliolatum	tree clover	UPL
Trifolium depauperatum var. amplectens	pale bladder clover	FAC-
Trifolium depauperatum var. truncatum	dwarf sack clover	FAC-
Trifolium willdenovii	tomcat clover	UPL
GERANIACEAE - Geranium Family		
*Erodium botrys**	broad-leaved filaree	UPL
*Erodium brachycarpum**	short fruited filaree	UPL
*Erodium cicutarium**	red-stemmed filaree	UPL
*Erodium moschatum**	white-stemmed filaree	UPL
JUGLANDACEAE - Walnut Family		
*Juglans hindsii**	Northern California blacck walnut	FAC
LAMIACEAE - Mint Family		
*Lamium amplexicaule**	henbit	UPL
LOASACEAE - Loasa Family		
Mentzelia affinis	yellow blazingstar	UPL
Mentzelia dispersa	bushy blazingstar	UPL
Mentzelia pectinata	San Joaquin blazingstar	UPL
Mentzelia veatchiana	Veatch's blazingstar	UPL
MALVACEAE - Mallow Family		
*Malva parviflora**	cheeseweed	UPL
MONTIACEAE - Montia Family		
Calandrinia ciliata	redmaids	FACU*
Claytonia exigua ssp. glauca	blue leaved spring beauty	UPL
MORACEAE - Mulberry Family		
*Morus alba**	white/silkworm mulberry	NI
MYRTACEAE - Myrtle Family		
*Eucalyptus sp.**		UPL

ONAGRACEAE - Evening primrose Family		
Camissonia graciliflora	hill suncup	UPL
Clarkia sp.		UPL
PAPAVERACEAE - Poppy Family		
Eschscholzia californica	California poppy	UPL
Platystemon californicus	California cream cups	UPL
PLANTAGINACEAE - Plantain Family		
Plantago erecta	California plantain	UPL
Veronica peregrina ssp. xalapensis	neckweed	OBL
*Veronica persica**	bird's eye speedwell	UPL
POACEAE - Grass Family		
*Avena barbata**	slender wild oat	UPL
*Avena fatua**	wild oat	UPL
*Bromus diandrus**	ripgut brome	UPL
*Bromus hordeaceus**	soft chess	FACW-
*Bromus madritensis ssp. rubens**	foxtail chess, red brome	UPL
*Cynodon dactylon**	bermuda grass	FAC
Deschampsia danthonioides	annual hairgrass	FACW*
Distichlis spicata	saltgrass	FACW*
Festuca idahoensis	Idaho/blue fescue	NI
*Hordeum marinum ssp. gussoneanum**	Mediterranean barley	FAC
*Hordeum murinum ssp. leporinum**	barnyard/farmer's foxtail, foxtail barley	NI
*Lamarckia aurea**	goldentop	UPL
Melica californica	California melicgrass	UPL
Muhlenbergia rigens	deergrass	FACW
*Poa annua**	annual bluegrass	FACW-
Puccinellia nuttalliana	Nuttall's alkaligrass	OBL
Schismus sp.	Mediterranean grass	UPL
*Schismus arabicus**	Mediterranean grass	UPL
*Schismus barbatus**	common Mediterranean grass	UPL
*Triticum aestivum**	common wheat	UPL
*Vulpia bromoides**	brome fescue	FACW
Vulpia microstachys var. ciliata	Eastwood fescue	UPL
Vulpia microstachys var. pauciflora	Pacific fescue	UPL
*Vulpia myuros var. hirsuta**	hairy rat-tail fescue	FACU*
*Vulpia myuros var. myuros**	rat-tail fescue	FACU*
POLEMONIACEAE - Phlox Family		
Gilia clivorum	purplespot gilia	UPL
Gilia tricolor ssp. tricolor	bird's eyes	UPL
Leptosiphon bicolor	true babystars	UPL
Leptosiphon ambiguus	Serpentine leptosiphon	UPL
Linanthus dichotomus	evening snow	UPL
Microsteris gracilis	slender phlox	FACU*
POLYGONACEAE - Buckwheat Family		
Eriogonum sp.	buckwheat	UPL
Eriogonum gracillimum	rose & white buckwheat	UPL
Rumex sp.	dock	
PRIMULACEAE - Primrose Family		
Dodecatheon clevelandii ssp. patulum	shooting star	UPL
RANUNCULACEAE - Buttercup Family		

Delphinium gypsophilum ssp. gypsophilum	Panoche Creek larkspur	UPL
Delphinium patens ssp. patens	zigzag larkspur	UPL
Delphinium cf. recurvatum	recurved larkspur	
Ranunculus californicus	California buttercup	FAC
ROSACEAE - Rose Family		
Aphanes occidentalis	lady's mantle	UPL
SALICACEAE - Willow Family		
Salix laevigata	red willow	~NI
SAXIFRAGACEAE - Saxifrage Family		
Saxifraga californica	California saxifrage	UPL
SCROPHULARIACEAE – Figwort Family		
Castilleja attenuata	valley tassels	UPL
Castilleja exserta ssp. exserta	purple owls clover	UPL
Triphysaria eriantha ssp. eriantha	butter 'n' eggs	UPL
SOLANACEAE - Nightshade Family		
Datura sp.	thornapple/jimsonweed	UPL
*Nicotiana glauca**	tree tobacco	FAC
Solanum umbelliferum	blue witch	UPL
TAMARICACEAE - Tamarisk Family		
*Tamarix aphylla**	athel	FACW-
THEMIDACEAE - Cluster Lily Family		
Brodiaea terrestris ssp. kernensis	Kern brodiaea	UPL
Dichelostemma capitatum ssp. capitatum	blue dicks	UPL
Muilla maritima	sea muilla	UPL
URTICACEAE - Nettle Family		
*Urtica urens**	dwarf nettle	UPL

APPENDIX B: PLANTS OBSERVED ON THE SITE BY SECTION

The table below details the plant species observed on the Panoche Valley solar farm site by section during the rare plant surveys conducted by LOA in March and April 2010.

Scientific Name	Section										
	3	4	8	9	10	11	13	14	15	16	19E
Achyrachaena mollis	x	x				x	x	x		x	
Allium crispum			x								
Allium howellii var. *howellii*							x				x
Amsinckia menziesii var. intermedia	x	x	x	x	x	x	x	x	x	x	x
Amsinckia menziesii var. menziesii	x	x	x	x	x	x	x	x	x	x	x
Aphanes occidentalis			x								
Artemisia californica			x	x						x	
Astragalus gambelianus	x	x	x	x	x	x	x	x	x	x	x
Astragalus oxyphysus			x					x		x	
Athysanus pusillus					x				x		
*Atriplex cf. semibaccata**		x									x
Atriplex polycarpa							x				
*Avena barbata**	x	x	x	x		x	x	x	x	x	
*Avena fatua**	x								x		
*Brassica nigra**	x							x	x	x	
*Brassica tournefortii**						x				x	x
Brodiaea terrestris ssp. kernensis		x		x						x	
*Bromus diandrus**	x	x		x		x	x	x		x	
*Bromus hordeaceus**	x	x	x	x	x	x	x	x	x	x	x
*Bromus madritensis ssp. rubens**	x	x	x	x	x	x	x	x	x	x	x
Calandrinia ciliata	x	x	x	x	x	x	x	x	x		x
Camissonia graciliflora			x								
*Capsella bursa-pastoris**	x	x	x	x	x	x	x	x	x	x	x
Castilleja attenuata	x	x	x	x		x	x	x		x	
Castilleja exserta ssp. exserta	x	x	x	x	x	x	x	x	x	x	x
*Centaurea melitensis**				x				x	x	x	
Centaurea sp.*										x	
Clarkia sp.		x	x	x		x		x		x	
Claytonia exigua ssp. glauca			x								
*Convolvulus arvensis**				x	x				x	x	
Crassula connata	x	x	x	x	x	x	x	x	x	x	x
Cryptantha decipiens			x								
Cryptantha flaccida				x							
*Cynodon dactylon**			x								
Datura sp.								x			
Delphinium cf. recurvatum		x									
Delphinium gypsophilum ssp. gypsophilum											x
Delphinium patens ssp. patens				x							
Delphinum sp.			x								
Deschampsia danthonioides			x								
*Descurainia sophia**	x					x	x	x	x		

Scientific Name	Section										
	3	4	8	9	10	11	13	14	15	16	19E
Descurainia sp.*										X	
Dichelostemma capitatum ssp. capitatum	X	X	X	X	X	X	X	X	X	X	X
Distichlis spicata							X	X		X	
Dodecatheon clevelandii ssp. patulum			X	X					X		
Eremocarpus setigerus	X	X	X	X	X	X	X	X	X	X	X
Ericameria cuneata											X
Ericameria linearifolia			X								
Ericameria sp.			X						X		
Eriogonum gracillimum	X										
Eriogonum sp.				X							
*Erodium botrys**					X						X
*Erodium brachycarpum**	X	X	X	X	X	X	X	X	X	X	X
*Erodium cicutarium**	X	X	X	X	X	X	X	X	X	X	X
*Erodium moschatum**	X	X	X	X	X	X	X	X	X	X	X
*Eruca vesicaria**										X	
Eschscholzia californica	X	X		X		X	X	X	X	X	
*Eucalyptus sp.**		X							X	X	
Festuca idahoensis						X					X
Gilia clivorum	X	X					X			X	X
Gilia tricolor ssp. tricolor	X		X	X		X			X	X	X
Guillenia lasiophylla	X	X	X	X	X	X	X	X	X	X	X
Heliotropium curassavicum				X				X		X	
Hemizonia sp.			X								
*Herniaria hirsuta var. cinerea**	X	X	X	X	X	X	X	X	X	X	X
Heterotheca oregona var. rudis								X	X	X	X
*Hirschfeldia incana**			X		X		X	X	X	X	X
*Hordeum marinum ssp. gussoneanum**	X	X	X	X	X	X	X	X	X	X	X
*Hordeum murinum ssp. leporinum**	X	X	X	X	X	X	X	X	X	X	X
*Hypochaeris glabra**			X	X							
Isocoma menziesii var. vernonioides										X	
*Juglans hindsii**											
*Lamarckia aurea**			X								
*Lamium amplexicaule**					X						
Lasthenia californica	X	X		X	X	X	X	X	X	X	X
Layia platyglossa	X	X	X	X	X	X	X	X		X	X
Layia sp.				X							
Lepidium dictyotum var. acutidens		X	X		X						
Lepidium dictyotum var. dictyotum		X	X	X	X		X	X	X	X	X
Lepidium nitidum var. nitidum	X	X	X	X	X	X	X	X	X	X	X
Leptosiphon ambiguus		X		X							
Leptosiphon bicolor		X		X							
Linanthus dichotomus		X		X							
Logfia filaginoides	X	X	X	X		X				X	X
Lomatium utriculatum			X								
Lotus strigosus			X								
Lotus wrangelianus	X	X	X	X		X	X	X	X	X	X

Scientific Name	Section										
	3	4	8	9	10	11	13	14	15	16	19E
Lupinus albifrons var. *albifrons*			x								
Lupinus bicolor		x	x	x					x	x	
Lupinus microcarpus var. *microcarpus*		x					x			x	x
Lupinus succulentus	x	x	x			x	x	x		x	x
Malacothrix coulteri							x	x		x	
*Malva parviflora**	x	x	x	x	x	x	x	x		x	x
*Matricaria matricarioides**	x	x	x	x	x	x	x	x	x	x	x
*Medicago lupulina**					x						
*Medicago polymorpha**	x	x	x			x		x	x	x	
Medicago sp.							x				x
Melica californica	x	x					x	x			
*Melilotus indicus**						x		x	x	x	
Mentzelia affinis						x					
Mentzelia dispersa								x			
Mentzelia pectinata									x		
Mentzelia veatchiana			x								
Microseris cf. *sylvatica*			x								
Microseris douglasii ssp. *douglasii*		x	x		x	x	x	x	x	x	
Microseris sp.				x							x
Microsteris gracilis		x	x	x	x			x	x	x	x
Monolopia major	x										
Monolopia sp.											x
Monolopia stricta						x	x	x	x		
*Morus alba**										x	
Muhlenbergia rigens											x
Muilla maritima		x	x	x						x	
*Nicotiana glauca**										x	
Pectocarya linearis ssp. ferocula			x								
Pectocarya penicillata		x				x	x	x	x	x	
Phacelia ciliata			x	x	x		x	x	x		x
Plagiobothrys acanthocarpus	x	x	x	x	x	x	x	x	x	x	x
Plagiobothrys canescens	x	x	x	x	x	x	x	x	x	x	x
Plagiobothrys humistratus		x		x				x	x		
Plagiobothrys nothofulvus			x		x		x		x	x	x
Plagiobothrys stipitatus var. micranthus		x			x		x	x	x	x	
Plantago erecta	x	x	x	x	x		x	x	x	x	x
Platystemon californicus				x				x		x	x
*Poa annua**		x	x	x			x		x		x
Psilocarphus brevissimus var. brevissimus		x	x							x	
Puccinellia nuttalliana		x	x	x					x		x
Ranunculus californicus			x								
Raphanus raphanistrum						x	x			x	
Rumex sp.			x	x					x		
Salix laevigata									x		
*Salsola tragus**			x				x				x
Sanicula bipinnatifida		x	x	x						x	

Scientific Name	Section										
	3	4	8	9	10	11	13	14	15	16	19E
Sanicula crassicaulis		X	X	X						X	
Saxifraga californica			X								
*Schismus arabicus**		X	X		X		X		X	X	X
*Schismus barbatus**	X					X		X	X	X	
Schismus sp.				X							
Senecio flaccidus var. douglasii			X	X	X					X	
*Senecio vulgaris**	X	X	X	X	X	X	X	X	X	X	X
*Sinapis arvensis**		X				X		X	X	X	X
*Sisymbrium irio**	X	X	X	X	X	X	X	X	X	X	X
*Sisymbrium orientale**						X		X	X	X	
Solanum umbelliferum								X			
*Sonchus oleraceus**		X								X	X
*Spergularia rubra**		X									
Stellaria media	X	X	X	X	X				X	X	X
Stellaria nitens	X	X	X	X	X	X		X	X	X	
Stephanomeria sp.								X	X		
*Tamarix aphylla**									X		
Tauschia hartwegii		X	X								
Thysanocarpus curvipes	X		X	X	X				X		X
Tragopogon sp.			X								
Trifolium albopurpureum var. albopurpureum	X	X	X	X		X		X	X	X	X
Trifolium ciliolatum		X				X		X		X	
Trifolium depauperatum var. amplectens		X			X		X			X	
Trifolium depauperatum var. truncatum	X	X	X	X		X	X	X	X	X	X
Trifolium sp.											X
Trifolium willdenovii	X	X	X	X	X	X	X	X	X	X	
Triphysaria eriantha ssp. eriantha		X	X	X			X				X
*Triticum aestivum**		X								X	
Tropidocarpum gracile	X	X	X	X	X				X	X	X
Uropappus lindleyi			X	X							
*Urtica urens**				X					X		
Veronica peregrina ssp. xalapensis			X								
*Veronica persica**		X							X	X	
*Vulpia bromoides**	X	X	X	X	X	X	X	X	X	X	X
Vulpia microstachys var. ciliata			X	X	X				X		X
Vulpia microstachys var. pauciflora	X	X	X			X	X	X		X	
*Vulpia myuros var. hirsuta**									X		
*Vulpia myuros var. myuros**	X	X	X	X	X	X	X	X	X	X	X

APPENDIX C

CALIFORNIA NATIVE PLANT SOCIETY BOTANICAL SURVEY GUIDELINES
&
CALIFORNIA DEPARTMENT OF FISH AND GAME PROTOCOLS FOR SURVEYING AND EVALUATING IMPACTS TO SPECIAL STATUS NATIVE PLANT POPULATIONS AND NATURAL COMMUNITIES

CNPS Botanical Survey Guidelines

(from CNPS *Inventory*, 6th Edition, 2001)

The following recommendations are intended to help those who prepare and review environmental documents determine when a botanical survey is needed, who should be considered qualified to conduct such surveys, how surveys should be conducted, and what information should be contained in the survey report. The California Native Plant Society recommends that lead agencies not accept the results of surveys unless they are conducted and reported according to these guidelines.

1. Botanical surveys are conducted in order to determine the environmental effects of proposed projects on all botanical resources, including special status plants (rare, threatened, and endangered plants) and plant (vegetation) communities. Special status plants are not limited to those that have been listed by state and federal agencies but include any plants that, based on all available data, can be shown to be rare, threatened, or endangered under the following definitions:

A species, subspecies, or variety of plant is "endangered" when the prospects of its survival and reproduction are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, or disease. A plant is "threatened" when it is likely to become endangered in the foreseeable future in the absence of protection measures. A plant is "rare" when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens.[1]

Rare plant (vegetation) communities are those communities that are of highly limited distribution. These communities may or may not contain special status plants. The most current version of the California Natural Diversity Database's *List of California Terrestrial Natural Communities*[2] should be used as a guide to the names and status of communities.

Consistent with the California Native Plant Society's goal of preserving plant biodiversity on a regional and local scale, and with California Environmental Quality Act environmental impact assessment criteria[3], surveys should also assess impacts to locally significant plants. Both plants and plant communities can be considered significant if their local occurrence is on the outer limits of known distribution, a range extension, a rediscovery, or rare or uncommon in a local context (such as within a county or region). Lead agencies should address impacts to these locally unique botanical resources regardless of their status elsewhere in the state.

2. Botanical surveys must be conducted to determine if, or to the extent that, special status or locally significant plants and plant communities will be affected by a proposed project when any natural vegetation occurs on the site and the project has the potential for direct or indirect effects on vegetation.

3. Those conducting botanical surveys must possess the following qualifications:

a. Experience conducting floristic field surveys;
b. Knowledge of plant taxonomy and plant community ecology and classification;
c. Familiarity with the plants of the area, including special status and locally significant plants;
d. Familiarity with the appropriate state and federal statutes related to plants and plant collecting; and,
e. Experience with analyzing impacts of a project on native plants and communities.

4. Botanical surveys should be conducted in a manner that will locate any special status or locally significant plants or plant communities that may be present. Specifically, botanical surveys should be:

a. Conducted in the field at the proper times of year when special status and locally significant plants are both evident and identifiable. When special status plants are known to occur in the type(s) of habitat present in the project area, nearby accessible occurrences of the plants (reference sites) should be observed to determine that the plants are identifiable at the time of survey.
b. Floristic in nature. A floristic survey requires that every plant observed be identified to species, subspecies, or variety as applicable. In order to properly characterize the site, a complete list of plants observed on the site shall be included in every botanical survey report. In addition, a sufficient number of visits spaced throughout the growing season is necessary to prepare an accurate inventory of all plants that exist on the

site. The number of visits and the timing between visits must be determined by geographic location, the plant communities present, and the weather patterns of the year(s) in which the surveys are conducted.

c. Conducted in a manner that is consistent with conservation ethics and accepted plant collection and documentation techniques[4,5]. Collections (voucher specimens) of special status and locally significant plants should be made, unless such actions would jeopardize the continued existence of the population. A single sheet should be collected and deposited at a recognized public herbarium for future reference. All collections shall be made in accordance with applicable state and federal permit requirements. Photography may be used to document plant identification only when the population cannot withstand collection of voucher specimens.
d. Conducted using systematic field techniques in all habitats of the site to ensure a thorough coverage of potential impact areas. All habitats within the project site must be surveyed thoroughly in order to properly inventory and document the plants present. The level of effort required per given area and habitat is dependent upon the vegetation and its overall diversity and structural complexity.
e. Well documented. When a special status plant (or rare plant community) is located, a California Native Species (or Community) Field Survey Form or equivalent written form, accompanied by a copy of the appropriate portion of a 7.5-minute topographic map with the occurrence mapped, shall be completed, included within the survey report, and separately submitted to the California Natural Diversity Database. Population boundaries should be mapped as accurately as possible. The number of individuals in each population should be counted or estimated, as appropriate.

5. Complete reports of botanical surveys shall be included with all environmental assessment documents, including Negative Declarations and Mitigated Negative Declarations, Timber Harvesting Plans, Environmental Impact Reports, and Environmental Impact Statements. Survey reports shall contain the following information:

a. Project location and description, including:
    1. A detailed map of the location and footprint of the proposed project.
    2. A detailed description of the proposed project, including one-time activities and ongoing activities that may affect botanical resources.
    3. A description of the general biological setting of the project area.
b. Methods, including:
    1. Survey methods for each of the habitats present, and rationale for the methods used.
    2. Description of reference site(s) visited and phenological development of the target special status plants, with an assessment of any conditions differing from the project site that may affect their identification.
    3. Dates of surveys and rationale for timing and intervals; names of personnel conducting the surveys; and total hours spent in the field for each surveyor on each date.
    4. Location of deposited voucher specimens and herbaria visited.
c. Results, including:
    1. A description and map of the vegetation communities on the project site. The current standard for vegetation classification, *A Manual of California Vegetation*[6], should be used as a basis for the habitat descriptions and the vegetation map. If another vegetation classification system is used, the report must reference the system and provide the reason for its use.
    2. A description of the phenology of each of the plant communities at the time of each survey date.
    3. A list of all plants observed on the project site using accepted scientific nomenclature, along with any special status designation. The reference(s) used for scientific nomenclature shall be cited.
    4. Written description and detailed map(s) showing the location of each special status or locally significant plant found, the size of each population, and method used to estimate or census the population.
    5. Copies of all California Native Species Field Survey Forms or Natural Community Field Survey Forms and accompanying maps.
d. Discussion, including:
    1. Any factors that may have affected the results of the surveys (e.g., drought, human disturbance, recent fire).
    2. Discussion of any special local or range-wide significance of any plant population or community on the site.
    3. An assessment of potential impacts. This shall include a map showing the distribution of special status and locally significant plants and communities on the site in relation to the proposed activities. Direct, indirect, and cumulative impacts to the plants and communities shall be discussed.
    4. Recommended measures to avoid and/or minimize direct, indirect, and cumulative impacts.
e. References cited and persons contacted.

f. Qualifications of field personnel including any special experience with the habitats and special status plants present on the site.

3.3.2 References Cited

[1] California Environmental Quality Act Guidelines, §15065 and §15380.

[2] List of California Terrestrial Natural Communities. California Department of Fish and Game Natural Diversity Database. Sacramento, CA.

[3] California Environmental Quality Act Guidelines, Appendix G (Initial Study Environmental Checklist).

[4] Collecting Guidelines and Documentation Techniques. California Native Plant Society Policy (adopted March 4, 1995).

[5] Ferren, W.R., Jr., D.L. Magney, and T.A. Sholars. 1995. The Future of California Floristics and Systematics: Collecting Guidelines and Documentation Techniques. *Madroño* 42(2):197-210.

[6] Sawyer, J.O. and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. California Native Plant Society. Sacramento, CA. 471 pp.

Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities

State of California
CALIFORNIA NATURAL RESOURCES AGENCY
Department of Fish and Game
November 24, 2009[1]

INTRODUCTION AND PURPOSE

The conservation of special status native plants and their habitats, as well as natural communities, is integral to maintaining biological diversity. The purpose of these protocols is to facilitate a consistent and systematic approach to the survey and assessment of special status native plants and natural communities so that reliable information is produced and the potential of locating a special status plant species or natural community is maximized. They may also help those who prepare and review environmental documents determine when a botanical survey is needed, how field surveys may be conducted, what information to include in a survey report, and what qualifications to consider for surveyors. The protocols may help avoid delays caused when inadequate biological information is provided during the environmental review process; assist lead, trustee and responsible reviewing agencies to make an informed decision regarding the direct, indirect, and cumulative effects of a proposed development, activity, or action on special status native plants and natural communities; meet California Environmental Quality Act (CEQA)[2] requirements for adequate disclosure of potential impacts; and conserve public trust resources.

DEPARTMENT OF FISH AND GAME TRUSTEE AND RESPONSIBLE AGENCY MISSION

The mission of the Department of Fish and Game (DFG) is to manage California's diverse wildlife and native plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. DFG has jurisdiction over the conservation, protection, and management of wildlife, native plants, and habitat necessary to maintain biologically sustainable populations (Fish and Game Code §1802). DFG, as trustee agency under CEQA §15386, provides expertise in reviewing and commenting on environmental documents and makes protocols regarding potential negative impacts to those resources held in trust for the people of California.

Certain species are in danger of extinction because their habitats have been severely reduced in acreage, are threatened with destruction or adverse modification, or because of a combination of these and other factors. The California Endangered Species Act (CESA) provides additional protections for such species, including take prohibitions (Fish and Game Code §2050 *et seq.*). As a responsible agency, DFG has the authority to issue permits for the take of species listed under CESA if the take is incidental to an otherwise lawful activity; DFG has determined that the impacts of the take have been minimized and fully mitigated; and, the take would not jeopardize the continued existence of the species (Fish and Game Code §2081). Surveys are one of the preliminary steps to detect a listed or special status plant species or natural community that may be impacted significantly by a project.

DEFINITIONS

Botanical surveys provide information used to determine the potential environmental effects of proposed projects on all special status plants and natural communities as required by law (i.e., CEQA, CESA, and Federal Endangered Species Act (ESA)). Some key terms in this document appear in **bold font** for assistance in use of the document.

For the purposes of this document, **special status plants** include all plant species that meet one or more of the following criteria[3]:

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1 This document replaces the DFG document entitled "Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened and Endangered Plants and Natural Communities."

2 http://ceres.ca.gov/ceqa/

3 Adapted from the East Alameda County Conservation Strategy available at http://www.fws.gov/sacramento/EACCS/Documents/080228_Species_Evaluation_EACCS.pdf

- Listed or proposed for listing as threatened or endangered under ESA or candidates for possible future listing as threatened or endangered under the ESA (50 CFR §17.12).

- Listed[4] or candidates for listing by the State of California as threatened or endangered under CESA (Fish and Game Code §2050 *et seq.*). A species, subspecies, or variety of plant is **endangered** when the prospects of its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, disease, or other factors (Fish and Game Code §2062). A plant is **threatened** when it is likely to become endangered in the foreseeable future in the absence of special protection and management measures (Fish and Game Code §2067).

- Listed as rare under the California Native Plant Protection Act (Fish and Game Code §1900 *et seq*.). A plant is **rare** when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens (Fish and Game Code §1901).

- Meet the definition of rare or endangered under CEQA §15380(b) and (d). Species that may meet the definition of rare or endangered include the following:

    - Species considered by the California Native Plant Society (CNPS) to be “rare, threatened or endangered in California” (Lists 1A, 1B and 2);

    - Species that may warrant consideration on the basis of local significance or recent biological information[5];

    - Some species included on the California Natural Diversity Database’s (CNDDB) *Special Plants, Bryophytes, and Lichens List* (California Department of Fish and Game 2008)[6].

- Considered a **locally significant species,** that is, a species that is not rare from a statewide perspective but is rare or uncommon in a local context such as within a county or region (CEQA §15125 (c)) or is so designated in local or regional plans, policies, or ordinances (CEQA Guidelines, Appendix G). Examples include a species at the outer limits of its known range or a species occurring on an uncommon soil type.

Special status natural communities are communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects. These communities may or may not contain special status species or their habitat. The most current version of the Department’s *List of California Terrestrial Natural Communities*[7] indicates which natural communities are of special status given the current state of the California classification.

Most types of wetlands and riparian communities are considered special status natural communities due to their limited distribution in California. These natural communities often contain special status plants such as those described above. These protocols may be used in conjunction with protocols formulated by other agencies, for example, those developed by the U.S. Army Corps of Engineers to delineate jurisdictional wetlands[8] or by the U.S. Fish and Wildlife Service to survey for the presence of special status plants[9].

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4 Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata.

5 In general, CNPS List 3 plants (plants about which more information is needed) and List 4 plants (plants of limited distribution) may not warrant consideration under CEQA §15380. These plants may be included on special status plant lists such as those developed by counties where they would be addressed under CEQA §15380. List 3 plants may be analyzed under CEQA §15380 if sufficient information is available to assess potential impacts to such plants. Factors such as regional rarity vs. statewide rarity should be considered in determining whether cumulative impacts to a List 4 plant are significant even if individual project impacts are not. List 3 and 4 plants are also included in the California Natural Diversity Database’s (CNDDB) *Special Plants, Bryophytes, and Lichens List.* [Refer to the current online published list available at: http://www.dfg.ca.gov/biogeodata.] Data on Lists 3 and 4 plants should be submitted to CNDDB. Such data aids in determining or revising priority ranking.

6 Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata.

7 http://www.dfg.ca.gov/biogeodata/vegcamp/pdfs/natcomlist.pdf. The rare natural communities are asterisked on this list.

8 http://www.wetlands.com/regs/tlpge02e.htm

9 U.S. Fish and Wildlife Service Survey Guidelines available at http://www.fws.gov/sacramento/es/protocol.htm

BOTANICAL SURVEYS

Conduct botanical surveys prior to the commencement of any activities that may modify vegetation, such as clearing, mowing, or ground-breaking activities. It is appropriate to conduct a botanical field survey when:

- Natural (or naturalized) vegetation occurs on the site, and it is unknown if special status plant species or natural communities occur on the site, and the project has the potential for direct or indirect effects on vegetation; or
- Special status plants or natural communities have historically been identified on the project site; or
- Special status plants or natural communities occur on sites with similar physical and biological properties as the project site.

SURVEY OBJECTIVES

Conduct field surveys in a manner which maximizes the likelihood of locating special status plant species or special status natural communities that may be present. Surveys should be **floristic in nature**, meaning that every plant taxon that occurs on site is identified to the taxonomic level necessary to determine rarity and listing status. "Focused surveys" that are limited to habitats known to support special status species or are restricted to lists of likely potential species are not considered floristic in nature and are not adequate to identify all plant taxa on site to the level necessary to determine rarity and listing status. Include a list of plants and natural communities detected on the site for each botanical survey conducted. More than one field visit may be necessary to adequately capture the floristic diversity of a site. An indication of the prevalence (estimated total numbers, percent cover, density, etc.) of the species and communities on the site is also useful to assess the significance of a particular population.

SURVEY PREPARATION

Before field surveys are conducted, compile relevant botanical information in the general project area to provide a regional context for the investigators. Consult the CNDDB[10] and BIOS[11] for known occurrences of special status plants and natural communities in the project area prior to field surveys. Generally, identify vegetation and habitat types potentially occurring in the project area based on biological and physical properties of the site and surrounding ecoregion[12], unless a larger assessment area is appropriate. Then, develop a list of special status plants with the potential to occur within these vegetation types. This list can serve as a tool for the investigators and facilitate the use of reference sites; however, special status plants on site might not be limited to those on the list. Field surveys and subsequent reporting should be comprehensive and floristic in nature and not restricted to or focused only on this list. Include in the survey report the list of potential special status species and natural communities, and the list of references used to compile the background botanical information for the site.

SURVEY EXTENT

Surveys should be comprehensive over the entire site, including areas that will be directly or indirectly impacted by the project. Adjoining properties should also be surveyed where direct or indirect project effects, such as those from fuel modification or herbicide application, could potentially extend offsite. Pre-project surveys restricted to known CNDDB rare plant locations may not identify all special status plants and communities present and do not provide a sufficient level of information to determine potential impacts.

FIELD SURVEY METHOD

Conduct surveys using **systematic field techniques** in all habitats of the site to ensure thorough coverage of potential impact areas. The level of effort required per given area and habitat is dependent upon the vegetation and its overall diversity and structural complexity, which determines the distance at which plants can be identified. Conduct surveys by walking over the entire site to ensure thorough coverage, noting all plant taxa

[10] Available at http://www.dfg.ca.gov/biogeodata/cnddb

[11] http://www.bios.dfg.ca.gov/

[12] Ecological Subregions of California, available at http://www.fs.fed.us/r5/projects/ecoregions/toc.htm

observed. The level of effort should be sufficient to provide comprehensive reporting. For example, one person-hour per eight acres per survey date is needed for a comprehensive field survey in grassland with medium diversity and moderate terrain[13], with additional time allocated for species identification.

TIMING AND NUMBER OF VISITS

Conduct surveys in the field at the time of year when species are both evident and identifiable. Usually this is during flowering or fruiting. Space visits throughout the growing season to accurately determine what plants exist on site. Many times this may involve multiple visits to the same site (e.g. in early, mid, and late-season for flowering plants) to capture the floristic diversity at a level necessary to determine if special status plants are present[14]. The timing and number of visits are determined by geographic location, the natural communities present, and the weather patterns of the year(s) in which the surveys are conducted.

REFERENCE SITES

When special status plants are known to occur in the type(s) of habitat present in the project area, observe reference sites (nearby accessible occurrences of the plants) to determine whether those species are identifiable at the time of the survey and to obtain a visual image of the target species, associated habitat, and associated natural community.

USE OF EXISTING SURVEYS

For some sites, floristic inventories or special status plant surveys may already exist. Additional surveys may be necessary for the following reasons:

- Surveys are not current[15]; or
- Surveys were conducted in natural systems that commonly experience year to year fluctuations such as periods of drought or flooding (e.g. vernal pool habitats or riverine systems); or
- Surveys are not comprehensive in nature; or fire history, land use, physical conditions of the site, or climatic conditions have changed since the last survey was conducted[16]; or
- Surveys were conducted in natural systems where special status plants may not be observed if an annual above ground phase is not visible (e.g. flowers from a bulb); or
- Changes in vegetation or species distribution may have occurred since the last survey was conducted, due to habitat alteration, fluctuations in species abundance and/or seed bank dynamics.

NEGATIVE SURVEYS

Adverse conditions may prevent investigators from determining the presence of, or accurately identifying, some species in potential habitat of target species. Disease, drought, predation, or herbivory may preclude the presence or identification of target species in any given year. Discuss such conditions in the report.

The failure to locate a known special status plant occurrence during one field season does not constitute evidence that this plant occurrence no longer exists at this location, particularly if adverse conditions are present. For example, surveys over a number of years may be necessary if the species is an annual plant having a persistent, long-lived seed bank and is known not to germinate every year. Visits to the site in more

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[13] Adapted from U.S. Fish and Wildlife Service kit fox survey guidelines available at www.fws.gov/sacramento/es/documents/kitfox_no_protocol.pdf

[14] U.S. Fish and Wildlife Service Survey Guidelines available at http://www.fws.gov/sacramento/es/protocol.htm

[15] Habitats, such as grasslands or desert plant communities that have annual and short-lived perennial plants as major floristic components may require yearly surveys to accurately document baseline conditions for purposes of impact assessment. In forested areas, however, surveys at intervals of five years may adequately represent current conditions. For forested areas, refer to "Guidelines for Conservation of Sensitive Plant Resources Within the Timber Harvest Review Process and During Timber Harvesting Operations", available at https://r1.dfg.ca.gov/portal/Portals/12/THPBotanicalGuidelinesJuly2005.pdf

[16] U.S. Fish and Wildlife Service Survey Guidelines available at http://www.fws.gov/ventura/speciesinfo/protocols_guidelines/docs/botanicalinventories.pdf

than one year increase the likelihood of detection of a special status plant especially if conditions change. To further substantiate negative findings for a known occurrence, a visit to a nearby reference site may ensure that the timing of the survey was appropriate.

REPORTING AND DATA COLLECTION

Adequate information about special status plants and natural communities present in a project area will enable reviewing agencies and the public to effectively assess potential impacts to special status plants or natural communities[17] and will guide the development of minimization and mitigation measures. The next section describes necessary information to assess impacts. For comprehensive, systematic surveys where no special status species or natural communities were found, reporting and data collection responsibilities for investigators remain as described below, excluding specific occurrence information.

SPECIAL STATUS PLANT OR NATURAL COMMUNITY OBSERVATIONS

Record the following information for locations of each special status plant or natural community detected during a field survey of a project site.

- A detailed map (1:24,000 or larger) showing locations and boundaries of each special status species occurrence or natural community found as related to the proposed project. Mark occurrences and boundaries as accurately as possible. Locations documented by use of global positioning system (GPS) coordinates must include the datum[18] in which they were collected;
- The site-specific characteristics of occurrences, such as associated species, habitat and microhabitat, structure of vegetation, topographic features, soil type, texture, and soil parent material. If the species is associated with a wetland, provide a description of the direction of flow and integrity of surface or subsurface hydrology and adjacent off-site hydrological influences as appropriate;
- The number of individuals in each special status plant population as counted (if population is small) or estimated (if population is large);
- If applicable, information about the percentage of individuals in each life stage such as seedlings vs. reproductive individuals;
- The number of individuals of the species per unit area, identifying areas of relatively high, medium and low density of the species over the project site; and
- Digital images of the target species and representative habitats to support information and descriptions.

FIELD SURVEY FORMS

When a special status plant or natural community is located, complete and submit to the CNDDB a California Native Species (or Community) Field Survey Form[19] or equivalent written report, accompanied by a copy of the relevant portion of a 7.5 minute topographic map with the occurrence mapped. Present locations documented by use of GPS coordinates in map and digital form. Data submitted in digital form must include the datum[20] in which it was collected. If a potentially undescribed special status natural community is found on the site, document it with a Rapid Assessment or Relevé form[21] and submit it with the CNDDB form.

VOUCHER COLLECTION

Voucher specimens provide verifiable documentation of species presence and identification as well as a public record of conditions. This information is vital to all conservation efforts. Collection of voucher specimens should

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17 Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata. For Timber Harvest Plans (THPs) please refer to the “Guidelines for Conservation of Sensitive Plant Resources Within the Timber Harvest Review Process and During Timber Harvesting Operations”, available at https://r1.dfg.ca.gov/portal/Portals/12/THPBotanicalGuidelinesJuly2005.pdf

18 NAD83, NAD27 or WGS84

19 http://www.dfg.ca.gov/biogeodata

20 NAD83, NAD27 or WGS84

21 http://www.dfg.ca.gov/biogeodata/vegcamp/veg_publications_protocols.asp

be conducted in a manner that is consistent with conservation ethics, and is in accordance with applicable state and federal permit requirements (e.g. incidental take permit, scientific collection permit). Voucher collections of special status species (or suspected special status species) should be made only when such actions would not jeopardize the continued existence of the population or species.

Deposit voucher specimens with an indexed regional herbarium[22] no later than 60 days after the collections have been made. Digital imagery can be used to supplement plant identification and document habitat. Record all relevant permittee names and permit numbers on specimen labels. A collecting permit is required prior to the collection of State-listed plant species[23].

BOTANICAL SURVEY REPORTS

Include reports of botanical field surveys containing the following information with project environmental documents:

- **Project and site description**
  - A description of the proposed project;
  - A detailed map of the project location and study area that identifies topographic and landscape features and includes a north arrow and bar scale; and,
  - A written description of the biological setting, including vegetation[24] and structure of the vegetation; geological and hydrological characteristics; and land use or management history.
- **Detailed description of survey methodology and results**
  - Dates of field surveys (indicating which areas were surveyed on which dates), name of field investigator(s), and total person-hours spent on field surveys;
  - A discussion of how the timing of the surveys affects the comprehensiveness of the survey;
  - A list of potential special status species or natural communities;
  - A description of the area surveyed relative to the project area;
  - References cited, persons contacted, and herbaria visited;
  - Description of reference site(s), if visited, and phenological development of special status plant(s);
  - A list of all taxa occurring on the project site. Identify plants to the taxonomic level necessary to determine whether or not they are a special status species;
  - Any use of existing surveys and a discussion of applicability to this project;
  - A discussion of the potential for a false negative survey;
  - Provide detailed data and maps for all special plants detected. Information specified above under the headings “Special Status Plant or Natural Community Observations,” and “Field Survey Forms,” should be provided for locations of each special status plant detected;
  - Copies of all California Native Species Field Survey Forms or Natural Community Field Survey Forms should be sent to the CNDDB and included in the environmental document as an Appendix. It is not necessary to submit entire environmental documents to the CNDDB; and,
  - The location of voucher specimens, if collected.

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22 For a complete list of indexed herbaria, see: Holmgren, P., N. Holmgren and L. Barnett. 1990. Index Herbariorum, Part 1: Herbaria of the World. New York Botanic Garden, Bronx, New York. 693 pp. Or: http://www.nybg.org/bsci/ih/ih.html

23 Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata.

24 A vegetation map that uses the National Vegetation Classification System (http://biology.usgs.gov/npsveg/nvcs.html), for example *A Manual of California Vegetation*, and highlights any special status natural communities. If another vegetation classification system is used, the report should reference the system, provide the reason for its use, and provide a crosswalk to the National Vegetation Classification System.

- **Assessment of potential impacts**
  - A discussion of the significance of special status plant populations in the project area considering nearby populations and total species distribution;
  - A discussion of the significance of special status natural communities in the project area considering nearby occurrences and natural community distribution;
  - A discussion of direct, indirect, and cumulative impacts to the plants and natural communities;
  - A discussion of threats, including those from invasive species, to the plants and natural communities;
  - A discussion of the degree of impact, if any, of the proposed project on unoccupied, potential habitat of the species;
  - A discussion of the immediacy of potential impacts; and,
  - Recommended measures to avoid, minimize, or mitigate impacts.

QUALIFICATIONS

Botanical consultants should possess the following qualifications:

- Knowledge of plant taxonomy and natural community ecology;
- Familiarity with the plants of the area, including special status species;
- Familiarity with natural communities of the area, including special status natural communities;
- Experience conducting floristic field surveys or experience with floristic surveys conducted under the direction of an experienced surveyor;
- Familiarity with the appropriate state and federal statutes related to plants and plant collecting; and,
- Experience with analyzing impacts of development on native plant species and natural communities.

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APPENDIX D

DELPHINIUM FOUND WITHIN THE APNOCHE SURVEY AREA (MEMORANDUM FROM DR. JAMES PAULUS)

Memorandum May 3, 2010

To: Davinna Ohlson, project manager
From: Jim Paulus

RE: Delphinium found within the Panoche survey area

Populations of native perennial herbs of the genus *Delphinium* were located in Sections 4, 8, 9 and 19 during surveys conducted in March and April. At least one individual in each located population was exhibiting flowers either upon initial detection or when the population was revisited by the project botanist. Identification to species at each location therefore was based upon available leaf, stem and flower characters. In addition, one individual in Section 8 was excavated in order to observe below-ground characters such as root length and strength of the stem attachment.

Plants in Sections 9 were assigned to the relatively common species *D. patens* ssp. *patens*, based upon above-ground characters exhibited by blooming individuals. Plants identified as *D. patens* ssp. *patens* had relatively dark purple-blue sepals, and petals of similar coloration except for whitish margins and white hairs on the upper surfaces. White petals would be expected of both *D. recurvatum* and *D. gypsophilum*. In addition, the flowers exhibited by *D. patens* were relatively small and crowded in comparison to flowers produced by populations located in other Sections. Sepal spurs were consistently less than 10 mm in length, lateral sepals were less than 15 mm in length, and inflorescence internodes were generally less than 20 mm apart. Plants of *D. recurvatum* or *D. gypsophilum* may be expected to produce at least some flowers of greater overall size and greater spacing within the inflorescence. Finally, the lower stems of *D. patens* in Section 9 were consistently glabrous, but were never glaucous and did not appear as reddish as the stems of *Delphinium* located elsewhere within the survey area.

Plants in Section 19 were assigned to the species *D. gypsophilum* ssp. *gypsophilum* (CNPS 4.2, no state or federal listing), based upon above-ground characters. These plants produced up to 25 flowers per inflorescence, spaced up to 3.5 cm apart and held on pedicels of 10-20 mm length. In general, these plants were robust relative to populations found elsewhere within the survey area, with some individuals standing greater than 1 m tall. The expected size of the stem and inflorescence would be smaller for *D. recurvatum*, which is described as generally less than 60 cm tall and with more crowded flowers due to pedicels spaced generally less than 2.5 cm apart. Also, the plants at had exhibited strongly glaucous lower stems, which is typical of *D. gypsophilum* ssp. *gypsophilum*, but not described in literature sources for *D. recurvatum*. Plants in Section 19 exhibited whitish flowers, with little variation between the sepal and petal colors. Some individuals had a small amount of blue in the sepals, which were observed to be reflexed relatively little (or none) even on older flowers. In contrast, *D. recurvatum* flowers would be generally expected to show greater contrast between sepals (bluish) and petals (white), with reflexed sepals. Characters that did not evoke confident separation included the leaves, which were at most ciliate along the edges, and petals that on some individuals were hairier on the inner surfaces relative to the outer surfaces. Expected characters for *D. gypsophilum* would include puberulent leaf margins and equally hairy petal surfaces.

Plants in Sections 4 and 8 could not be confidently separated from the rare species *D. recurvatum* (CNPS 1B.1, no state or federal listing), based upon above-ground characters and below-ground characters of one individual excavated in Section 8. These plants, comprising eight separate groupings (one in Section 8 and seven in Section 4), generally exhibited greater variation in color of petals and sepals, with some plants having light purple-blue sepals that strongly contrasted with the white petals (Figure 1). No plants in these groups were observed to achieve greater than 60 cm overall height. Stems were observed to be consistently reddish and glabrous, but not glaucous. Inflorescence size (ie, pedicel spacing and length, number of flowers) was consistent with the size expected for *D. recurvatum*, with less than 10 flowers held on glabrous pedicels (ascending at 45 degrees) spaced at about 2 cm apart. Finally, the root system investigated in Section 8 (Figure 2) was highly branched, with a narrowed but firm attachment to the stem. Some plants within each of these groups (all located within an area of about one square mile) exhibited often strong variation in these characters, making positive identification to the species level of taxa difficult. For example, sepal coloration and reflexion varied considerably, with sepal color ranging from white to slightly pinkish (Figure 3) to slightly or rather strongly bluish (Figure 1), and older flowers attaining a range of barely to strongly reflexed. This variability was observed on at least one occasion to occur on a single individual. Petal hairiness with regard to overall amount of hairs and contrast between inner and outer surfaces was also variable, although all plants exhibited some degree of white-hairiness on both the inner and outer surfaces. Leaves were never puberulent, appearing overall glabrous but upon close inspection having ciliate hairs on leaf margins and thus resembling plants separated as *D. gypsophilum* in Section 19. Like all other *Delphinium* found within the survey area except *D. patens* in Section 9, plants in Sections 4 and 8 developed darkish, often greenish, central sepal spots, which is not a character described in the available literature or appearing in herbaria specimen photographs of *D. recurvatum*.

As of this writing, it is speculated that some hybridization has occurred among the *Delphinium* that now populate portions of Sections 4 and 8. Hybridization would account for the relatively high inter- and intra-group variability, and is a generally well-documented trait of local *Delphinium* species. This known tendency for hybridization is thought to be more commonly realized in areas that have been significantly disturbed, and disturbance is certainly in force within the habitat where these plants were found. This area (the flatlands at and near Sections 4 and 8) likely once supported alkaline scrub vegetation, but has been historically used for pasture. It now supports heavily grazed non-native grasslands. Sections 4 and 8 where *Delphinium* populations have survived do not exhibit the tillage lines found in other Sections. The tentatively assigned *Delphinium recurvatum* remains there (despite grazing disturbance), but has possibly responded to habitat alteration by becoming hybridized with other locally occurring species such as *D. gypsophilum* ssp. *gypsophilum* or *D. hesperium* ssp. *pallescens*. It is likely that revisiting all of the populations located in Sections 4 and 8 during fruit and seed maturation will allow more confident assignation to the species level of taxa.

Figure 1. Delphinium cf. recurvatum, Section 4

Figure 3. Delphinium cf. recurvatum, Section 4

Figure 2. Delphinium cf. recurvatum, Section 8

September 17, 2010

Eric Cherniss
Vice President of Project Development
Solargen Energy, Inc.
20400 Stevens Creek Blvd., Suite 700
Cupertino, CA 95014

Subject: Late spring rare plant surveys for the Panoche Valley Solar Farm project in San Benito County, California (PN 1297-04c)

Dear Eric:

Live Oak Associates, Inc. (LOA) has completed a focused late spring survey for special status plants (i.e., plants designated as endangered, threatened, or rare, per CDFG, 2010, and plants listed by the California Native Plant Society, per CNPS, 2009) on 4,717 acres of the Panoche Valley Solar Farm site (hereafter referred to as "study area") located along Little Panoche Road in San Benito County, California. Specifically, this survey was conducted to determine whether or not special status plants that would bloom in May, June or July were present within the study area in 2010. The results of a late spring/early fall survey for special status plants that would bloom in August, September, and October have been previously reported in the memorandum "Late summer/early fall rare plant surveys for the Panoche Valley Solar Farm project in San Benito County, California (PN1297-04)," date November 24, 2009, and the results of an early spring survey for special status plants that would bloom in March or April have been previously reported in the memorandum "Early spring rare plant surveys for the Panoche Valley Solar Farm project in San Benito County, California (PN 1297-04b)," dated June 17, 2010.

Site Location and Existing Conditions

The project site occurs on the floor of Panoche Valley between the Gabilan Range to the west and the Panoche Hills to the east. The survey area is generally bounded to the west, north, and east by open space and rangelands and to the south by Yturiarte Road (Figure 1). Surrounding lands consist of rangelands used for cattle grazing.

The late spring 2010 study area included the same valley floor topography surveyed in early spring (generally, all or portions of Sections 3, 4, 5, 8, 9, 10, 11, 13, 14, 15, and 16, of Township 15 south, Range 10 east, and Section 19 of Township 15 south, Range 11 east). All seasonally flowing creeks, ephemeral drainages and low swales that exhibited surface waters during the early spring surveys had become dried as the area entered seasonal drought during the May through July timing of the late spring survey. A few artificially charged ponds associated with cattle grazing remained wet. Rainfall events during the May-July period provided only trace amounts of precipitation. Non-native, annual species, which are clearly dominant throughout the study area, were senescing at the time of the survey. However, the climate in May through early June was unusually cool and moist, providing an excellent opportunity to complete an inventory of later-blooming members of the study area's plant assemblage.

Literature Search and Botanical Survey

A literature search was conducted in order to identify special status plant species that may potentially occur within the study area's available habitats. A review of California Natural Diversity Database records and environmental documentation for area projects, and consultation with local California Department of Fish and Game and Bureau of Land Management botanists (Mr. Dave Hacker, Ms. Ellen Cypher, Mr. Ryan O'Dell) uncovered 23 potentially occurring special status plants (Table 1). Of these, 22 have flowering and fruiting periods (optimal survey times) that fall within the May-July period that was chosen for the late spring botanical survey. This includes San Joaquin woollythreads (*Monolopia congdonii*) and California jewelflower (*Caulanthus californicus*), species that are federally listed as Endangered. The optimal survey times for eight of these species (*Astragalus macrodon*, *Atriplex vallicola*, *Blepharizonia plumosa*, *Cordylanthus mollis* ssp. *hispidus*, *Deinandra halliana*, *Eriogonum vestitum*, *Navarretia nigelliformis* ssp. *radians*, and *Trichostema ovatum*) fall within the survey period chosen for late spring surveys. Due to their normally late development, these species likely would not have been reliably separable from related common species during the March-April early spring survey period.

Table 1. Special status plant species that could potentially occur within the 4,717-acre Panoche Valley Solar Farm study area. Blooming period is taken from CNPS (2009).

Species	Status*	Habitat	Blooming Period
Santa Clara thorn-mint *Acanthomintha lanceolata* Annual herb	CNPS 4	Chaparral, woodland, rocky, often serpentine	March-June
Forked fiddleneck *Amsinckia vernicosa* var. *furcata* Annual herb	CNPS 4	Woodland, grassland	February-May
California androsace *Androsace elongata* ssp. *acuta* Annual herb	CNPS 4	Chaparral, woodland, meadows and seeps, grassland	March-June
Salinas milk-vetch *Astragalus macrodon* Perennial herb	CNPS 4	Chaparral, woodland, grassland	April-July

Table 1 (cont'd.). Special status plant species that could potentially occur within the 4,717-acre Panoche Valley Solar Farm study area. Blooming period is taken from CNPS (2009).

Species	**Status***	**Habitat**	**Blooming Period**
Crownscale *Atriplex coronata* var. *coronata* Annual herb	CNPS 4	Chenopod scrub, grasslands, and vernal pools, alkaline soils	March–October
Lost Hills crownscale *Atriplex vallicola* Annual herb	CNPS 1B	Chenopod scrub, grasslands, and vernal pools, alkaline soils.	April–August
Big tarplant *Blepharizonia plumosa* Annual herb	CNPS 1B	Dry areas in grasslands	July–October
Round-leaved filaree *California macrophylla* Annual herb	CNPS 1B	Woodland, grassland	March-May
California jewelflower *Caulanthus californicus* Perennial herb	CNPS 1B Federal Endangered	grasslands (non-alkaline), flats	March-May
Lemmon's jewelflower *Caulanthus coulteri* var. *lemmonii* Perennial herb	CNPS 1B	Pinyon-juniper woodland, grassland	March-May
Hispid bird's-beak *Cordylanthus mollis* ssp. *hispidus* Annual herb	CNPS 1B	Meadows and seeps, playas, grasslands, often damp, alkaline	June–September
Hall's tarplant *Deinandra halliana* Annual herb	CNPS 1B	Chenopod scrub, grassland, clay soils	April-May
Gypsum-loving larkspur *Delphinium gypsophilum* ssp. *gypsophilum* Perennial herb	CNPS 4	Chenopod scrub, grassland, clay soils	February-May
Recurved larkspur *Delphinium recurvatum* Perennial herb	CNPS 1B	Chenopod scrub, grassland, alkaline	March-June
Idria buckwheat *Eriogonum vestitum* Annual herb	CNPS 4	Grasslands, open slopes	April–August
Pale yellow layia *Layia heterotricha* Annual herb	CNPS 1B	Pinyon-juniper woodland, alkaline grassland, clay	March-June

Table 1 (cont'd.). Special status plant species that could potentially occur within the 4,717-acre Panoche Valley Solar Farm study area. Blooming period is taken from CNPS (2009).

Species	Status*	Habitat	Blooming Period
Panoche peppergrass *Lepidium jaredii* ssp. *album* Annual herb	CNPS 1B	Grassland, washes and alluvial fans	February-June
Serpentine leptosiphon *Leptosiphon ambiguus* Annual herb	CNPS 4	Grassland, often serpentine soil	March-June
Showy golden madia *Madia radiata* Annual herb	CNPS 1B	Woodland, grassland	March-May
San Joaquin woollythreads *Monolopia congdonii* Annual herb	CNPS 1B federal Endangered	Chenopod scrub, grassland, sandy	February-May
Shining navarretia *Navarretia nigelliformis* ssp. *radians* Annual herb	CNPS 1B	Woodland, grassland, vernal pools	May-July
Chaparral ragwort *Senecio aphanactis* Annual herb	CNPS 2	Woodland, chaparral	January-April
San Joaquin bluecurls *Trichostema ovatum* Annual herb	CNPS 4	Chenopod scrub, grasslands	July–October

***California Native Plant Society (CNPS) list designations**
1B: Plants Rare, Threatened, or Endangered in California and elsewhere
2: Plants Rare, Threatened, or Endangered in California but more common elsewhere
4: Plants of limited distribution – a watch list

Survey Methods

Known nearby populations of potentially occurring special status plant species were visited in order to develop a search image for these special status species and to verify that the timing of on-site survey work would coincide with the period in which these species can be readily seen and are separable from common local species. Reference populations that were chosen for observation were all located at elevations similar to the study area and within 10 miles of the study area. Reference populations visited in May included forked fiddleneck, crownscale, Lost Hills crownscale, Panoche peppergrass, serpentine leptosiphon, and showy golden madia. The reference populations visited in June included Santa Clara thorn-mint, Salinas milkvetch, gypsum-loving larkspur, Idria buckwheat, and chaparral ragwort. These visits supported the chosen period for the survey as being within the anthesis period of potentially occurring special status species.

Focused special status plant species surveys were conducted by LOA botanists Neal Kramer and Jim Paulus, and by LOA ecologists Nathan Hale, Jessica Celis, Chris Bronny, Colby

Boggs,Yancey Bissonnette, and Wendy Fisher, using the same methodology as described for the Fall 2009 and early spring 2010 surveys (LOA, 2009, 2010). In summary, the survey team walked the entire site in evenly-spaced transects, ensuring 100% visual coverage, during the species' blooming period when they would be evident and most identifiable. Emphasis was placed on areas more likely to support suitable habitat for the target species. All vascular plant species observed were recorded in a field notebook. The survey was floristic, striving to identify all species to the level of taxa needed to separate occurring species from the potentially occurring special status species identified during the literature review (Appendices A and B). The survey methodology is consistent with survey protocols outlined by the CNPS and complied with the most recent California Department of Fish and Game guidelines (Appendix C). Thorough transect surveys were conducted on May 4 through June 4, 2010. Additional surveys conducted July 26-27, 2010, determined the species of 28 *Blepharizonia* populations that were found to be occurring in pre-flowering phenology during the May-June transect surveys.

Results: Plant Species Present in May - July 2010

The results of the May-July 2010 botanical survey indicate greater diversity is present than was suggested by the fall 2009 and early spring 2010 surveys alone. The late spring survey added 37 species to the study area total (239 species as of July 28; Appendix A).

No federal or state listed plant species were found within the study area. No plants that could be confused with either San Joaquin woollythreads or California caulanthus were found in 2010. The survey detected four widely scattered individuals that are classifiable as the CNPS List 1B species recurved larkspur, three populations of CNPS List 4 gypsum-loving larkspur, and four populations of the CNPS List 4 serpentine leptosiphon (Figure 2). All *Blepharizonia* populations visited July 26-27 exhibited mature fruit pappus structures and were determined to be *B. laxa*, a common species. Identifications of special status plants in the field, and the mapping of their populations, were performed by one of the two LOA botanists who participated in all surveys.

Plants classifiable as recurved larkspur (*Delphinium recurvatum*) were found widely scattered in Sections 4 and 13. All occur in relatively flat, open pasture habitat. A technical memorandum prepared by Dr. Paulus discusses non-characteristic traits common to these plants, including weak sepal coloration, and variations that suggest these plants may be hybrids of *D. recurvatum* with the locally occurring, less sensitive *D. gypsophilum* ssp. *gypsophilum* and *D. hesperium* ssp. *pallescens* (Appendix D). Attempts to locate plants with mature fruit and thereby determine species-specific seed characteristics were either thwarted by cows, who had removed nearly all plants of this type that were located during the early spring survey (see Figure 2 in LOA, 2010), or at best resulted in finding sterile, underdeveloped fruits. Sterile fruit production further supports the opinion that plants occurring within the study area are hybrids (LOA, 2010). Sterile fruit and nearly complete destruction by herbivory at flowering are traits of a population or group of plants that is not reproductively self-sustaining.

Gypsum-loving larkspur was found at small occurrences in Sections 13 and 19. Unlike the plants in Sections 4 and 8 (where the plants could not be separated from recurved larkspur), these plants fit well within the expected species characteristics of gypsum-loving larkspur. Individuals appear to be confined rather narrowly to north or northwest-facing slopes associated with gully habitats that are available only at the fringe of the study area. This is the same habitat noted for reference populations of this species. Previously documented occurrences of this species within the study area were confined to Section 19 (LOA, 2010).

Four populations of serpentine leptosiphon were found in bloom during the survey. Serpentine leptosiphon is an annual species. Blooming in this species was observed as late as June 1. The sole occurrence east of Little Panoche Road, an individual apparently isolated in Section 13, may be considered a waif. All other located populations (Figure 2) numbered in the several hundreds, and occurred in more typical serpentine alluvium near the study area's western edge. Considering these populations with the populations documented during the 2010 early spring survey (LOA, 2010), serpentine leptosiphon occurred in 2010 in very impressive displays to the west of Little Panoche Road. In all, several tens of thousands of plants were observed to bloom and set seed within the study area.

Relic, highly disturbed aquatic features that may be classifiable as vernal pools were located in Sections 4, 8, 10, and 16. These features, despite heavy use by livestock, maintain a species assemblage that is unique within the study area. Species found only at these small and isolated seasonal pools (all pools of this type were observed to perch shallow groundwater until May in 2010) are assigned by Reed (1988) as being typical wetland species in California.

If you have any questions regarding our findings, please contact Michele Korpos at mkorpos@loainc.com or (408) 281-5881 at your earliest convenience.

Sincerely,

Davinna Ohlson

Davinna Ohlson
Senior Project Manager
Plant/Wildlife Ecologist

Enclosures

References

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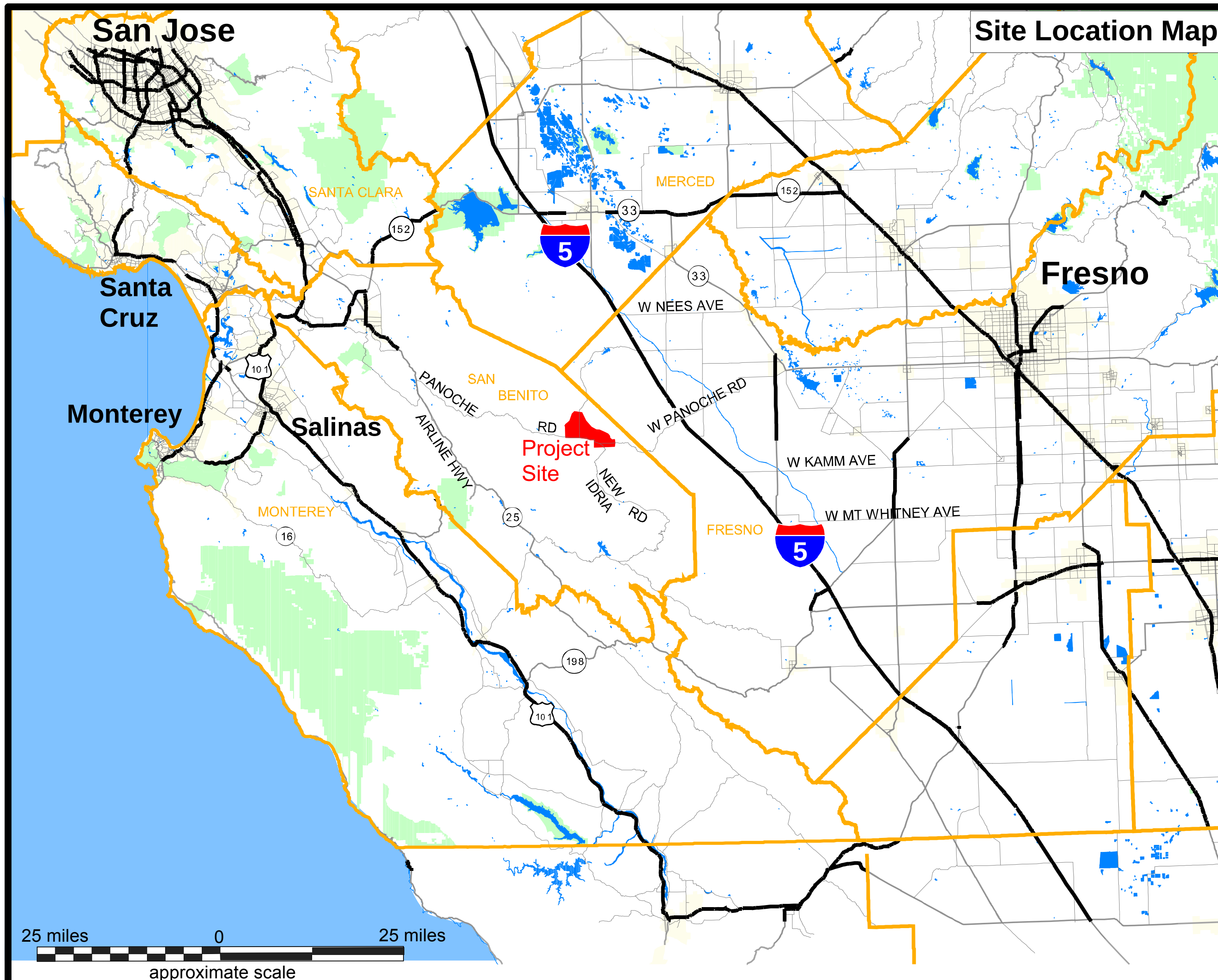
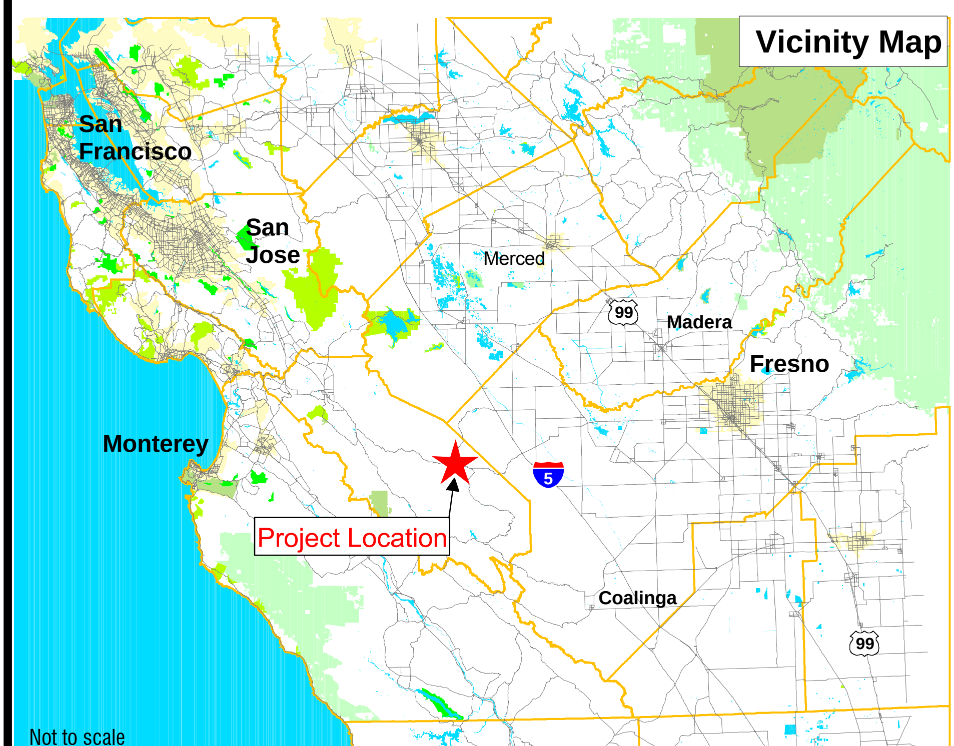
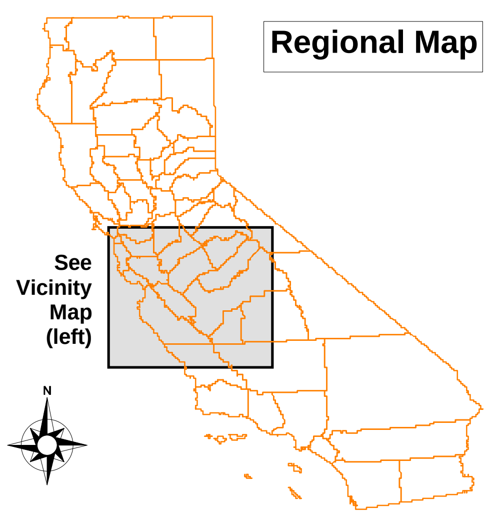


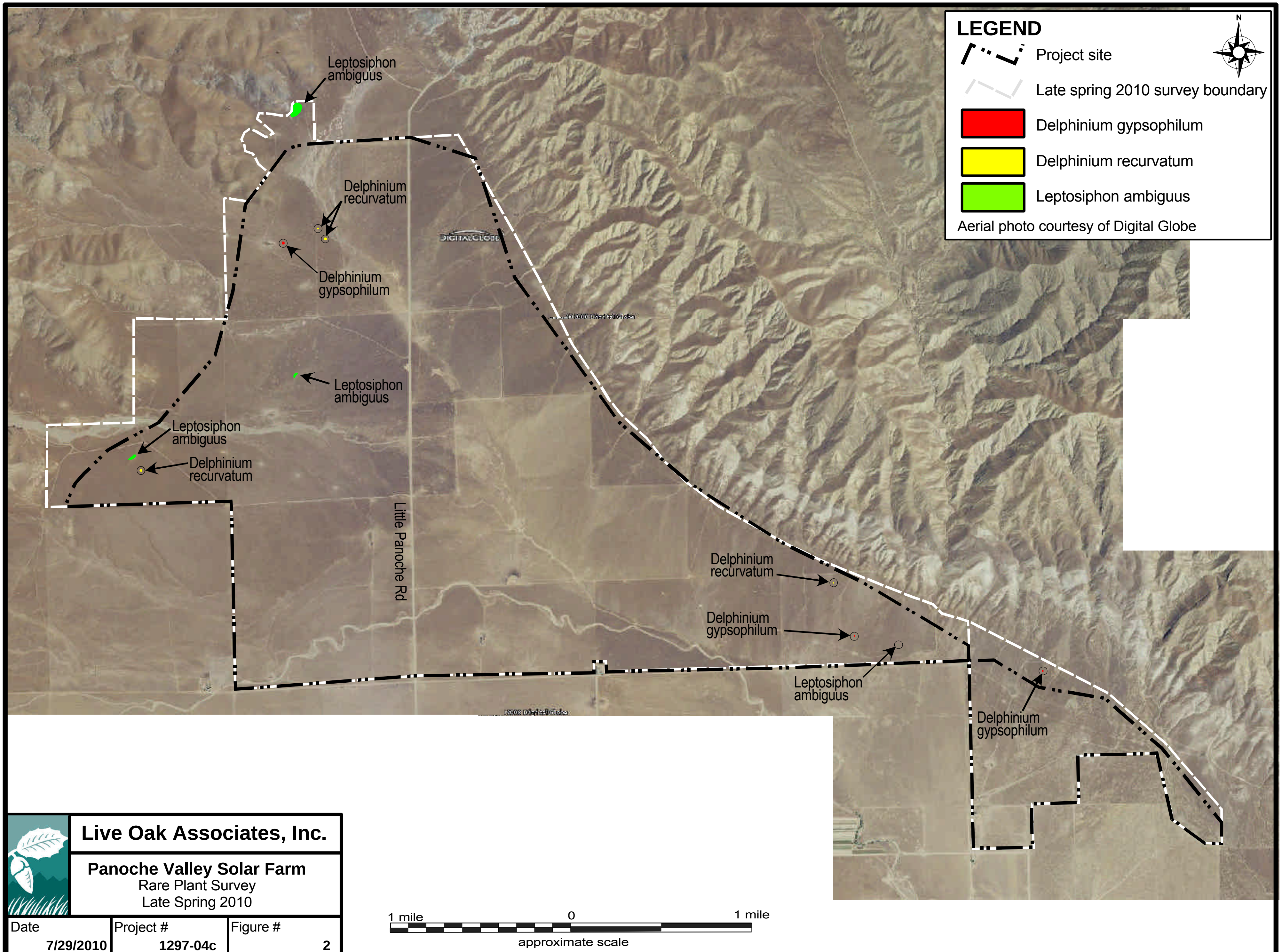




Live Oak Associates, Inc.

Panoche Valley Solar Farm
Vicinity Map

Date	Project #	Figure #
11/11/09	1297-04	1


LEGEND
Project site
Late spring 2010 survey boundary
Delphinium gypsophilum
Delphinium recurvatum
Leptosiphon ambiguus
Aerial photo courtesy of Digital Globe
N
Leptosiphon ambiguus
Delphinium recurvatum
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Little Panoche Rd
Delphinium recurvatum
Delphinium gypsophilum
Leptosiphon ambiguus
Delphinium gypsophilum
Live Oak Associates, Inc.
Panoche Valley Solar Farm
Rare Plant Survey
Late Spring 2010
Date 7/29/2010
Project # 1297-04c
Figure # 2
1 mile
0
1 mile
approximate scale

APPENDIX A: VASCULAR PLANTS OF THE STUDY AREA

The plants species listed below were observed on the Panoche Valley solar farm site during the field survey conducted by Live Oak Associates from May through July 2010. The U.S. Fish and Wildlife Service wetland indicator status of each plant has been shown following its common name.

OBL - Obligate
FACW - Facultative Wetland
FAC - Facultative
FACU - Facultative Upland
UPL - Upland
+/- - Higher/lower end of category
NI - No investigation

Scientific Name	Common Name	Wetland Status
AMARANTHACEAE - Amaranth Family		
Amaranthus blitoides	mat/prostrate amaranth	FACW
ALLIACEAE - Allium Family		
Allium crispum	crinkled onion	UPL
Allium howellii var. *howellii*	Howell's onion	UPL
APIACEAE - Carrot Family		
Daucus pusillus	wild carrot	UPL
Lomatium dissectum var. *multifidum*	carrot leaved biscut root	UPL
Lomatium utriculatum	common lomatium	UPL
Sanicula bipinnatifida	purple sanicle, snakeroot	UPL
Sanicula crassicaulis	Pacific sanicle, gamble weed	UPL
Tauschia hartwegii	Harweg's umbrellawort/tauschia	UPL
APOCYNACEAE - Dogbane Family		
Asclepias fascicularis	narrow leaf milkweed	FAC
ASTERACEAE - Sunflower Family		
Achyrachaena mollis	blow wives	UPL
Ambrosia acanthicarpa	annual bursage	UPL
*Anthemis cotula**	dog fennel/Mayweed	FACU
Artemisia californica	California sagebrush	UPL
Artemisia douglasiana	mugwort	FACW
Baccharis salicifolia	mulefat	UPL
Blepharizonia sp.	tarweed	UPL
*Carduus pycnocephalus**	Italian thistle	UPL
*Centaurea melitensis**	tocalote	UPL
Centaurea sp.*	knapweed/thistle	UPL
Chaenactis fremontii	pincushion flower	UPL
Conyza canadensis	Canada horsewood	FAC
Deinandra kelloggii	Kellogg's tarweed	UPL
Ericameria sp.	goldenbush	UPL
Ericameria cuneata	cliff/rock/wedgeleaf goldenbush	UPL
Ericameria linearifolia	interior/narrow-leaf goldenbush	UPL
Euthamia occidentalis	western goldentop	OBL
Gnaphalium sp.	cudweed	-
Helianthus annuus	common sunflower	FAC

Hemizonia congesta ssp. luzulifolia	hayfield tarweed	UPL
Heterotheca oregona var. rudis	inland Oregon golden aster	UPL
Holocarpha heermannii	Heermann's tarweed	UPL
Holocarpha obconica	San Joaquin tarweed	UPL
Holocarpha virgata ssp. virgata	narrow tarplant	UPL
*Hypochaeris glabra**	smooth cat's ear	UPL
*Hypochaeris radicata**	rough/hairy cat's ear	NO
Isocoma acradenia	alkali goldenbush	UPL
Isocoma menziesii var. vernonioides	coastal isocoma, coast goldenbush	FACW
Iva axillaris ssp. robustior	poverty weed	FAC
*Lactuca serriola**	prickly lettuce	FAC
Lagophylla ramosissima	common hareleaf	UPL
Lasthenia californica	coast/California/common goldfields	UPL
Layia platyglossa	common tidy-tips	UPL
Layia sp.	tidy-tips	FAC/FACW
Lessingia nemaclada	slender/thread stem lessingia	UPL
Logfia filaginoides	logfia	UPL
Malacothrix coulteri	snakes head	UPL
*Matricaria matricarioides**	pineapple weed	FACU
Micropus californicus var. californicus	slender cottonweed	UPL
Microseris sp.	microseris	UPL
Microseris douglasii ssp. *douglasii*	Douglas' silverpuffs	UPL
Microseris cf. *sylvatica*	sylvan scorzonella	UPL
Monolopia major	cupped monolopia	UPL
Monolopia stricta	Crum's monolopia	UPL
Psilocarphus brevissimus var. brevissimus	dwarf woolly-heads	OBL
Senecio aronicoides	rayless ragwort/groundsel/butterweed	UPL
Senecio flaccidus var. douglasii	Douglas' groundsel/shrubby butterweed	UPL
*Senecio vulgaris**	common groundsel	NI
*Sonchus asper ssp. asper**	sow thistle	FAC
*Sonchus oleraceus**	common sow thistle	NI
Stephanomeria pauciflora	wire lettuce/desert straw	UPL
Tragopogon sp.	salsify, goatsbeard	UPL
Uropappus lindleyi	silverpuffs	UPL
Xanthium spinosum	spiny cocklebur	FAC+
Xanthium strumarium	rough cocklebur	FAC+
BORAGINACEAE - Borage Family		
Amsinckia tessellata	devil's lettuce, checker fiddleneck	UPL
Plagiobothrys stipitatus var. micranthus	stocked popcornflower	OBL
BRASSICACEAE - Mustard Family		
*Descurainia sophia**	flixweed, tansymustard	UPL
*Lepidium draba ssp. draba**	hoary cress	UPL
*Sisymbrium orientale**	oriental mustard	UPL
CARYOPHYLLACEAE - Pink Family		
*Spergularia bocconi**	sand spurry	UPL
*Spergularia rubra**	red sandspurry	FAC-
CHENOPODIACEAE - Goosefoot Family		
Atriplex fruticulosa	valley/ball saltbush	FACW

*Chenopodium album**	white goosefoot/lamb's quarters	FAC
Chenopodium sp.	goosefoot	-
CONVOLVULACEAE - Morning-Glory Family		
*Convolvulus arvensis**	bindweed, orchard morningglory	UPL
EUPHORBIACEAE - Spurge Family		
Chamaesyce ocellata ssp. ocellata	contura creek sandmat	UPL
FABACEAE - Legume Family		
Astragalus didymocarpus var. didymocarpus	two seeded milk vetch	UPL
Astragalus oxyphysus	Mt. Diablo milkvetch, Diablo locoweed	UPL
Lotus humistratus	hill/short podded lotus	UPL
Lotus strigosus	hairy lotus	UPL
Lupinus microcarpus var. *microcarpus*	gully/chick lupine	UPL
Lupinus succulentus	arroyo lupine	UPL
*Medicago polymorpha**	burclover	UPL
*Medicago sativa**	alfalfa	UPL
*Melilotus indicus**	sour clover, Indian melilot	FAC
Trifolium ciliolatum	tree clover	UPL
Trifolium gracilentum var. gracilentum	pinpoint clover	UPL
Trifolium variegatum	few flowered clover	FACW
FRANKENIACEAE - Frankenia Family		
Frankenia salina	alkali heath	UPL
JUNCACEAE - Rush Family		
Juncus bufonius var. bufonius	toad rush	FACW+
Juncus bufonius var. congestus	clustered toad rush	FACW+
LAMIACEAE - Mint Family		
*Marrubium vulgare**	horehound	FAC
Trichostema lanceolatum	vinegarweed	UPL
LILIACEAE - Lily Family		
Calochortus venustus	butterfly mariposa	UPL
LOASACEAE - Loasa Family		
Mentzelia affinis	yellow blazingstar	UPL
MALVACEAE - Mallow Family		
Malvella leprosa	alkali weed	FAC
MORACEAE - Mulberry Family		
*Morus alba**	white/silkworm mulberry	NI
MYRSINACEAE - Myrsine Family		
*Anagallis arvensis**	scarlet pimpernel	FAC
ONAGRACEAE - Evening primrose Family		
Clarkia purpurea ssp. quadrivulnera	purple clarkia	UPL
Clarkia unguiculata	elegant clarkia	UPL
Epilobium pygmaeum	smooth spike primrose	UPL
Epilobium sp.	fuchsia	-
PAPAVERACEAE - Poppy Family		
Eschscholzia caespitosa	tufted poppy	UPL
PLANTAGINACEAE - Plantain Family		
Plantago elongata	prairie/annual coast/long leaf plantain	FACW
POACEAE - Grass Family		

*Avena barbata**	slender wild oat	UPL
*Avena fatua**	wild oat	UPL
*Bromus diandrus**	ripgut brome	UPL
*Cynodon dactylon**	bermuda grass	FAC
Deschampsia danthonioides	annual hairgrass	FACW
Distichlis spicata	saltgrass	FACW
*Koeleria phleoides**	annual junegrass/bristly Koeler's grass	UPL
Leymus triticoides	creeping wild rye	UPL
*Lolium multiflorum**	Italian rye grass	UPL
*Lolium perenne**	English/perennial rye grass	FAC
Melica harfordii	Harford's melic	UPL
Melica imperfecta	small flowered/California melica	UPL
Nassella pulchra	purple needle grass	UPL
*Phalaris aquatica**	harding grass	FAC+
*Poa annua**	annual bluegrass	FACW-
*Polypogon monspeliensis**	rabbit's foot grass	FACW+
*Triticum aestivum**	common wheat	UPL
*Vulpia myuros var. hirsuta**	hairy rat-tail fescue	FACU
POLEMONIACEAE - Phlox Family		
Gilia angelensis	chaparral gilia	UPL
Leptosiphon ambiguus	Serpentine leptosiphon	UPL
Navarretia pubescens	downy pincushionplant	UPL
POLYGONACEAE - Buckwheat Family		
Chorizanthe membranacea	pink spineflower	UPL
Chorizanthe polygonoides var. polygonoides	knotweed spineflower	UPL
Eriogonum angulosum	anglestem buckwheat	UPL
Eriogonum gracile var. gracile	slender buckwheat	UPL
Hollisteria lanata	false spineflower	UPL
*Polygonum aviculare**	dooryard/oval leaf/common knotweed	FAC
*Rumex crispus**	curly dock	FACW
Rumex salicifolius	willow dock	OBL
Rumex stenophyllus	narrowleaf dock	NI
Rumex sp.	dock	-
RANUNCULACEAE - Buttercup Family		
Delphinium gypsophilum ssp. gypsophilum	Panoche Creek larkspur	UPL
Delphinium recurvatum	recurved larkspur	UPL
SCROPHULARIACEAE - Figwort Family		
Castilleja attenuata	valley tassels	UPL
SOLANACEAE - Nightshade Family		
Datura wrightii	thornapple/jimsonweed	UPL
*Nicotiana acuminata var. multiflora**	many flowered tobacco	UPL
THEMIDACEAE - Cluster Lily Family		
Bloomeria crocea	common goldenstar	UPL
Brodiaea terrestris ssp. kernensis	Kern brodiaea	UPL
VERBENACEAE - Verbena Family		
Verbena lasiostachys	common verbena/vervain	FAC-
ZYGOPHYLLACEAE - Caltrop Family		

*Tribulus terrestris**	puncture vine	UPL

APPENDIX B: PLANTS OBSERVED ON THE SITE BY SECTION

The table below details the plant species observed on the Panoche Valley solar farm site by section during the rare plant surveys conducted by LOA from May through July 2010.

Scientific Name	Section										
	3	4	8	9	10	11	13	14	15	16	19E
Achyrachaena mollis			x		x				x		
Amaranthus blitoides	x				x			x			x
Ambrosia acanthicarpa									x		
Amsinckia tessellata									x		x
*Anagallis arvensis**					x						
*Anthemis cotula**									x		
Artemisia douglasiana								x		x	
Asclepias fascicularis			x	x					x	x	
Astragalus didymocarpus var. didymocarpus		x	x	x	x			x	x	x	
Astragalus oxyphysus	x			x	x				x		x
Atriplex fruticulosa		x	x								x
*Avena barbata**					x						
*Avena fatua**			x	x	x	x				x	
Baccharis salicifolia			x								
Blepharizonia sp.						x		x	x	x	x
Bloomeria crocea		x								x	
Brodiaea terrestris ssp. kernensis					x						
*Bromus diandrus**					x				x		
Calochortus venustus			x				x				x
*Carduus pycnocephalus**			x								
Castilleja attenuata									x		
*Centaurea melitensis**	x				x	x	x				
Chaenactis fremontii											x
Chamaesyce ocellata ssp. ocellata	x	x	x	x	x	x	x	x	x	x	x
*Chenopodium album**								x	x		x
Chenopodium sp.		x							x		x
Chorizanthe membranacea			x								
Chorizanthe polygonoides var. polygonoides			x								
Clarkia purpurea ssp. quadrivulnera	x	x	x	x	x	x	x	x	x	x	x
Clarkia unguiculata								x			
*Convolvulus arvensis**	x	x	x				x	x			
Conyza canadensis								x			
*Cynodon dactylon**				x	x					x	
Datura wrightii								x		x	
Daucus pusillus		x	x								
Deinandra kelloggii		x	x	x	x	x	x	x	x	x	
Delphinium cf. recurvatum							x				
Deschampsia danthonioides				x							

Scientific Name	Section										
	3	4	8	9	10	11	13	14	15	16	19E
*Descurainia sophia**		x									
Distichlis spicata									x		
Epilobium pygmaeum										x	
Epilobium sp.		x									
Eriogonum angulosum					x		x	x		x	x
Eriogonum gracile var. gracile				x							
Eriogonum gracillimum								x			x
Eschscholzia caespitosa								x			
Euthamia occidentalis									x		
Frankenia salina		x					x	x			
Gilia angelensis					x						x
Gnaphalium sp.					x						
Helianthus annuus								x			
Heliotropium curassavicum								x	x		
Hemizonia congesta ssp. luzulifolia								x			
Heterotheca oregona var. rudis			x								
Hollisteria lanata											x
Holocarpha heermannii										x	
Holocarpha obconica		x	x		x					x	
Holocarpha virgata ssp. virgata		x	x	x	x					x	
*Hypochaeris glabra**		x								x	
*Hypochaeris radicata**			x								
Isocoma acradenia								x			
Isocoma menziesii var. vernonioides							x	x	x		
Iva axillaris ssp. robustior									x		
Juncus bufonius var. bufonius			x	x	x				x	x	
Juncus bufonius var. congestus					x						
*Koeleria phleoides**	x	x		x			x	x	x		x
*Lactuca serriola**		x			x		x	x	x		
Lagophylla ramosissima			x	x	x			x	x	x	
*Lepidium draba ssp. draba**								x			
Leptosiphon ambiguus							x				
Lessingia nemaclada			x					x	x		
Leymus triticoides								x		x	
Logfia filaginoides									x		
*Lolium multiflorum**	x	x		x	x		x				
*Lolium perenne**		x		x	x		x				
Lomatium utriculatum				x				x			
Lotus humistratus			x							x	
Lotus strigosus							x				
Lupinus microcarpus var. *microcarpus*			x						x		
Lupinus succulentus					x				x		
Malvella leprosa								x	x	x	
*Marrubium vulgare**			x						x		
*Medicago polymorpha**					x						
*Medicago sativa**					x						

Scientific Name	Section										
	3	4	8	9	10	11	13	14	15	16	19E
Melica harfordii		x									
Melica imperfecta			x								
*Melilotus indicus**				x	x				x		
Mentzelia affinis								x	x		
Micropus californicus var. californicus			x	x							x
Microseris douglasii ssp. *douglasii*				x							
*Morus alba**									x		
Nassella pulchra			x								
Navarretia pubescens		x	x	x	x	x	x	x	x	x	x
*Nicotiana acuminata var. multiflora**								x			
*Phalaris aquatica**								x			
Plagiobothrys stipitatus var. micranthus				x							
Plantago elongata		x									
*Poa annua**					x					x	
*Polygonum aviculare**				x					x		
*Polypogon aviculare**											
*Polypogon monspeliensis**				x				x	x		
Psilocarphus brevissimus var. brevissimus					x						
*Rumex crispus**								x	x		
Rumex salicifolius			x	x	x						
Rumex sp.					x				x		
Rumex stenophyllus								x			
*Salsola tragus**								x			
Sanicula bipinnatifida			x								
*Schismus arabicus**								x			
Senecio aronicoides							x				
Senecio flaccidus var. douglasii									x		
*Senecio vulgaris**									x		
*Sisymbrium irio**	x										
*Sisymbrium orientale**							x				x
*Sonchus asper ssp. asper**									x		
*Sonchus oleraceus**							x	x	x		
*Spergularia bocconi**		x	x	x							
*Spergularia rubra**			x		x				x		
Stephanomeria pauciflora								x	x	x	x
Tragopogon sp.										x	
*Tribulus terrestris**				x	x			x			
Trichostema lanceolatum	x	x	x	x	x	x	x	x	x	x	x
Trifolium ciliolatum									x		
Trifolium gracilentum var. gracilentum					x			x	x		
Trifolium variegatum									x		
*Triticum aestivum**			x	x	x		x	x	x		
Verbena lasiostachys					x			x			
Vulpia microstachys var. ciliata								x			
*Vulpia myuros var. hirsuta**										x	
Xanthium spinosum								x			

Scientific Name	Section										
	3	**4**	**8**	**9**	**10**	**11**	**13**	**14**	**15**	**16**	**19E**
Xanthium strumarium					x			x	x		

APPENDIX C

CALIFORNIA NATIVE PLANT SOCIETY BOTANICAL SURVEY GUIDELINES
&
GUIDELINES FOR ASSESSING THE EFFECTS OF PROPOSED PROJECT ON RARE, THREATENED AND ENDANGERED PLANTS AND NATURAL COMMUNITIES BY THE RESOURCE AGENCY OF THE CALIFORNIA DEPARTMENT OF FISH AND GAME

CNPS Botanical Survey Guidelines

(from CNPS *Inventory*, 6th Edition, 2001)

The following recommendations are intended to help those who prepare and review environmental documents determine when a botanical survey is needed, who should be considered qualified to conduct such surveys, how surveys should be conducted, and what information should be contained in the survey report. The California Native Plant Society recommends that lead agencies not accept the results of surveys unless they are conducted and reported according to these guidelines.

1. Botanical surveys are conducted in order to determine the environmental effects of proposed projects on all botanical resources, including special status plants (rare, threatened, and endangered plants) and plant (vegetation) communities. Special status plants are not limited to those that have been listed by state and federal agencies but include any plants that, based on all available data, can be shown to be rare, threatened, or endangered under the following definitions:

A species, subspecies, or variety of plant is "endangered" when the prospects of its survival and reproduction are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, or disease. A plant is "threatened" when it is likely to become endangered in the foreseeable future in the absence of protection measures. A plant is "rare" when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens.[1]

Rare plant (vegetation) communities are those communities that are of highly limited distribution. These communities may or may not contain special status plants. The most current version of the California Natural Diversity Database's *List of California Terrestrial Natural Communities*[2] should be used as a guide to the names and status of communities.

Consistent with the California Native Plant Society's goal of preserving plant biodiversity on a regional and local scale, and with California Environmental Quality Act environmental impact assessment criteria[3], surveys should also assess impacts to locally significant plants. Both plants and plant communities can be considered significant if their local occurrence is on the outer limits of known distribution, a range extension, a rediscovery, or rare or uncommon in a local context (such as within a county or region). Lead agencies should address impacts to these locally unique botanical resources regardless of their status elsewhere in the state.

2. Botanical surveys must be conducted to determine if, or to the extent that, special status or locally significant plants and plant communities will be affected by a proposed project when any natural vegetation occurs on the site and the project has the potential for direct or indirect effects on vegetation.

3. Those conducting botanical surveys must possess the following qualifications:

a. Experience conducting floristic field surveys;
b. Knowledge of plant taxonomy and plant community ecology and classification;
c. Familiarity with the plants of the area, including special status and locally significant plants;
d. Familiarity with the appropriate state and federal statutes related to plants and plant collecting; and,
e. Experience with analyzing impacts of a project on native plants and communities.

4. Botanical surveys should be conducted in a manner that will locate any special status or locally significant plants or plant communities that may be present. Specifically, botanical surveys should be:

a. Conducted in the field at the proper times of year when special status and locally significant plants are both evident and identifiable. When special status plants are known to occur in the type(s) of habitat present in the project area, nearby accessible occurrences of the plants (reference sites) should be observed to determine that the plants are identifiable at the time of survey.
b. Floristic in nature. A floristic survey requires that every plant observed be identified to species, subspecies, or variety as applicable. In order to properly characterize the site, a complete list of plants observed on the site shall be included in every botanical survey report. In addition, a sufficient number of visits spaced

throughout the growing season is necessary to prepare an accurate inventory of all plants that exist on the site. The number of visits and the timing between visits must be determined by geographic location, the plant communities present, and the weather patterns of the year(s) in which the surveys are conducted.

c. Conducted in a manner that is consistent with conservation ethics and accepted plant collection and documentation techniques[4,5]. Collections (voucher specimens) of special status and locally significant plants should be made, unless such actions would jeopardize the continued existence of the population. A single sheet should be collected and deposited at a recognized public herbarium for future reference. All collections shall be made in accordance with applicable state and federal permit requirements. Photography may be used to document plant identification only when the population cannot withstand collection of voucher specimens.
d. Conducted using systematic field techniques in all habitats of the site to ensure a thorough coverage of potential impact areas. All habitats within the project site must be surveyed thoroughly in order to properly inventory and document the plants present. The level of effort required per given area and habitat is dependent upon the vegetation and its overall diversity and structural complexity.
e. Well documented. When a special status plant (or rare plant community) is located, a California Native Species (or Community) Field Survey Form or equivalent written form, accompanied by a copy of the appropriate portion of a 7.5-minute topographic map with the occurrence mapped, shall be completed, included within the survey report, and separately submitted to the California Natural Diversity Database. Population boundaries should be mapped as accurately as possible. The number of individuals in each population should be counted or estimated, as appropriate.

5. Complete reports of botanical surveys shall be included with all environmental assessment documents, including Negative Declarations and Mitigated Negative Declarations, Timber Harvesting Plans, Environmental Impact Reports, and Environmental Impact Statements. Survey reports shall contain the following information:

a. Project location and description, including:
    1. A detailed map of the location and footprint of the proposed project.
    2. A detailed description of the proposed project, including one-time activities and ongoing activities that may affect botanical resources.
    3. A description of the general biological setting of the project area.
b. Methods, including:
    1. Survey methods for each of the habitats present, and rationale for the methods used.
    2. Description of reference site(s) visited and phenological development of the target special status plants, with an assessment of any conditions differing from the project site that may affect their identification.
    3. Dates of surveys and rationale for timing and intervals; names of personnel conducting the surveys; and total hours spent in the field for each surveyor on each date.
    4. Location of deposited voucher specimens and herbaria visited.
c. Results, including:
    1. A description and map of the vegetation communities on the project site. The current standard for vegetation classification, *A Manual of California Vegetation*[6], should be used as a basis for the habitat descriptions and the vegetation map. If another vegetation classification system is used, the report must reference the system and provide the reason for its use.
    2. A description of the phenology of each of the plant communities at the time of each survey date.
    3. A list of all plants observed on the project site using accepted scientific nomenclature, along with any special status designation. The reference(s) used for scientific nomenclature shall be cited.
    4. Written description and detailed map(s) showing the location of each special status or locally significant plant found, the size of each population, and method used to estimate or census the population.
    5. Copies of all California Native Species Field Survey Forms or Natural Community Field Survey Forms and accompanying maps.
d. Discussion, including:
    1. Any factors that may have affected the results of the surveys (e.g., drought, human disturbance, recent fire).
    2. Discussion of any special local or range-wide significance of any plant population or community on the site.
    3. An assessment of potential impacts. This shall include a map showing the distribution of special status and locally significant plants and communities on the site in relation to the proposed activities. Direct, indirect, and cumulative impacts to the plants and communities shall be discussed.
    4. Recommended measures to avoid and/or minimize direct, indirect, and cumulative impacts.

e. References cited and persons contacted.
f. Qualifications of field personnel including any special experience with the habitats and special status plants present on the site.

3.3.2 References Cited

[1] California Environmental Quality Act Guidelines, §15065 and §15380.

[2] List of California Terrestrial Natural Communities. California Department of Fish and Game Natural Diversity Database. Sacramento, CA.

[3] California Environmental Quality Act Guidelines, Appendix G (Initial Study Environmental Checklist).

[4] Collecting Guidelines and Documentation Techniques. California Native Plant Society Policy (adopted March 4, 1995).

[5] Ferren, W.R., Jr., D.L. Magney, and T.A. Sholars. 1995. The Future of California Floristics and Systematics: Collecting Guidelines and Documentation Techniques. *Madroño* 42(2):197-210.

[6] Sawyer, J.O. and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. California Native Plant Society. Sacramento, CA. 471 pp.

Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities

State of California
CALIFORNIA NATURAL RESOURCES AGENCY
Department of Fish and Game
November 24, 2009[1]

INTRODUCTION AND PURPOSE

The conservation of special status native plants and their habitats, as well as natural communities, is integral to maintaining biological diversity. The purpose of these protocols is to facilitate a consistent and systematic approach to the survey and assessment of special status native plants and natural communities so that reliable information is produced and the potential of locating a special status plant species or natural community is maximized. They may also help those who prepare and review environmental documents determine when a botanical survey is needed, how field surveys may be conducted, what information to include in a survey report, and what qualifications to consider for surveyors. The protocols may help avoid delays caused when inadequate biological information is provided during the environmental review process; assist lead, trustee and responsible reviewing agencies to make an informed decision regarding the direct, indirect, and cumulative effects of a proposed development, activity, or action on special status native plants and natural communities; meet California Environmental Quality Act (CEQA)[2] requirements for adequate disclosure of potential impacts; and conserve public trust resources.

DEPARTMENT OF FISH AND GAME TRUSTEE AND RESPONSIBLE AGENCY MISSION

The mission of the Department of Fish and Game (DFG) is to manage California's diverse wildlife and native plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. DFG has jurisdiction over the conservation, protection, and management of wildlife, native plants, and habitat necessary to maintain biologically sustainable populations (Fish and Game Code §1802). DFG, as trustee agency under CEQA §15386, provides expertise in reviewing and commenting on environmental documents and makes protocols regarding potential negative impacts to those resources held in trust for the people of California.

Certain species are in danger of extinction because their habitats have been severely reduced in acreage, are threatened with destruction or adverse modification, or because of a combination of these and other factors. The California Endangered Species Act (CESA) provides additional protections for such species, including take prohibitions (Fish and Game Code §2050 *et seq.*). As a responsible agency, DFG has the authority to issue permits for the take of species listed under CESA if the take is incidental to an otherwise lawful activity; DFG has determined that the impacts of the take have been minimized and fully mitigated; and, the take would not jeopardize the continued existence of the species (Fish and Game Code §2081). Surveys are one of the preliminary steps to detect a listed or special status plant species or natural community that may be impacted significantly by a project.

DEFINITIONS

Botanical surveys provide information used to determine the potential environmental effects of proposed projects on all special status plants and natural communities as required by law (i.e., CEQA, CESA, and Federal Endangered Species Act (ESA)). Some key terms in this document appear in **bold font** for assistance in use of the document.

For the purposes of this document, **special status plants** include all plant species that meet one or more of the following criteria[3]:

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[1] This document replaces the DFG document entitled “Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened and Endangered Plants and Natural Communities.”

[2] http://ceres.ca.gov/ceqa/

[3] Adapted from the East Alameda County Conservation Strategy available at http://www.fws.gov/sacramento/EACCS/Documents/080228_Species_Evaluation_EACCS.pdf

- Listed or proposed for listing as threatened or endangered under ESA or candidates for possible future listing as threatened or endangered under the ESA (50 CFR §17.12).

- Listed[4] or candidates for listing by the State of California as threatened or endangered under CESA (Fish and Game Code §2050 *et seq.*). A species, subspecies, or variety of plant is **endangered** when the prospects of its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, disease, or other factors (Fish and Game Code §2062). A plant is **threatened** when it is likely to become endangered in the foreseeable future in the absence of special protection and management measures (Fish and Game Code §2067).

- Listed as rare under the California Native Plant Protection Act (Fish and Game Code §1900 *et seq*.). A plant is **rare** when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens (Fish and Game Code §1901).

- Meet the definition of rare or endangered under CEQA §15380(b) and (d). Species that may meet the definition of rare or endangered include the following:

  - Species considered by the California Native Plant Society (CNPS) to be "rare, threatened or endangered in California" (Lists 1A, 1B and 2);

  - Species that may warrant consideration on the basis of local significance or recent biological information[5];

  - Some species included on the California Natural Diversity Database's (CNDDB) *Special Plants, Bryophytes, and Lichens List* (California Department of Fish and Game 2008)[6].

- Considered a **locally significant species,** that is, a species that is not rare from a statewide perspective but is rare or uncommon in a local context such as within a county or region (CEQA §15125 (c)) or is so designated in local or regional plans, policies, or ordinances (CEQA Guidelines, Appendix G). Examples include a species at the outer limits of its known range or a species occurring on an uncommon soil type.

Special status natural communities are communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects. These communities may or may not contain special status species or their habitat. The most current version of the Department's *List of California Terrestrial Natural Communities*[7] indicates which natural communities are of special status given the current state of the California classification.

Most types of wetlands and riparian communities are considered special status natural communities due to their limited distribution in California. These natural communities often contain special status plants such as those described above. These protocols may be used in conjunction with protocols formulated by other agencies, for example, those developed by the U.S. Army Corps of Engineers to delineate jurisdictional wetlands[8] or by the U.S. Fish and Wildlife Service to survey for the presence of special status plants[9].

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4 Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata.

5 In general, CNPS List 3 plants (plants about which more information is needed) and List 4 plants (plants of limited distribution) may not warrant consideration under CEQA §15380. These plants may be included on special status plant lists such as those developed by counties where they would be addressed under CEQA §15380. List 3 plants may be analyzed under CEQA §15380 if sufficient information is available to assess potential impacts to such plants. Factors such as regional rarity vs. statewide rarity should be considered in determining whether cumulative impacts to a List 4 plant are significant even if individual project impacts are not. List 3 and 4 plants are also included in the California Natural Diversity Database's (CNDDB) *Special Plants, Bryophytes, and Lichens List.* [Refer to the current online published list available at: http://www.dfg.ca.gov/biogeodata.] Data on Lists 3 and 4 plants should be submitted to CNDDB. Such data aids in determining or revising priority ranking.

6 Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata.

7 http://www.dfg.ca.gov/biogeodata/vegcamp/pdfs/natcomlist.pdf. The rare natural communities are asterisked on this list.

8 http://www.wetlands.com/regs/tlpge02e.htm

9 U.S. Fish and Wildlife Service Survey Guidelines available at http://www.fws.gov/sacramento/es/protocol.htm

BOTANICAL SURVEYS

Conduct botanical surveys prior to the commencement of any activities that may modify vegetation, such as clearing, mowing, or ground-breaking activities. It is appropriate to conduct a botanical field survey when:

- Natural (or naturalized) vegetation occurs on the site, and it is unknown if special status plant species or natural communities occur on the site, and the project has the potential for direct or indirect effects on vegetation; or
- Special status plants or natural communities have historically been identified on the project site; or
- Special status plants or natural communities occur on sites with similar physical and biological properties as the project site.

SURVEY OBJECTIVES

Conduct field surveys in a manner which maximizes the likelihood of locating special status plant species or special status natural communities that may be present. Surveys should be **floristic in nature**, meaning that every plant taxon that occurs on site is identified to the taxonomic level necessary to determine rarity and listing status. "Focused surveys" that are limited to habitats known to support special status species or are restricted to lists of likely potential species are not considered floristic in nature and are not adequate to identify all plant taxa on site to the level necessary to determine rarity and listing status. Include a list of plants and natural communities detected on the site for each botanical survey conducted. More than one field visit may be necessary to adequately capture the floristic diversity of a site. An indication of the prevalence (estimated total numbers, percent cover, density, etc.) of the species and communities on the site is also useful to assess the significance of a particular population.

SURVEY PREPARATION

Before field surveys are conducted, compile relevant botanical information in the general project area to provide a regional context for the investigators. Consult the CNDDB[10] and BIOS[11] for known occurrences of special status plants and natural communities in the project area prior to field surveys. Generally, identify vegetation and habitat types potentially occurring in the project area based on biological and physical properties of the site and surrounding ecoregion[12], unless a larger assessment area is appropriate. Then, develop a list of special status plants with the potential to occur within these vegetation types. This list can serve as a tool for the investigators and facilitate the use of reference sites; however, special status plants on site might not be limited to those on the list. Field surveys and subsequent reporting should be comprehensive and floristic in nature and not restricted to or focused only on this list. Include in the survey report the list of potential special status species and natural communities, and the list of references used to compile the background botanical information for the site.

SURVEY EXTENT

Surveys should be comprehensive over the entire site, including areas that will be directly or indirectly impacted by the project. Adjoining properties should also be surveyed where direct or indirect project effects, such as those from fuel modification or herbicide application, could potentially extend offsite. Pre-project surveys restricted to known CNDDB rare plant locations may not identify all special status plants and communities present and do not provide a sufficient level of information to determine potential impacts.

FIELD SURVEY METHOD

Conduct surveys using **systematic field techniques** in all habitats of the site to ensure thorough coverage of potential impact areas. The level of effort required per given area and habitat is dependent upon the vegetation and its overall diversity and structural complexity, which determines the distance at which plants can be identified. Conduct surveys by walking over the entire site to ensure thorough coverage, noting all plant taxa

[10] Available at http://www.dfg.ca.gov/biogeodata/cnddb

[11] http://www.bios.dfg.ca.gov/

[12] Ecological Subregions of California, available at http://www.fs.fed.us/r5/projects/ecoregions/toc.htm

observed. The level of effort should be sufficient to provide comprehensive reporting. For example, one person-hour per eight acres per survey date is needed for a comprehensive field survey in grassland with medium diversity and moderate terrain[13], with additional time allocated for species identification.

TIMING AND NUMBER OF VISITS

Conduct surveys in the field at the time of year when species are both evident and identifiable. Usually this is during flowering or fruiting. Space visits throughout the growing season to accurately determine what plants exist on site. Many times this may involve multiple visits to the same site (e.g. in early, mid, and late-season for flowering plants) to capture the floristic diversity at a level necessary to determine if special status plants are present[14]. The timing and number of visits are determined by geographic location, the natural communities present, and the weather patterns of the year(s) in which the surveys are conducted.

REFERENCE SITES

When special status plants are known to occur in the type(s) of habitat present in the project area, observe reference sites (nearby accessible occurrences of the plants) to determine whether those species are identifiable at the time of the survey and to obtain a visual image of the target species, associated habitat, and associated natural community.

USE OF EXISTING SURVEYS

For some sites, floristic inventories or special status plant surveys may already exist. Additional surveys may be necessary for the following reasons:

- Surveys are not current[15]; or
- Surveys were conducted in natural systems that commonly experience year to year fluctuations such as periods of drought or flooding (e.g. vernal pool habitats or riverine systems); or
- Surveys are not comprehensive in nature; or fire history, land use, physical conditions of the site, or climatic conditions have changed since the last survey was conducted[16]; or
- Surveys were conducted in natural systems where special status plants may not be observed if an annual above ground phase is not visible (e.g. flowers from a bulb); or
- Changes in vegetation or species distribution may have occurred since the last survey was conducted, due to habitat alteration, fluctuations in species abundance and/or seed bank dynamics.

NEGATIVE SURVEYS

Adverse conditions may prevent investigators from determining the presence of, or accurately identifying, some species in potential habitat of target species. Disease, drought, predation, or herbivory may preclude the presence or identification of target species in any given year. Discuss such conditions in the report.

The failure to locate a known special status plant occurrence during one field season does not constitute evidence that this plant occurrence no longer exists at this location, particularly if adverse conditions are present. For example, surveys over a number of years may be necessary if the species is an annual plant having a persistent, long-lived seed bank and is known not to germinate every year. Visits to the site in more

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[13] Adapted from U.S. Fish and Wildlife Service kit fox survey guidelines available at www.fws.gov/sacramento/es/documents/kitfox_no_protocol.pdf

[14] U.S. Fish and Wildlife Service Survey Guidelines available at http://www.fws.gov/sacramento/es/protocol.htm

[15] Habitats, such as grasslands or desert plant communities that have annual and short-lived perennial plants as major floristic components may require yearly surveys to accurately document baseline conditions for purposes of impact assessment. In forested areas, however, surveys at intervals of five years may adequately represent current conditions. For forested areas, refer to "Guidelines for Conservation of Sensitive Plant Resources Within the Timber Harvest Review Process and During Timber Harvesting Operations", available at https://r1.dfg.ca.gov/portal/Portals/12/THPBotanicalGuidelinesJuly2005.pdf

[16] U.S. Fish and Wildlife Service Survey Guidelines available at http://www.fws.gov/ventura/speciesinfo/protocols_guidelines/docs/botanicalinventories.pdf

than one year increase the likelihood of detection of a special status plant especially if conditions change. To further substantiate negative findings for a known occurrence, a visit to a nearby reference site may ensure that the timing of the survey was appropriate.

REPORTING AND DATA COLLECTION

Adequate information about special status plants and natural communities present in a project area will enable reviewing agencies and the public to effectively assess potential impacts to special status plants or natural communities[17] and will guide the development of minimization and mitigation measures. The next section describes necessary information to assess impacts. For comprehensive, systematic surveys where no special status species or natural communities were found, reporting and data collection responsibilities for investigators remain as described below, excluding specific occurrence information.

SPECIAL STATUS PLANT OR NATURAL COMMUNITY OBSERVATIONS

Record the following information for locations of each special status plant or natural community detected during a field survey of a project site.

- A detailed map (1:24,000 or larger) showing locations and boundaries of each special status species occurrence or natural community found as related to the proposed project. Mark occurrences and boundaries as accurately as possible. Locations documented by use of global positioning system (GPS) coordinates must include the datum[18] in which they were collected;
- The site-specific characteristics of occurrences, such as associated species, habitat and microhabitat, structure of vegetation, topographic features, soil type, texture, and soil parent material. If the species is associated with a wetland, provide a description of the direction of flow and integrity of surface or subsurface hydrology and adjacent off-site hydrological influences as appropriate;
- The number of individuals in each special status plant population as counted (if population is small) or estimated (if population is large);
- If applicable, information about the percentage of individuals in each life stage such as seedlings vs. reproductive individuals;
- The number of individuals of the species per unit area, identifying areas of relatively high, medium and low density of the species over the project site; and
- Digital images of the target species and representative habitats to support information and descriptions.

FIELD SURVEY FORMS

When a special status plant or natural community is located, complete and submit to the CNDDB a California Native Species (or Community) Field Survey Form[19] or equivalent written report, accompanied by a copy of the relevant portion of a 7.5 minute topographic map with the occurrence mapped. Present locations documented by use of GPS coordinates in map and digital form. Data submitted in digital form must include the datum[20] in which it was collected. If a potentially undescribed special status natural community is found on the site, document it with a Rapid Assessment or Relevé form[21] and submit it with the CNDDB form.

VOUCHER COLLECTION

Voucher specimens provide verifiable documentation of species presence and identification as well as a public record of conditions. This information is vital to all conservation efforts. Collection of voucher specimens should

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17 Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata. For Timber Harvest Plans (THPs) please refer to the “Guidelines for Conservation of Sensitive Plant Resources Within the Timber Harvest Review Process and During Timber Harvesting Operations”, available at https://r1.dfg.ca.gov/portal/Portals/12/THPBotanicalGuidelinesJuly2005.pdf

18 NAD83, NAD27 or WGS84

19 http://www.dfg.ca.gov/biogeodata

20 NAD83, NAD27 or WGS84

21 http://www.dfg.ca.gov/biogeodata/vegcamp/veg_publications_protocols.asp

be conducted in a manner that is consistent with conservation ethics, and is in accordance with applicable state and federal permit requirements (e.g. incidental take permit, scientific collection permit). Voucher collections of special status species (or suspected special status species) should be made only when such actions would not jeopardize the continued existence of the population or species.

Deposit voucher specimens with an indexed regional herbarium[22] no later than 60 days after the collections have been made. Digital imagery can be used to supplement plant identification and document habitat. Record all relevant permittee names and permit numbers on specimen labels. A collecting permit is required prior to the collection of State-listed plant species[23].

BOTANICAL SURVEY REPORTS

Include reports of botanical field surveys containing the following information with project environmental documents:

- **Project and site description**
  - A description of the proposed project;
  - A detailed map of the project location and study area that identifies topographic and landscape features and includes a north arrow and bar scale; and,
  - A written description of the biological setting, including vegetation[24] and structure of the vegetation; geological and hydrological characteristics; and land use or management history.

- **Detailed description of survey methodology and results**
  - Dates of field surveys (indicating which areas were surveyed on which dates), name of field investigator(s), and total person-hours spent on field surveys;
  - A discussion of how the timing of the surveys affects the comprehensiveness of the survey;
  - A list of potential special status species or natural communities;
  - A description of the area surveyed relative to the project area;
  - References cited, persons contacted, and herbaria visited;
  - Description of reference site(s), if visited, and phenological development of special status plant(s);
  - A list of all taxa occurring on the project site. Identify plants to the taxonomic level necessary to determine whether or not they are a special status species;
  - Any use of existing surveys and a discussion of applicability to this project;
  - A discussion of the potential for a false negative survey;
  - Provide detailed data and maps for all special plants detected. Information specified above under the headings “Special Status Plant or Natural Community Observations,” and “Field Survey Forms,” should be provided for locations of each special status plant detected;
  - Copies of all California Native Species Field Survey Forms or Natural Community Field Survey Forms should be sent to the CNDDB and included in the environmental document as an Appendix. It is not necessary to submit entire environmental documents to the CNDDB; and,
  - The location of voucher specimens, if collected.

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22 For a complete list of indexed herbaria, see: Holmgren, P., N. Holmgren and L. Barnett. 1990. Index Herbariorum, Part 1: Herbaria of the World. New York Botanic Garden, Bronx, New York. 693 pp. Or: http://www.nybg.org/bsci/ih/ih.html

23 Refer to current online published lists available at: http://www.dfg.ca.gov/biogeodata.

24 A vegetation map that uses the National Vegetation Classification System (http://biology.usgs.gov/npsveg/nvcs.html), for example *A Manual of California Vegetation*, and highlights any special status natural communities. If another vegetation classification system is used, the report should reference the system, provide the reason for its use, and provide a crosswalk to the National Vegetation Classification System.

- **Assessment of potential impacts**
    - A discussion of the significance of special status plant populations in the project area considering nearby populations and total species distribution;
    - A discussion of the significance of special status natural communities in the project area considering nearby occurrences and natural community distribution;
    - A discussion of direct, indirect, and cumulative impacts to the plants and natural communities;
    - A discussion of threats, including those from invasive species, to the plants and natural communities;
    - A discussion of the degree of impact, if any, of the proposed project on unoccupied, potential habitat of the species;
    - A discussion of the immediacy of potential impacts; and,
    - Recommended measures to avoid, minimize, or mitigate impacts.

QUALIFICATIONS

Botanical consultants should possess the following qualifications:

- Knowledge of plant taxonomy and natural community ecology;
- Familiarity with the plants of the area, including special status species;
- Familiarity with natural communities of the area, including special status natural communities;
- Experience conducting floristic field surveys or experience with floristic surveys conducted under the direction of an experienced surveyor;
- Familiarity with the appropriate state and federal statutes related to plants and plant collecting; and,
- Experience with analyzing impacts of development on native plant species and natural communities.

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APPENDIX D

DELPHINIUM FOUND WITHIN THE PANOCHE SURVEY AREA (MEMORANDUM FROM DR. JAMES PAULUS)

Memorandum May 3, 2010

To: Davinna Ohlson, project manager
From: Jim Paulus

RE: Delphinium found within the Panoche survey area

Populations of native perennial herbs of the genus *Delphinium* were located in Sections 4, 8, 9 and 19 during surveys conducted in March and April. At least one individual in each located population was exhibiting flowers either upon initial detection or when the population was revisited by the project botanist. Identification to species at each location therefore was based upon available leaf, stem and flower characters. In addition, one individual in Section 8 was excavated in order to observe below-ground characters such as root length and strength of the stem attachment.

Plants in Sections 9 were assigned to the relatively common species *D. patens* ssp. *patens*, based upon above-ground characters exhibited by blooming individuals. Plants identified as *D. patens* ssp. *patens* had relatively dark purple-blue sepals, and petals of similar coloration except for whitish margins and white hairs on the upper surfaces. White petals would be expected of both *D. recurvatum* and *D. gypsophilum*. In addition, the flowers exhibited by *D. patens* were relatively small and crowded in comparison to flowers produced by populations located in other Sections. Sepal spurs were consistently less than 10 mm in length, lateral sepals were less than 15 mm in length, and inflorescence internodes were generally less than 20 mm apart. Plants of *D. recurvatum* or *D. gypsophilum* may be expected to produce at least some flowers of greater overall size and greater spacing within the inflorescence. Finally, the lower stems of *D. patens* in Section 9 were consistently glabrous, but were never glaucous and did not appear as reddish as the stems of *Delphinium* located elsewhere within the survey area.

Plants in Section 19 were assigned to the species *D. gypsophilum* ssp. *gypsophilum* (CNPS 4.2, no state or federal listing), based upon above-ground characters. These plants produced up to 25 flowers per inflorescence, spaced up to 3.5 cm apart and held on pedicels of 10-20 mm length. In general, these plants were robust relative to populations found elsewhere within the survey area, with some individuals standing greater than 1 m tall. The expected size of the stem and inflorescence would be smaller for *D. recurvatum*, which is described as generally less than 60 cm tall and with more crowded flowers due to pedicels spaced generally less than 2.5 cm apart. Also, the plants at had exhibited strongly glaucous lower stems, which is typical of *D. gypsophilum* ssp. *gypsophilum*, but not described in literature sources for *D. recurvatum*. Plants in Section 19 exhibited whitish flowers, with little variation between the sepal and petal colors. Some individuals had a small amount of blue in the sepals, which were observed to be reflexed relatively little (or none) even on older flowers. In contrast, *D. recurvatum* flowers would be generally expected to show greater contrast between sepals (bluish) and petals (white), with reflexed sepals. Characters that did not evoke confident separation included the leaves, which were at most ciliate along the edges, and petals that on some individuals were hairier on the inner surfaces relative to the outer surfaces. Expected characters for *D. gypsophilum* would include puberulent leaf margins and equally hairy petal surfaces.

Plants in Sections 4 and 8 could not be confidently separated from the rare species *D. recurvatum* (CNPS 1B.1, no state or federal listing), based upon above-ground characters and below-ground characters of one individual excavated in Section 8. These plants, comprising eight separate groupings (one in Section 8 and seven in Section 4), generally exhibited greater variation in color of petals and sepals, with some plants having light purple-blue sepals that strongly contrasted with the white petals (Figure 1). No plants in these groups were observed to achieve greater than 60 cm overall height. Stems were observed to be consistently reddish and glabrous, but not glaucous. Inflorescence size (ie, pedicel spacing and length, number of flowers) was consistent with the size expected for *D. recurvatum*, with less than 10 flowers held on glabrous pedicels (ascending at 45 degrees) spaced at about 2 cm apart. Finally, the root system investigated in Section 8 (Figure 2) was highly branched, with a narrowed but firm attachment to the stem. Some plants within each of these groups (all located within an area of about one square mile) exhibited often strong variation in these characters, making positive identification to the species level of taxa difficult. For example, sepal coloration and reflexion varied considerably, with sepal color ranging from white to slightly pinkish (Figure 3) to slightly or rather strongly bluish (Figure 1), and older flowers attaining a range of barely to strongly reflexed. This variability was observed on at least one occasion to occur on a single individual. Petal hairiness with regard to overall amount of hairs and contrast between inner and outer surfaces was also variable, although all plants exhibited some degree of white-hairiness on both the inner and outer surfaces. Leaves were never puberulent, appearing overall glabrous but upon close inspection having ciliate hairs on leaf margins and thus resembling plants separated as *D. gypsophilum* in Section 19. Like all other *Delphinium* found within the survey area except *D. patens* in Section 9, plants in Sections 4 and 8 developed darkish, often greenish, central sepal spots, which is not a character described in the available literature or appearing in herbaria specimen photographs of *D. recurvatum*.

As of this writing, it is speculated that some hybridization has occurred among the *Delphinium* that now populate portions of Sections 4 and 8. Hybridization would account for the relatively high inter- and intra-group variability, and is a generally well-documented trait of local *Delphinium* species. This known tendency for hybridization is thought to be more commonly realized in areas that have been significantly disturbed, and disturbance is certainly in force within the habitat where these plants were found. This area (the flatlands at and near Sections 4 and 8) likely once supported alkaline scrub vegetation, but has been historically used for pasture. It now supports heavily grazed non-native grasslands. Sections 4 and 8 where *Delphinium* populations have survived do not exhibit the tillage lines found in other Sections. The tentatively assigned *Delphinium recurvatum* remains there (despite grazing disturbance), but has possibly responded to habitat alteration by becoming hybridized with other locally occurring species such as *D. gypsophilum* ssp. *gypsophilum* or *D. hesperium* ssp. *pallescens*. It is likely that revisiting all of the populations located in Sections 4 and 8 during fruit and seed maturation will allow more confident assignation to the species level of taxa.

Figure 1. Delphinium cf. recurvatum, Section 4

Figure 3. Delphinium cf. recurvatum, Section 4

Figure 2. Delphinium cf. recurvatum, Section 8

LIVE OAK ASSOCIATES, INC.

an Ecological Consulting Firm

RESULTS OF 2010 ADULT AND JUVENILE BNLL SURVEYS CONDUCTED ON SECTION 16 OF TOWNSHIP 15S, RANGE 10E FOR SOLARGEN ENERGY'S PANOCHE VALLEY SOLAR FARM

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22 September 2010 PN: 1297-10B

TABLE OF CONTENTS

1 INTRODUCTION 1

1.1 Project description 1

FIGURE 1. VICINITY MAP 2

2 EXISTING CONDITIONS 4

2.1 Biotic habitats associated with Sections 10 and 15 of township 15S, range 10e 4

2.2 history of blunt-nosed leopard lizards within the greater 10,000 acres of the site 4

3 METHODS 5

FIGURE 2 AREA SURVED 7

FIGURE 3 SPECIES LOCATIONS .... Error! Bookmark not defined.

4 RESULTS 9

5 SUMMARY 12

6 REFERENCES 13

APPENDIX A 14

APPENDIX B 16

1 INTRODUCTION

The following is a report of findings relating to 2010 adult and juvenile blunt-nosed leopard lizard (*Gamelia sila*)(BNLL) surveys conducted by Live Oak Associates, Inc. (LOA) on a single-Section subset of land within the Panoche Valley Solar Farm project site. The proposed Solargen Energy's Panoche Valley Solar Farm is located approximately 15 miles west of Highway 5 along West Shields, Panoche and Little Panoche Roads in eastern San Benito County.

The outline of the proposed project is irregularly-shaped, and can be found in the Panoche, Mercey Hot Springs, Llanada, and Cerro Colorado 7.5 minute U.S. Geological Survey quadrangles in Sections 3, 4, 8-11, and 13-16 of Township 15 South, Range 10 East; and section 19 of Township 15 South, Range 11 East. The majority of parcels within the site are used for cattle grazing. The site is surrounded by rangeland and bordered to the west by the Gabilan Range and to the east by the Panoche Hills. A number of drainages and creeks are present in the area including the Panoche and Las Aguilas Creeks. The portion of the Valley associated with the proposed project ranges in elevation from approximately 1240 feet above sea level to approximately 1400 feet.

1.1 PROJECT DESCRIPTION

Solargen Energy Inc. proposes to construct and operate a 420 Megawatt solar photovoltaic (PV) energy generating facility that would be named the Panoche Ranch Solar Farm (Farm). This site comprises approximately 4885 acres located in the eastern portion of San Benito County.

The Farm is proposed, in part, to support California in meeting the Renewable Portfolio Standard mandate, requiring investor-owned utilities to supply 20% of their total electricity through renewable energy by the year 2010. Benefits of the proposed Farm include the following:

- Direct conversion of sunlight to electricity through the PV effect does not require water to generate electricity
- Solargen's PV panels consist of non-toxic materials such as glass, silicon, concrete and steel
- The Farm would offset potential emissions of greenhouse gases that contribute to climate change and other pollutants such as nitrogen dioxide from fossil fuel fired power plants

The Farm would be constructed on contiguous parcels of land historically used for grazing. A buffer zone with a minimum width of 35-feet would be maintained between the PV panels and surrounding land and the operation of the Farm would not interfere with adjacent land uses currently in place.

The selection of the site in Panoche Valley is based mainly on sun light, topography and proximity to the Moss to Panoche transmission line owned by PG&E. This line provides a unique opportunity to connect energy produced at the Farm to an existing point on the system with available electric transmission capacity. The Panoche Valley offers a relatively level valley floor, occurring between approximately 1240 and 1400 feet above sea level. The Panoche Valley area supports a strong solar resource according to the National Renewable Energy Laboratory Solar Radiation Database (http://www.nrel.gov/gis/data_analysis.html), which has collected data for the last decade on various locations around the United States. The Farm would be expected to remain in operation for at least 30 years, with the possibility of a subsequent re-powering for additional years of operation. The energy produced here would mainly benefit users in San Benito and Fresno Counties, though outlying customers would also receive a portion of their energy from the Farm.

The Farm would consist primarily of PV panels on steel support structures, which would be dark in color. These panels would be arranged in rows, with panels tilting upward and facing south or southwest. Each panel would be 7- by 8-feet and they would stand no more than 15-feet above the ground. The panels would be arranged in blocks, and each block would be supported by an inverter and transformer. These units would stand no more than 25-feet above the ground. Medium-voltage collection system lines would be buried underground. It is believed that this system, with no moving parts, no thermal cycle, no water needs, a low visual profile and underground collection system would help minimize the Farm's potential impacts to the environment.

Due to the topography of the Panoche Valley, the installation of the Farm would not require large-scale grading. The main areas of grading would occur for all-weather access roads, the Farm substation, and an operations and maintenance (OM) facility. The roads would be heavily used during the construction phase, and then rarely used for maintenance in subsequent years.

As stated previously, the Farm would not require water to generate electricity. However, some water would be required for sanitary facilities and for periodic panel cleaning. It is estimated that these uses would require approximately 10.5 acre-feet of water per year, based on a one time per year cleaning schedule. This annual water demand represents approximately 6% of that used for a similar-sized solar thermal facility, based on recent California Energy Commission information. It is estimated that the construction of the Farm would take approximately 6 years to complete, and during this time, additional water would be necessary for sanitary facilities, dust control, initial panel washing and manufacturing concrete. Solargen is exploring opportunities to clean and recycle gray water for reuse onsite. Existing onsite wells should be sufficient to serve the Farm's water needs, however thorough studies of the water resources both onsite and in the greater Panoche Valley area are planned.

An approximately 5-acre substation is proposed as part of the project, and includes an adjacent area of up to 2 acres to be occupied by an OM facility, including a small parking area. One or more cement pads would be constructed as foundations for substation equipment, and other areas would utilize a gravel substrate. An 8-foot chain link fence would be constructed around the substation. These facilities would be strategically placed adjacent to the existing PG&E Moss to Panoche 230 kV transmission line. In addition to the substation and OM facility, there would be approximately one gear switch house for every 40 inverter and transformer combinations, each of which would have similar dimensions to the inverters and transformers.

2 EXISTING CONDITIONS

2.1 BIOTIC HABITATS ASSOCIATED WITH SECTION 16 OF TOWNSHIP 15S, RANGE 10E

Ruderal Grassland: At the time of the adult and juvenile BNLL surveys were conducted (3 May to 9 July, and 2 August to 10 September 2010, respectively), Section 16 the northeast corner of the site was used as a bull pen, and the remainder of the northern half of the Section was grazed in patches during juvenile survey. The southern half of the site was more heavily grazed during the adult surveys. The vegetation on-site included ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis*), foxtail barley (*Hordeum murinum ssp. leporinum*) and rat-tail fescue (*Vulpia myuros*). Dominant forbs included broad-leaved filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), shining peppergrass (*Lepidium nitidum var. nitidum*) and vinegarweed (*Tricostema lanceolatum*). Fiddleneck (*Amsinckia menziesii*), shepherds purse (*Capsella bursa-pastoris*), turkey mullein (*Eremocarpus setigerus*) and bur clover (*Medicago polymorpha*) were also common, especially along ranch roads. In general, the vegetation on the northern half of the Section was much more dense than on the southern half.

2.2 HISTORY OF BLUNT-NOSED LEOPARD LIZARDS WITHIN THE GREATER 4,885 ACRES OF THE SITE

The blunt-nosed leopard lizard (BNLL) is federally listed as Endangered (11 March 1967, Federal Register 32:4001); is state listed as Endangered (27 June 1971); and is also a Fully Protected species under California Fish and Game Code Section 5050. The California Natural Diversity Database (CNDDB) contains several observations of BNLL on the Valley floor dating between 1979 and 2004.

3 METHODS

The project site is within the known range of the BNLL. Therefore, surveys for adult and juvenile BNLL were conducted on Section 16 of Township 15S, Range 10E (Figure 1), which represents the initial area, or Phase I, of proposed development for the Panoche Valley Solar Farm. These surveys were conducted following the protocol outlined in CDFG's *Approved Survey Methodology for the Blunt-Nosed Leopard Lizard*, May 2004, hereinafter referred to as CDFG Guidelines.

Survey Protocol Constraints:

The currently accepted survey methodology for the BNLL requires the following:

- The maximum width that survey transects can be spaced is 30 meters
- A maximum of 4 surveys on a given site per week and 8 days of surveys within a 30-day period. At least one survey session should be conducted for 4 consecutive days
- Surveys must be conducted within the following temperatures: 25°C-35°C (77°F – 95°F)
- No surveys on overcast days (cloud cover of >90%)
- No surveys when sustained wind velocities exceed 10 mph
- Surveys may begin after sunrise when temperatures are within appropriate ranges, but must end by 1400 hours or when maximum temperatures are reached
- Surveys must be conducted by a minimum of 2 biologists

Qualifications of Researchers:

An acceptable BNLL survey crew should consist of no more than 3 **Level I** researchers for every **Level II** researcher. This restriction should reduce the number of incorrect/missed identifications. The names and affiliations of all researchers must be recorded for each survey day.

- **Level l**: Researcher has demonstrated ability to distinguish BNLL from other common lizard species that may inhabit the area
- **Level II**: Researcher has demonstrated ability to distinguish BNLL from other common lizard species that may inhabit the area and has participated in at least 50 survey days for BNLL (or 25 survey days and a BNLL identification course recognized by/acceptable to the Department of Fish and Game). Researcher has made at least one confirmed field sighting of a BNLL
- A minimum of one confirmed field sighting must be documented for each **Level II** researcher and be available to the Department upon request. As with all BNLL sightings, it should also be submitted to the California Natural Diversity Database. The Information to be included in documentation of BNLL sighting include: Name of researcher, date of survey, location of survey, names of accompanying researchers who can confirm the sighting, and details of sighting (distance, BNLL activity, etc.)

LOA Level II biologists included: Dr. Mark Jennings, Molly Gobel, Yancey Bissonnette, Steve Pruett, Karl Weiss, Missy Chase, Jayanna Miller, Jared Prat and Lisa Wifrey. LOA Level I biologists included: Dan Cordova, Jen Turner, Fabian Pereida, Jared Bigler, Colby Boggs, Neal

Kramer, Chris Bronny, Wendy Fisher, Dave Wappler, Emily Cmapbe, Lidia D'Amico, Danielle Castle, Cecile Shohet, Andy Huck and Katrina Huck.

LOA conducted adult BNLL surveys, following the CDFG Guidelines, between 3 May and 9 July 2010. Young-of-the-year surveys were conducted between 2 August and 10 September 2010, again following CDFG Guidelines. The results of these surveys are summarized in Section 4 below.

4 RESULTS

Surveys for adult BNLL began on 3 May 2010 and were conducted most days, Monday through Friday, through 9 July 2010, weather permitting. Surveys for juvenile BNLL began on 2 August and ended 10 September 2010. As noted above, these surveys were conducted on Section 16 of Township 15S, Range 10E; the Section containing and Phase I of the proposed Panoche Valley Solar Farm. A total of 12 survey days were conducted during the adult surveys, and a total of 5 survey days were conducted for the juvenile surveys. The first adult BNLL was observed along Panoche Creek on 4 May 2010, the second day of surveys. A total of 12 adult surveys were conducted on Section 16 resulting in 37 observations of adult. Individual adult BNLL were observed throughout the survey window. Table 1 represents the dates and general location of BNLL observations during adult surveys, locations outside of Section 16 occurred outside of protocol parameters when surveyors walked the Panoche Creek wash.

Table 1. Dates and General Locations of Adult BNLL Observations (3 May to 9 July, 2010)

Date	Location*
4-May-2010	SE 1/4
5-May-2010	SE 1/4
5-May-2010	SE 1/4
5-May-2010	SE 1/4
5-May-2010	incidental along wash, Section 15
5-May-2010	incidental along wash, Section 15
5-May-2010	incidental along wash, Section 15
5-May-2010	incidental along wash, Section 15
7-May-2010	incidental along wash, Section 14
7-May-2010	incidental along wash, Section 14
7-May-2010	incidental along wash, Section 14
12-May-2010	On Southern Fence Row
12-May-2010	SE 1/4
13-May-2010	SE 1/4
13-May-2010	SE 1/4
13-May-2010	SE 1/4

14-May-2010	SW 1/4
14-May-2010	SW 1/4
14-May-2010	SE 1/4
19-May-2010	SE 1/4
25-May-2010	SE 1/4
25-May-2010	SE 1/4
25-May-2010	SE 1/4
5-Jun-2010	On Southern Fence Row
1-Jun-2010	SW 1/4
1-Jun-2010	SW 1/4
2-Jun-2010	SE 1/4
2-Jun-2010	SE 1/4
3-Jun-2010	SW 1/4
3-Jun-2010	SE 1/4
4-Jun-2010	SW 1/4
7-Jun-2010	SE 1/4
7-Jun-2010	SE 1/4
7-Jun-2010	SE 1/4
11-Jun-2010	SE 1/4
16-Jun-2010	SE 1/4
16-Jun-2010	SE 1/4
16-Jun-2010	SE 1/4
21-Jun-2010	SE 1/4
22-Jun-2010	SE 1/4
22-Jun-2010	SE 1/4
22-Jun-2010	SE 1/4
6-Jul-2010	SE 1/4

*All in Section 16 unless otherwise noted

Surveys for juvenile BNLL began on 2 August and continued until 10 September 2010. CDFG Guidelines call for a total of 5 complete surveys for juveniles, and Section 16 was surveyed 5 times following CDFG guidelines. The results were similar to the adult surveys, with BNLL being located in similar areas within Section 16 (i.e., in and around Panoche Creek). The dates and general locations of these observations can be seen in Table 2. Figure 2 graphically represents the general locations of select sightings.

Table 2. Dates and General Locations of Juvenile BNLL Observations (3 August - 1 September 2009)

Date	Location within Section 16
08/03/2010	SW 1/4
08/09/2010	SE 1/4
08/10/2010	SE 1/4-4 individuals
08/17/2010	SE 1/4
09/01/2010	SE 1/4

Other grassland species (e.g., BUOW and SJKF) continued to be observed and recorded during juvenile BNLL surveys. The general location and dates of observations are shown on Figure 2.

5 SUMMARY

Adult BNLL surveys were conducted on Section 16 of Township 15S, Range 10E of the proposed Panoche Valley Solar Farm between 3 May and 9 July2010; and juvenile BNLL surveys were conducted between 2 August and 10 September 2010. BNLL adult and juveniles were observed on Section 16.

The adult and juvenile BNLL found in Section 16 were found mainly in association with Panoche Creek, which is consistent with known habitat preferences of washes and floodplains (Warrick et al., 1998), and non-native grasslands (USFWS 1998), among others. Juvenile BNLL were found along the washes and also farther away as they dispersed from their hatching sites. Section 16 supports mid to dense vegetation one main wash. The grasses in the north portion of Section 16 was much more dense than the south portion, which may prove to be too dense to support BNLL populations.

6 REFERENCES

CDFG. 2009. California Natural Diversity Data Base. The Resources Agency, Sacramento, CA.

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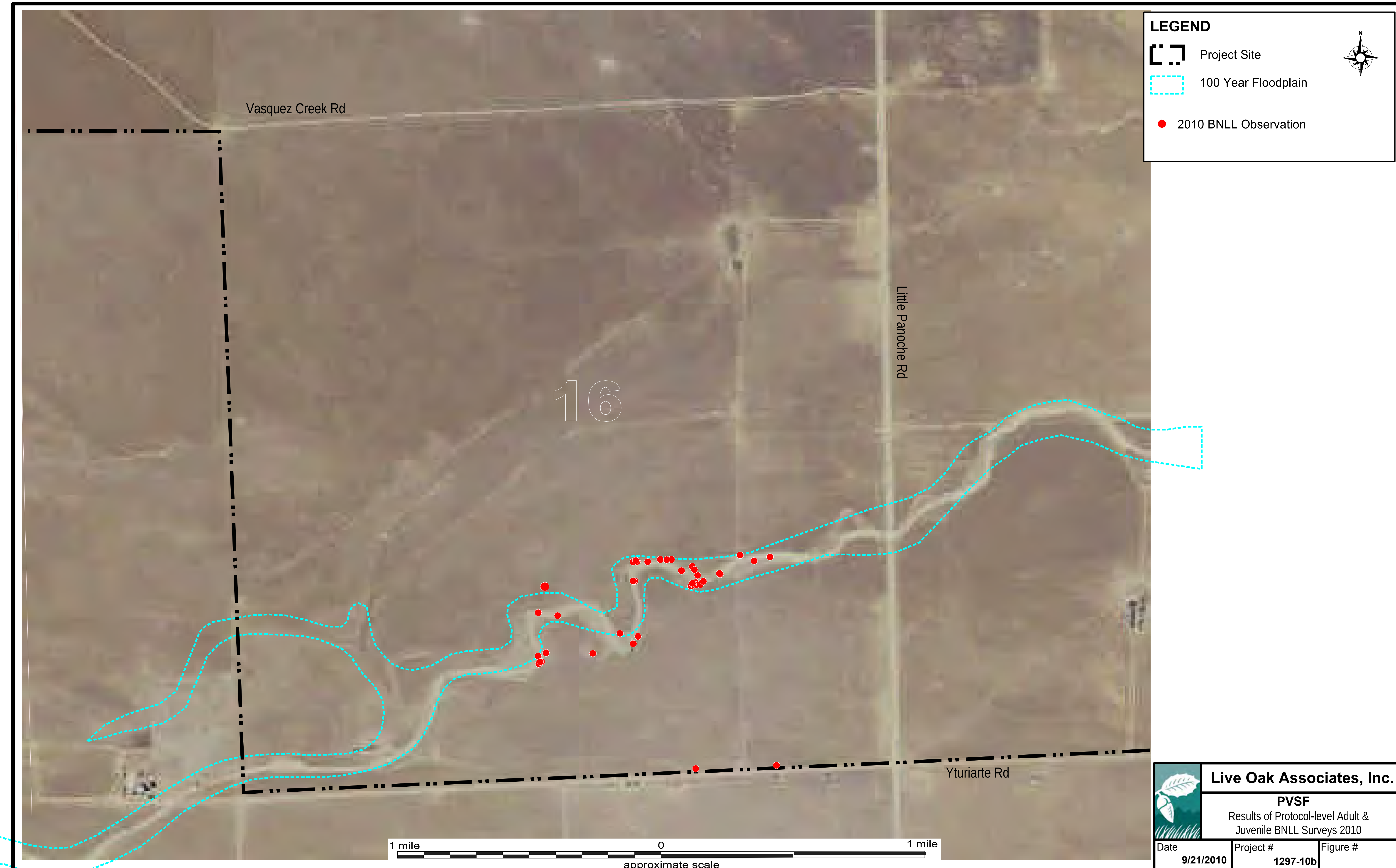
Germano, D.J. 2009. *The Number of Consensus Days Needed to Detect Blunt-Nosed Leopard Lizards*, Gambelia Sila. CDFG 95(2):106-109.

USFWS. 1998. *Recover Plan for Upland Species of the San Joaquin Valley, California*.

Warrick, G.D., T.T. Kato, B.R. Rose. 1998. *Microhabitat Use and Home Range Characteristics of Blunt-Nosed Leopard Lizards*. Journal of Herpetology, V32,N2,pp183-191.


LEGEND
Project Site
100 Year Floodplain
2010 BNLL Observation
Vasquez Creek Rd
Little Panoche Rd
Yturiarte Rd
16
1 mile
0
1 mile
approximate scale
Live Oak Associates, Inc.
PVSF
Results of Protocol-level Adult &
Juvenile BNLL Surveys 2010
Date
9/21/2010
Project #
1297-10b
Figure #

LIVE OAK ASSOCIATES, INC.
an Ecological Consulting Firm

DATA REQUEST #8 – 10 September 2010

INTRODUCTION

Live Oak Associates, Inc. (LOA) conducted reconnaissance-level surveys on approximately 10,900-acres of the Silver Creek Ranch (SCR), proposed mitigation lands for the Panoche Valley Solar Farm (PVSF). These surveys were focused on blunt-nosed leopard lizards (*Gambelia sila*; BNLL), giant kangaroo rat (*Dipodomys ingens*; GKR) and San Joaquin kit fox (*Vulpes macrotis mutica*; SJKF). Observations of other species of special concern were also noted. Dr. Mark Jennings and Molly Goble conducted five days of BNLL surveys between 30 August and 3 September; Katrina and Andy Huck conducted three days of mammal surveys between 30 August and 1 September 2010; and Dr. Jim Paulus and Neal Kramer conducted three days of vegetation alliance surveys between 3 and 5 September 2010.

Each of these surveys began by visiting historic observations of relevant species as presented by the California Natural Diversity Database (CNDDB) and spot-checking those areas to determine whether they still support the species. To cover the most ground in the least amount of time, biologists drove as close as possible to historic sightings and then surveyed the areas on foot allowing the greatest amount of visual coverage. Subsequent efforts included other portions of the site that support suitable habitat for the target species. The following is a summary of effort for each segment of the reconnaissance survey.

SURVYES

<u>Vegetation Alliances</u>

Methods/Results

Map elements (vegetation alliances) identified within the study area were visited or viewed from nearby using binoculars. Boundaries between associations were drawn onto georectified 1:24,000 scale color aerial images during field reconnaissance. These polygons were then digitized to facilitate map interpretation. The typical total cover provided by the herbaceous, shrub and tree strata were observed, and a list of associations as signaled by shifts in dominant canopy species abundance was developed for each alliance present. A partial floristic inventory was conducted in concert with the mapping effort. Survey work included searching for extant riparian corridor or spring-driven habitat across the entire area. Observations of riparian habitat indicators such as surface flows, defined channels with evidence of scour, and phreatophytic species prominence were recorded. Due to the late timing of the surveys, potentially occurring rare plant species would be expected to be exhibiting late fruiting or senescing phenology, and so were past their optimal periods for identification. A table of special status plants with the potential to occur onsite is included at the end of this summary, as well as a partial inventory of plants onsite and a habitat map.

The three-day reconnaissance survey for plant alliances produced five distinct alliances. These alliances include California annual grassland, Ephedra californica shrubland, Populus fremontii forest, zonal riparian, and tamarix semi-natural shrubland (see Habitats map).

Blunt-nosed leopard lizard (*Gambelia sila*)

Methods/Results

General habitat and ocular surveys were conducted for BNLL and were concentrated where BNLL have been recorded in the past (in the CNDDB) and in those areas most likely to support BNLL habitat (e.g., barren washes and areas with sparse vegetation on friable soils). Two biologists walked abreast of one another no more than 30 meters apart, stopping from time to time and searching the surroundings through binoculars. The five days of surveys occurred within the juvenile survey period (1 August to 15 September) outlined in the CDFG's *Approved Survey Methodology for the Blunt-Nosed Leopard Lizard*, May 2004 and generally followed the survey methodology. Observations of the target species and other species of special concern were mapped using a Garmin GPS unit.

Of the portions of the SCR that were surveyed, the highest quality habitat for BNLL appears to be in the lower portions of intermittent drainages near Panoche Road. The best habitats were in the SE corner of Section 27, the eastern half of Section 34, and the SW corner of Section 35. A total of 5 juvenile BNLL were observed in these areas (see Figure entitled: Silver Creek Recon BNLL3). The general habitat for all of these areas was sandy washes bordered by rocks and boulders with an abundance of California side-blotched lizards (*Uta stansburiana elegans*). The amount of vegetation present was sparse, especially for introduced grasses.

LOA did not find any juvenile BNLL in the portions of Section 32 (near center) and 35 (in the SE corner) previously recorded by the CNDDB. This could be due to the current presence of dense amounts of vegetation in the intermittent drainages there. Vegetation is almost certainly sparser during drought or below average rainfall years, or in years when these areas are more heavily grazed.

Giant Kangaroo Rat

Methods/Results

Surveys for GKR began in those areas with historic sightings (CNDDB) of the species (primary surveys), represented as polygons on the figure entitled: Silver Creek Recon GKR3; and secondary surveys were conducted in areas with a slope of 11% or less, which represents habitat most likely to support the target species, based on literature review and conversations with the Agencies. Spot-checking involved driving as near a polygon as possible, walking meandering transects and recording observations. Observations of the target species and other species of special concern were noted and mapped with a Trimble GPS unit. Due to some overlap in size class of scat between GKR and Heermann's kangaroo rat (*Dipodomys heermanni*) at 7mm, only rat scats ≥ 9mm were recorded as GKR. Possible locations of GKR were mapped as a polygon or a point depending on the amount of confirmed sign. The time constraints of the survey did not allow surveying of every CNDDB polygon. However, every CNDDB polygon that was surveyed (3 of 9) via spot-checking contained confirmed sign of GKR. A small valley, not previously recorded in the CNDDB supported a large colony of confirmed GKR sign (see GKR3).

San Joaquin kit fox

Methods/Results

Surveys for SJKF began in those areas with historic sightings (CNDDB) of the species (primary surveys), represented as polygons on the figure entitled: Silver Creek Recon SJKF3; and secondary surveys were conducted in areas with a slope of 11% or less, which represents habitat most likely to support the target species, based on literature review and conversations with the Agencies. Spot-checking involved driving as near a polygon as possible, walking meandering transects and recording observations. The CNDDB polygon encompassing Section 35 is still utilized by SJKF, confirmed by SJKF scat. The only other CNDDB polygons for SJKF on the SCR occur along Panoche Road, and are presumed to be data from previous road surveys or incidental sightings. LOA identified additional locations within the site containing SJKF scat. Five individuals were observed on the night of 1 September during spotlighting surveys from ranch roads within the site.

CONCLUSION

LOA conducted a brief reconnaissance survey of approximately 10,900-acres of the SCR focusing on vegetation alliances, BNLL, GKR and SJKF. Surveys began by spot-checking historic sightings of species as presented in the CNDDB and were conducted during the juvenile BNLL survey window. LOA confirmed that areas with historic observations of GKR and SJKF are still valid. While no observations of BNLL were made in areas with historic sightings, observations of 5 juvenile BNLL were made in the first two days of surveys in areas with no previous sightings, indicating a relatively healthy population, based on Germano's (CDFG 2009) findings that when the species is abundant it takes an average of 1.18 days of survey effort to observe.

In addition to the target species, a number of other special status species were observed including the San Joaquin coachwhip (*Masticophis flagellum ruddocki*), loggerhead shrike (*Lanius ludovicianus*), San Joaquin antelope squirrel (*Ammospermophilus nelsoni;* SJAS), and American badger (*Taxidea taxus*). Observations of SJAS were initially being GPS'd, however they were so abundant across the site it became necessary to stop recording their locations due to a short survey window and so many acres to cover.

The site also supports potential breeding habitat for the California tiger salamander (*Ambystoma californiense*) in the form of stock ponds and vernal pools. Perennial waters in the Panoche Creek with covered by stands of cottonwood (*Populus fremontii*) could potentially support suitable habitat for California red-legged frog (*Rana draytonii*), especially considering the lack of predacious fish and bullfrogs in these waters.

The *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) and the *Blunt-nosed Leopard Lizard 5-Year Review Summary and Evaluation* (USFWS 2010) identified the SCR as a targeted area for protection and subsequent recovery of the suite of upland species occurring in the Panoche Valley and greater Ciervo-Panoche Region. Considering BNLL were not observed this year in areas where they were previously observed (CNDDB), likely due to the dense vegetation occurring there, there is an opportunity to manage the site to increase suitable habitat for BNLL. Opportunities to create breeding ponds for CTS are also likely present onsite. Eradicating tamarix from the drainages would increase biotic value on many levels.

Adding the SCR to the mitigation lands for the proposed PVSF would offer the entire Ciervo-Panoche Region an opportunity to protect already high quality habitat for the suite of upland species that occurs there and enhance habitat for the same species through restoration and adaptive management.

REFERENCES

CDFG. 2004. *Approved Survey Methodology for the Blunt-Nosed Leopard Lizard*.

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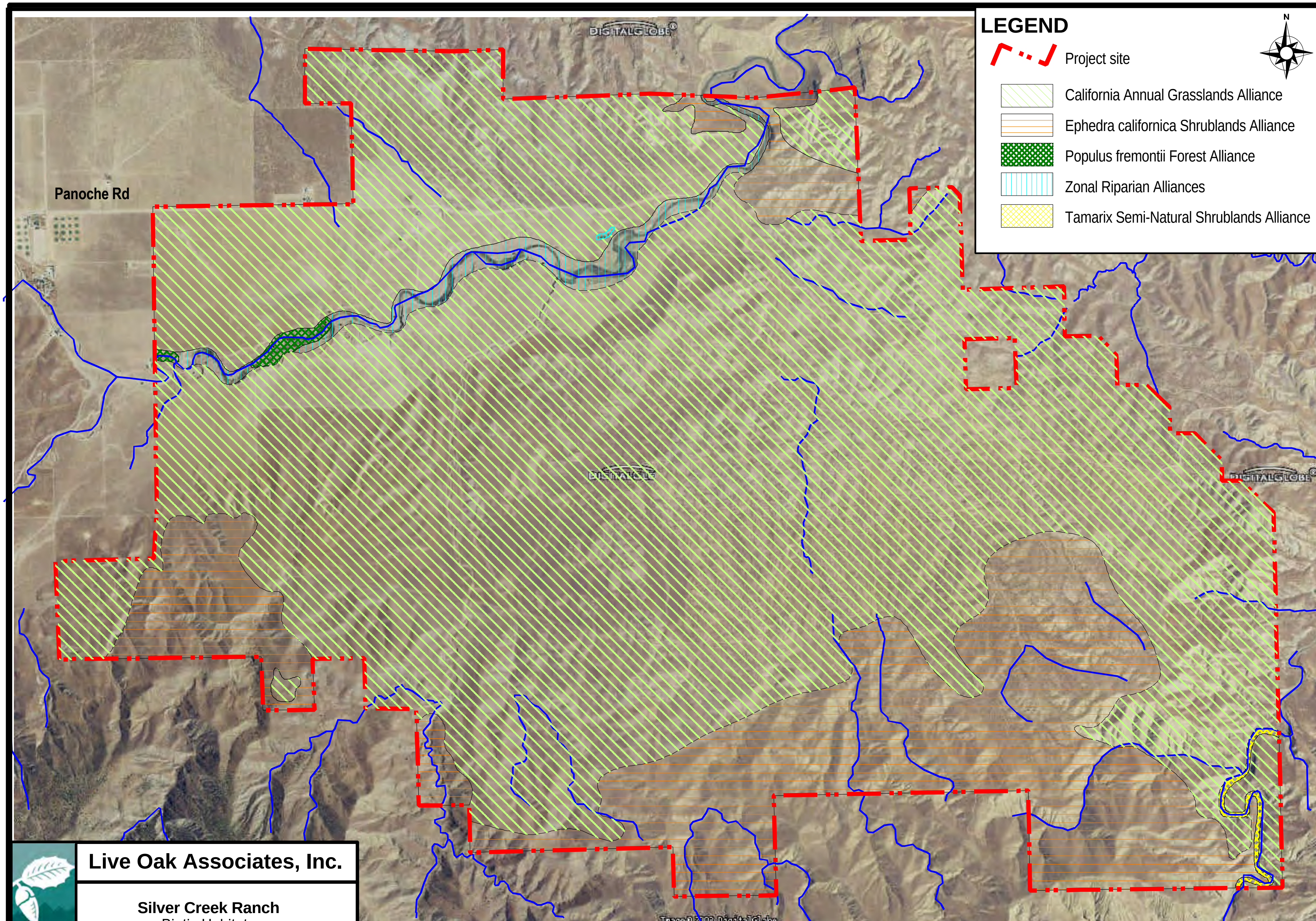


Live Oak Associates, Inc.

Silver Creek Ranch
Biotic Habitats

Date	Project #	Figure #
9/09/2010	**1297-13**	**2**

1 mile 0 1 mile
approximate scale

Aerial photo courtesy of Digital Globe

Table 1. Special status plant species that could potentially occur within the 10,903 acre Silver Creek Ranch proposed Solargen Panoche Mitigation Area. Blooming period is taken from CNPS (2001).

Species	**Status***	**Habitat**	**Blooming Period**
Santa Clara thorn-mint *Acanthomintha lanceolata* Annual herb	CNPS 4	Chaparral, woodland, rocky, often serpentine	March-June
forked fiddleneck *Amsinckia vernicosa* var. *furcata* Annual herb	CNPS 4	Woodland, grassland	February-May
Salinas milk-vetch *Astragalus macrodon* Perennial herb	CNPS 4	Chaparral, woodland, grassland	April-July
crownscale *Atriplex coronata* var. *coronata* Annual herb	CNPS 4	Chenopod scrub, grasslands, and vernal pools, alkaline soils	March-October
Lost Hills crownscale *Atriplex vallicola* Annual herb	CNPS 1B	Chenopod scrub, grasslands, and vernal pools, alkaline soils.	April-August
western lessingia *Benitoa occidentalis* Annual herb	CNPS 4	Chaparral, grassland, clay soils	May-November
round-leaved filaree *California macrophylla* Annual herb	CNPS 1B	Woodland, grassland	March-May
Lemmon's jewelflower *Caulanthus coulteri* var. *lemmonii* Perennial herb	CNPS 1B	Pinyon-juniper woodland, grassland	March-May
Hall's tarplant *Deinandra halliana* Annual herb	CNPS 1B	Chenopod scrub, grassland, clay soils	April-May
gypsum-loving larkspur *Delphinium gypsophilum* ssp. *gypsophilum* Perennial herb	CNPS 4	Chenopod scrub, grassland, clay soils	February-May

Table 1. (continued)

Species	**Status***	**Habitat**	**Blooming Period**

recurved larkspur *Delphinium recurvatum* Perennial herb	CNPS 1B	Chenopod scrub, grassland, alkaline	March-June
protruding buckwheat *Eriogonum nudum* var. *indictum* Perennial herb	CNPS 4	Scrubland, woodland, often clay or serpentine	May-December
Temblor buckwheat *Eriogonum temblorense* Annual herb	CNPS 1B	Grasslands, open slopes	May-September
Idria buckwheat *Eriogonum vestitum* Annual herb	CNPS 4	Grasslands, open slopes	April-August
pale yellow layia *Layia heterotricha* Annual herb	CNPS 1B	Pinyon-juniper woodland, alkaline grassland, clay	March-June
Panoche peppergrass *Lepidium jaredii* ssp. *album* Annual herb	CNPS 1B	Grassland, washes and alluvial fans	February-June
serpentine leptosiphon *Leptosiphon ambiguus* Annual herb	CNPS 4	Grassland, often serpentine soil	March-June
showy golden madia *Madia radiata* Annual herb	CNPS 1B	Woodland, grassland	March-May
San Joaquin woollythreads *Monolopia congdonii* Annual herb	CNPS 1B federal Endangered	Chenopod scrub, grassland, sandy	February-May
chaparral ragwort *Senecio aphanactis* Annual herb	CNPS 2	Woodland, chaparral	January-April

***California Native Plant Society (CNPS) list designations**

1B: Plants Rare, Threatened, or Endangered in California and elsewhere
2: Plants Rare, Threatened, or Endangered in California but more common elsewhere
4: Plants of limited distribution – a watch list

Appendix A**.** Partial plant list developed during field verification of plant associations present in the Solargen Panoche proposed Silver Creek Ranch mitigation area in September 2010. Nomenclature is taken from Hickman (1993) and Jepson Herbarium (2010). Wetland status is taken from Reed (1988). Status codes are given below.

Scientific Name	Common Name	Wetland Status
AGAVACEAE - Agave Family		
Hesperoyucca whipplei[1, 2]	Spanish bayonet	UPL
ALLIACEAE - Onion Family		
Allium crispum[2]	crinkled onion	UPL
APIACEAE - Carrot Family		
Lomatium utriculatum	common lomatium	UPL
ASTERACEAE - Sunflower Family		
Achillea millefolium	yarrow	FACU
Ambrosia acanthicarpa	annual bursage	UPL
Blepharizonia laxa[3]	big tarweed	UPL
*Centaurea melitensis**	tocalote	UPL
Chrysothamnus nauseosus	rabbitbrush	UPL
Deinandra kelloggii[4]	Kellogg's tarweed	UPL
Eastwoodia elegans	yellow mock aster	UPL
Ericameria linearifolia	interior/narrowleaf goldenbush	UPL
Euthamia occidentalis	western goldenrod	OBL
Gutierrezia californica	California matchweed	UPL
Helianthus annuus	common sunflower	FAC-
Isocoma acradenia var. *bracteosa*	alkali goldenbush	UPL
Iva axillaris ssp. robustior	poverty weed	FAC
*Lactuca saligna**	willow lettuce	NI*
*Lactuca serriola**	prickly lettuce	FAC
Lagophylla ramosissima[5]	common hareleaf	UPL
Lasthenia californica	common goldfields	UPL
Lessingia nemaclada	slenderstem lessingia	UPL
Micropus californicus var. *californicus*	slender cottonweed	UPL
Stephanomeria pauciflora	wire lettuce	UPL
Xanthium spinosum	spiny cocklebur	FAC+
Xanthium strumarium	cocklebur	FAC+
BORAGINACEAE - Borage Family		
Amsinckia menziesii	common fiddleneck	UPL
Amsinckia tessellata	checker fiddleneck	UPL
Heliotropium curassavicum	seaside/salt heliotrope	OBL
Phacelia tanacetifolia[6]	tansy phacelia	UPL
BRASSICACEAE - Mustard Family		
Lepidium nitidum var. *nitidum*	shining peppergrass	UPL
*Nasturtium officinale**	water cress	OBL
*Sisymbrium orientale**	oriental mustard	UPL
CARYOPHYLLACEAE - Pink Family		
Herniaria hirsuta var. *cinerea**	gray herniaria	UPL

Scientific Name	Common Name	Wetland Status
CHENOPODIACEAE - Goosefoot Family		
Atriplex argentea var. *mohavensis*	silverscale	FAC
Atriplex fruiticulosa	ball saltbush	
Atriplex lentiformis ssp. *lentiformis*	big saltbush	FAC
Atriplex polycarpa	allscale, desert saltbush	UPL
*Bassia hysopifolia**	fivehorn smotherweed	FAC
*Salsola tragus**	Russian thistle, tumbleweed	FACU
CUPRESSACEAE - Cypress Family		
Juniperus californica	California juniper	UPL
CYPERACEAE - Sedge Family		
Bolboschoenus maritimus[7]	saltmarsh bulrush	OBL
Eleocharis montevidensis	sand spikerush	FACW
Schoenoplectus americanus[8]	three square	OBL
Schoenoplectus pungens[9]	common threesquare	OBL
EPHEDRACEAE - Ephedra Family		
Ephedra californica	California ephedra, Mormon tea	UPL
EUPHORBIACEAE - Spurge Family		
Chamaesyce ocellata ssp. *ocellata*	Contura Creek sandmat	UPL
Croton setigerus[10]	turkey mullein, dove weed	UPL
FABACEAE - Legume Family		
Acacia greggii	catclaw	FACU
Astragalus didymocarpus var. *didymocarpus*	dwarf white milkvetch	
Astragalus oxyphysus	Mt. Diablo milkvetch	UPL
*Lotus corniculatus**	bird's foot trefoil	FAC
Lotus wrangelianus	California lotus	UPL
Lupinus microcarpus	chick lupine	UPL
*Medicago polymorpha**	burclover	UPL
*Melilotus indicus**	sour clover, small melilot	FAC
Prosopis glandulosa var. *torreyana*	mesquite	FACU
Trifolium willdenovii	tomcat clover	UPL
FRANKENIACEAE - Frankenia Family		
Frankenia salina	alkali heath	FACW+
GERANIACEAE - Geranium Family		
*Erodium cicutarium**	red-stemmed filaree	UPL
JUNCACEAE - Rush Family		
Juncus mexicanus	Mexican rush	FACW
Juncus ensifolius	dagger rush	FACW
Juncus xiphioides	iris-leaved rush	OBL
LAMIACEAE - Mint Family		
Salvia carduacea	thistle sage	UPL
Salvia columbariae	chia	UPL
Trichostema lanceolatum	vinegarweed	UPL

Scientific Name	Common Name	Wetland Status
ONAGRACEAE - Evening primrose Family		
Camissonia boothii ssp. *decorticans*	shredding primrose	UPL
Clarkia unguiculata	elegant clarkia	UPL
PLANTAGINACEAE - Plantain Family		
Plantago erecta	California plantain	UPL
POACEAE - Grass Family		
*Avena barbata**	slender wild oat	UPL
*Bromus diandrus**	ripgut brome	UPL
*Bromus hordeaceus**	soft chess	FACW-
Bromus madritensis ssp. *rubens**	foxtail chess, red brome	UPL
Distichlis spicata	saltgrass	FACW*
Hordeum marinum ssp. *gussoneanum**	Mediterranean barley	FAC
Hordeum murinum ssp. *leporinum**	foxtail barley	NI
*Koeleria phleoides**	annual junegrass	
Leymus triticoides	alkali ryegrass	FAC+
Muhlenbergia asperifolia	scratch grass	FACW
Poa secunda ssp. *secunda*	one-sided bluegrass	UPL
*Polypogon monspeliensis**	rabbit's foot grass	FACW+
Vulpia microstachys	annual fescue	UPL
*Vulpia myuros var. myuros**	rat-tail fescue	FACU*
POLEMONIACEAE - Phlox Family		
Eriastrum pluriflorum	manyflowered woollystar	UPL
POLYGONACEAE - Buckwheat Family		
Chorizanthe uniaristida	one-awned spineflower	UPL
Eriogonum angulosum	anglestem buckwheat	UPL
Eriogonum fasciculatum var. *polifolium*	California buckwheat	UPL
Eriogonum gracile var. *gracile*	slender woolly buckwheat	UPL
Eriogonum nudum var. *indictum*	protruding buckwheat	UPL
Hollisteria lanata		UPL
Lastarriaea coriacea	leather spineflower	UPL
Mucronea perfoliata	perfoliate spineflower	UPL
*Rumex stenophyllus**	narrowleaf dock	NI
RANUNCULACEAE - Buttercup Family		
Delphinium sp.	larkspur	UPL
SALICACEAE - Willow Family		
Populus fremontii ssp. *fremontii*	Fremont cottonwood	FACW
Salix exigua	narrow-leaved willow	OBL
Salix laevigata	red willow	~NI
SOLANACEAE - Nightshade Family		
*Nicotiana glauca**	tree tobacco	FAC
Nicotiana quadrivalvis	indian tobacco	UPL
TAMARICACEAE - Tamarisk Family		
*Tamarix ramosissima**	saltcedar	FAC
TYPHACEAE - Cattail Family		
Typha latifolia	broadleaf cattail	OBL

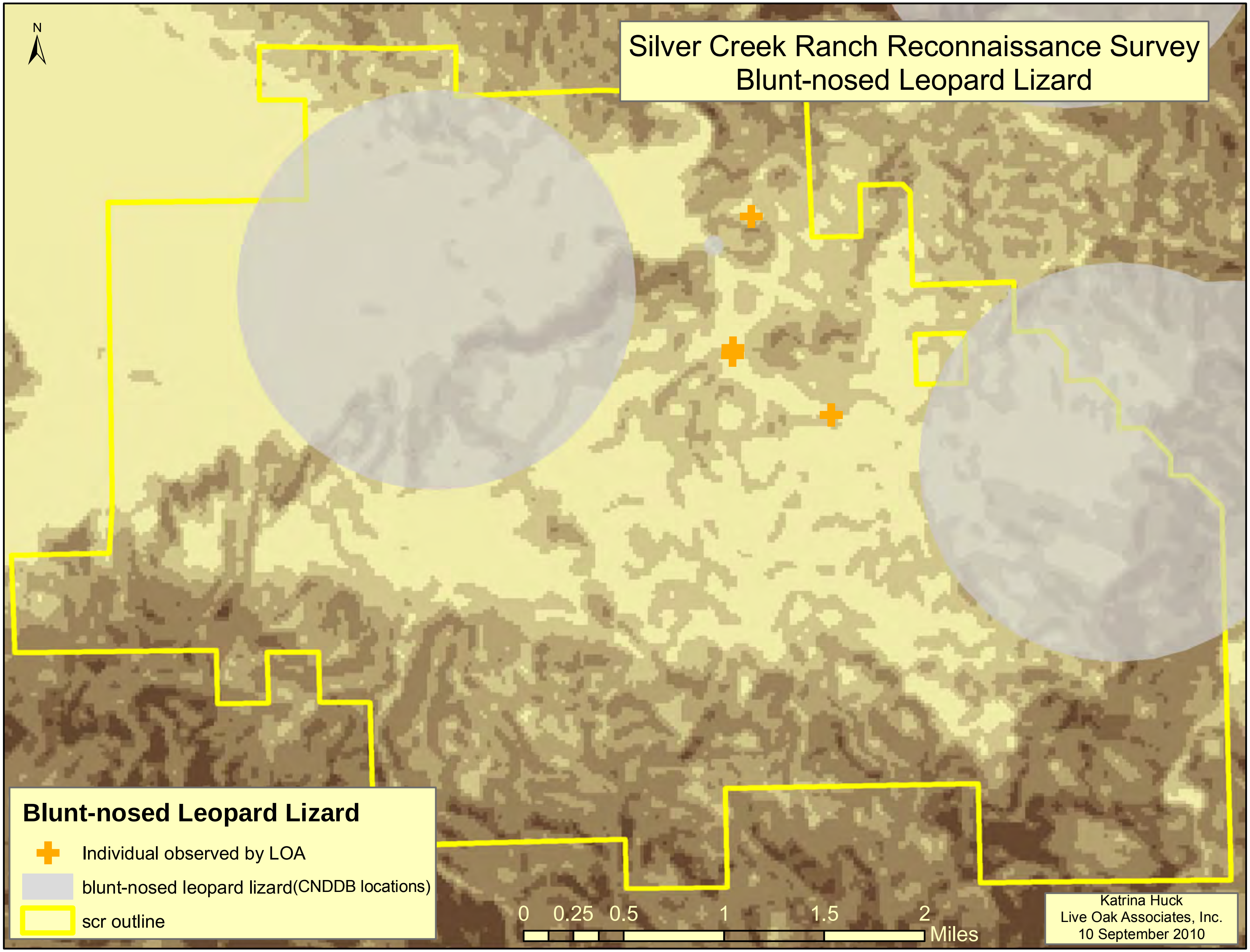
Scientific Name	Common Name	Wetland Status
VISCACEAE - Mistletoe Family		
Phoradendron serotinum ssp. *macrophyllum*[11]	bigleaf mistletoe	UPL
ZANNICHELLIACEAE - Horned-Pondweed Family		
Zannichellia palustris	horned-pondweed	OBL
ZYGOPHYLLACEAE - Caltrop Family		
*Tribulus terrestris**	punture vine	UPL

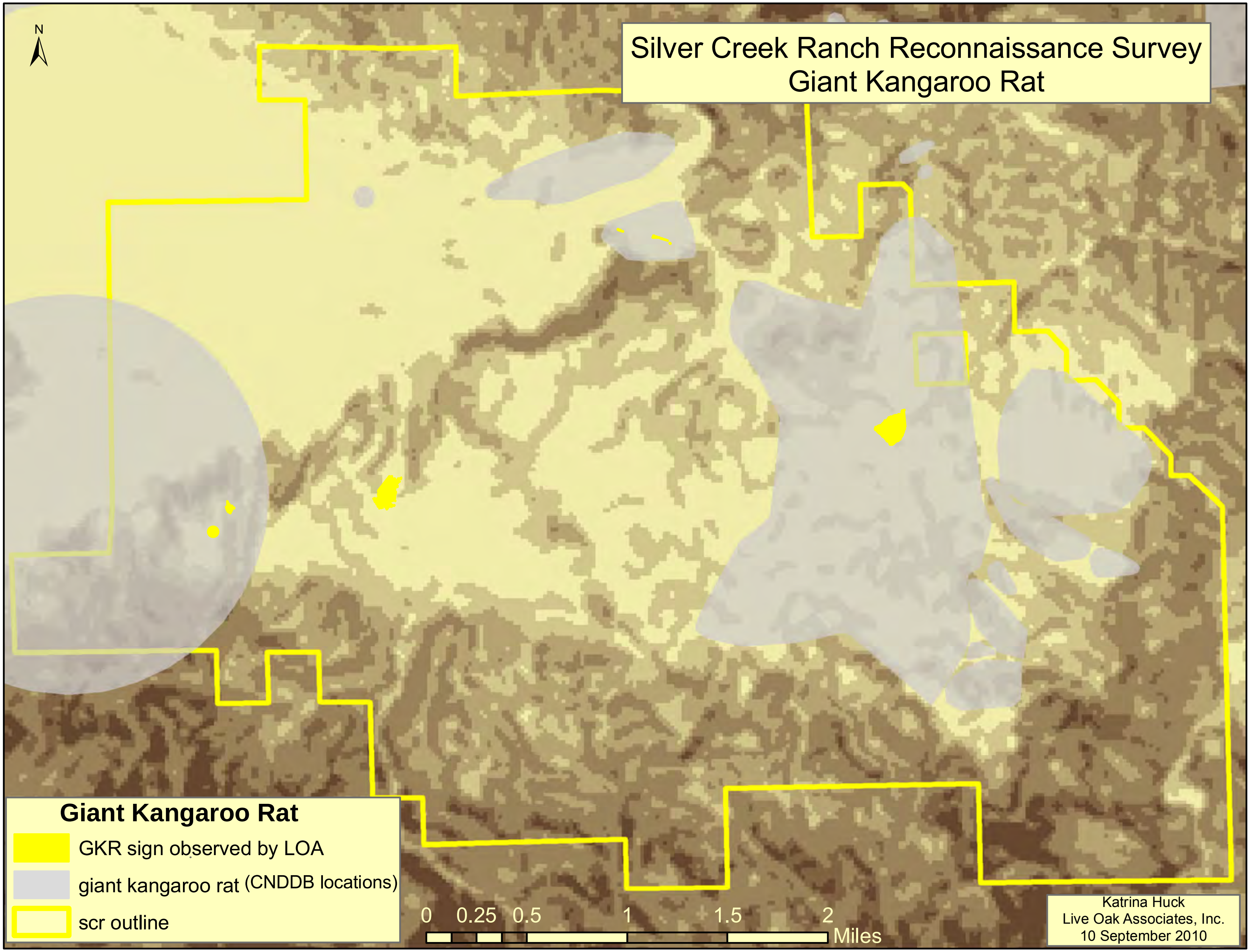
* Indicates introduced non-native species.

Key to the U.S. Fish and Wildlife wetland indicator status abreviations:

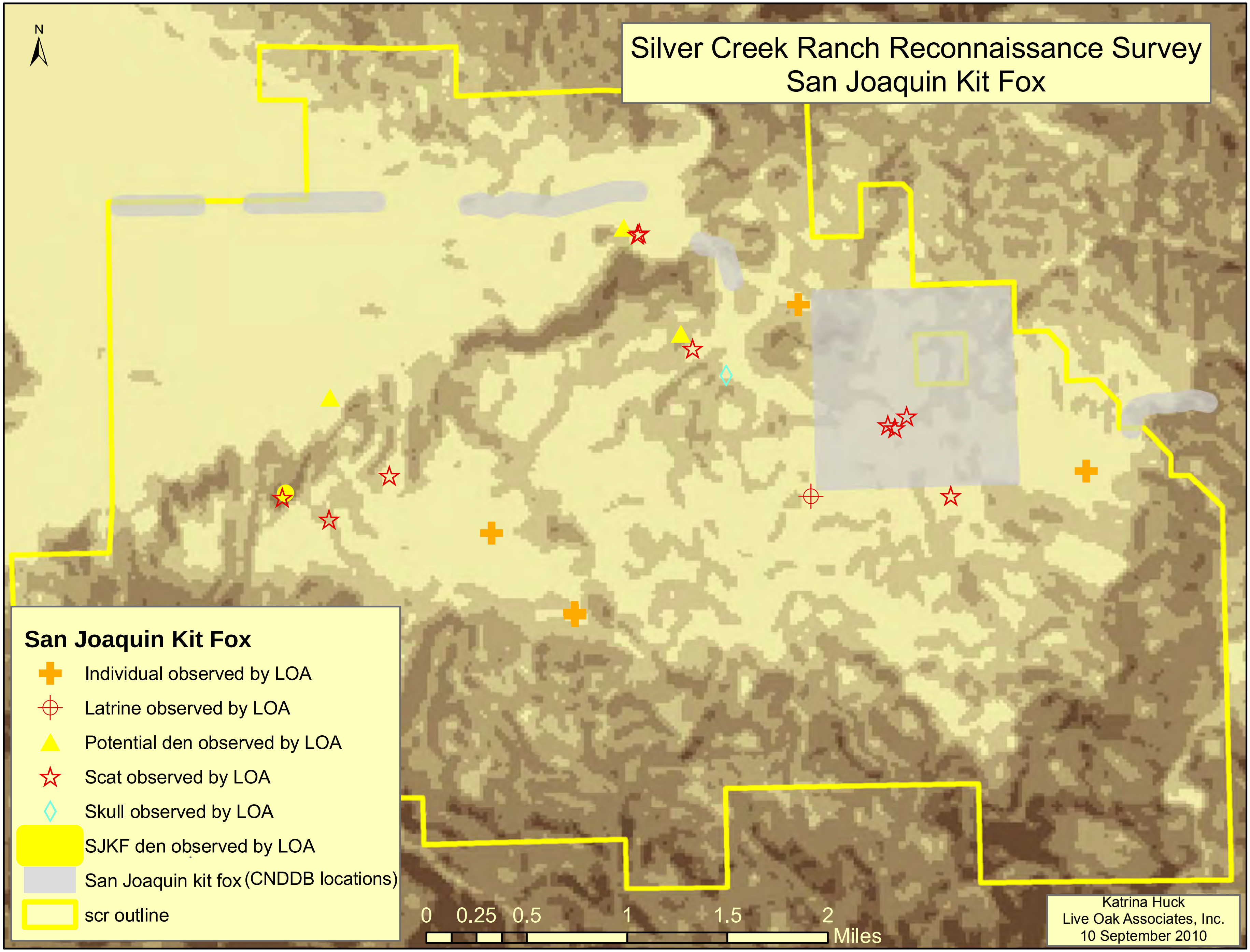
- OBL - obligate
- FACW - Facultative Wetland
- FAC - Facultative
- FACU - Facultative Upland
- UPL - Upland
- +/- - indicates High or Low end of category.
- NI - No investigation

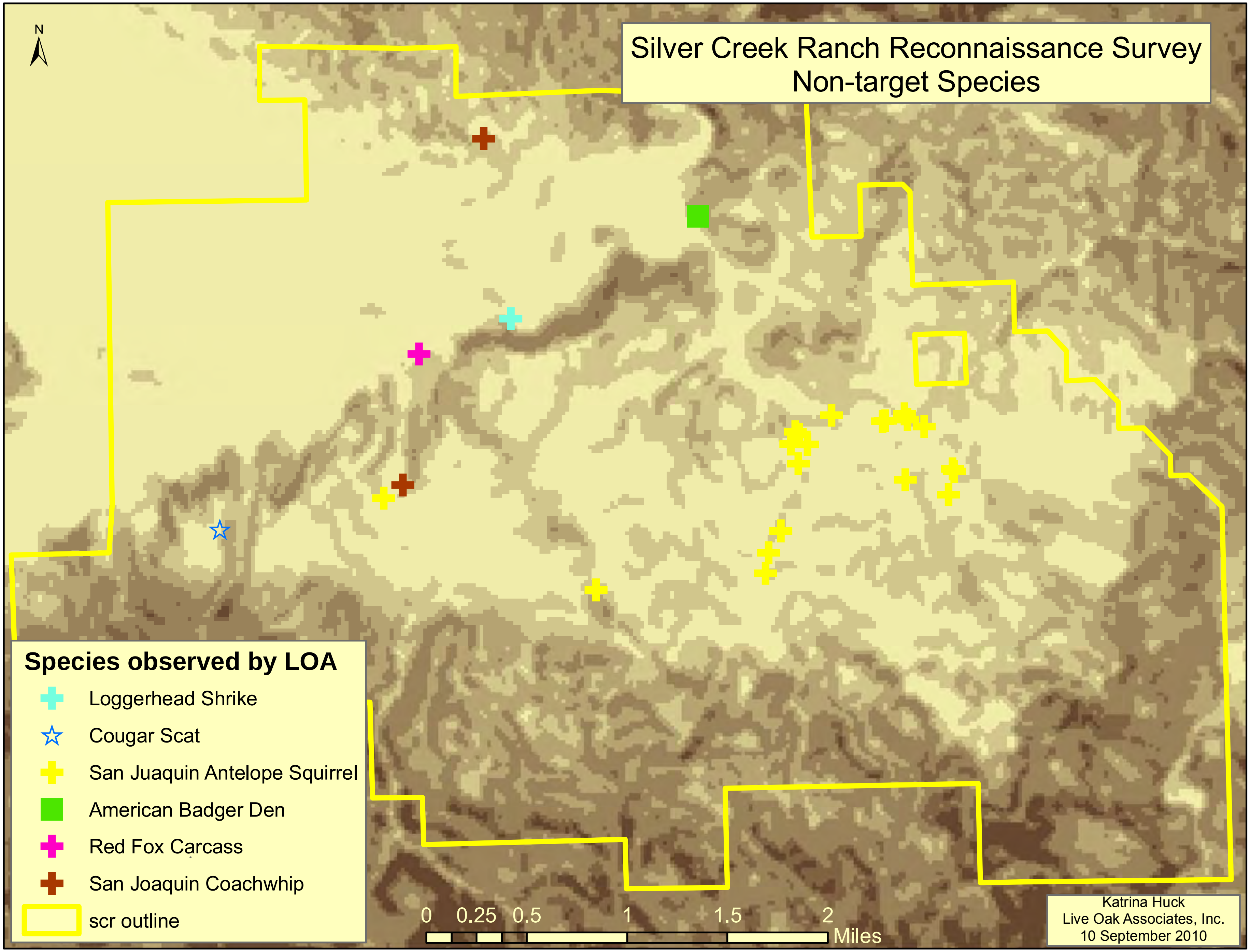
1 syn. *Yucca whipplei*
2 formerly included in family Liliaceae
3 syn. *Blepharizonia plumosa* ssp. *viscida*
4 syn. *Hemizonia kelloggii*
5 syn. *Lagophylla ramossissima* ssp. *ramosissima*
6 formerly included in family Hydrophyllaceae
7 syn. *Scirpus maritimus*
8 syn. *Scirpus americanus*
9 syn. *Scirpus pungens*
10 syn. *Eremocarpus setigerus*
11 syn. *Phoradendrom macrophyllum*


Silver Creek Ranch Reconnaissance Survey
Blunt-nosed Leopard Lizard
N
Blunt-nosed Leopard Lizard
Individual observed by LOA
blunt-nosed leopard lizard(CNDDB locations)
scr outline
0 0.25 0.5 1 1.5 2
Miles
Katrina Huck
Live Oak Associates, Inc.
10 September 2010

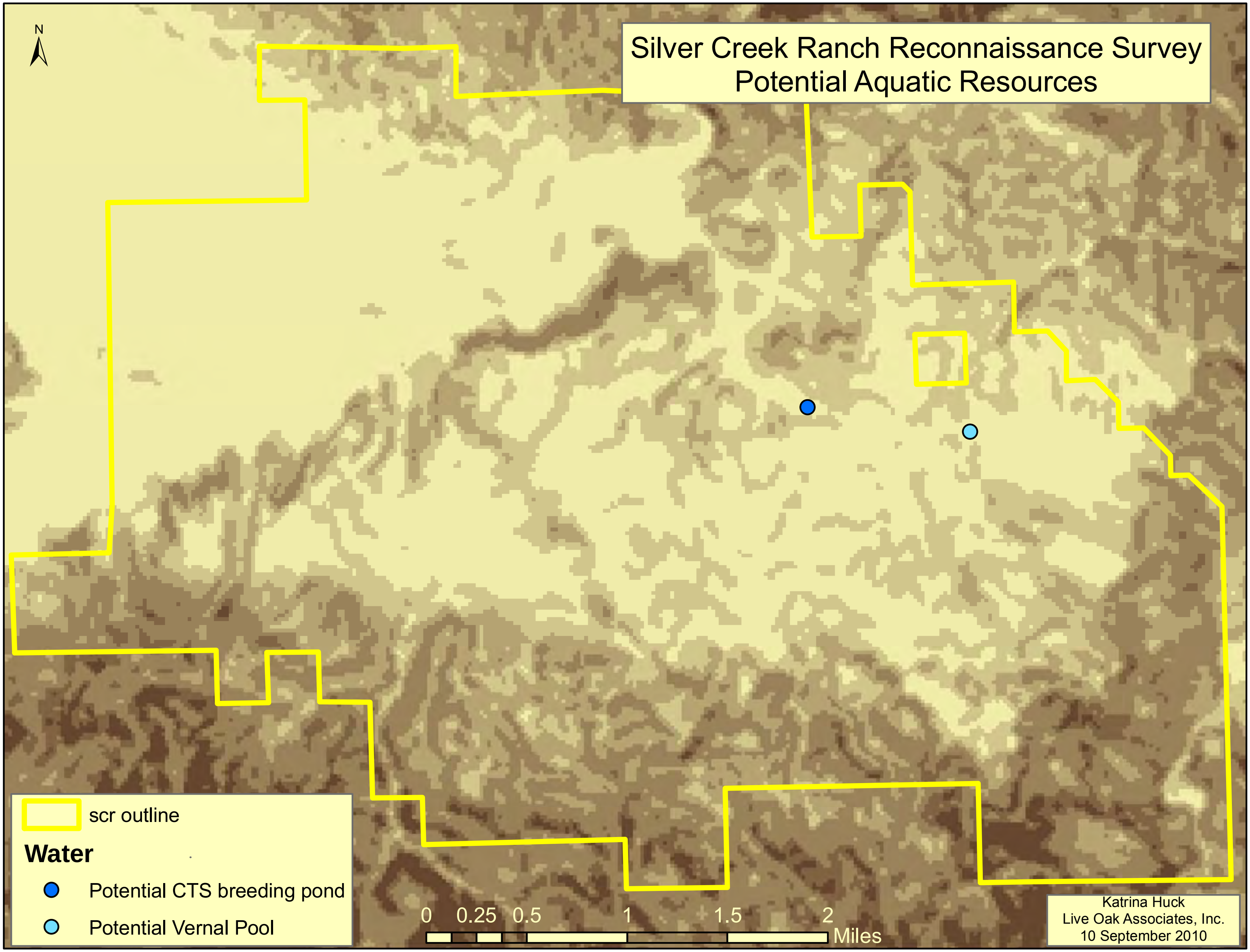


N
Silver Creek Ranch Reconnaissance Survey
Giant Kangaroo Rat
Giant Kangaroo Rat
GKR sign observed by LOA
giant kangaroo rat (CNDDB locations)
scr outline
0 0.25 0.5 1 1.5 2
Miles
Katrina Huck
Live Oak Associates, Inc.
10 September 2010


Silver Creek Ranch Reconnaissance Survey
San Joaquin Kit Fox
N
San Joaquin Kit Fox
Individual observed by LOA
Latrine observed by LOA
Potential den observed by LOA
Scat observed by LOA
Skull observed by LOA
SJKF den observed by LOA
San Joaquin kit fox (CNDDB locations)
scr outline
0 0.25 0.5 1 1.5 2
Miles
Katrina Huck
Live Oak Associates, Inc.
10 September 2010

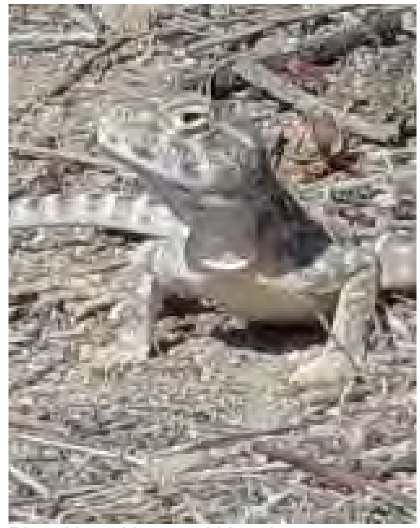


N
Silver Creek Ranch Reconnaissance Survey
Non-target Species
Species observed by LOA
Loggerhead Shrike
Cougar Scat
San Juaquin Antelope Squirrel
American Badger Den
Red Fox Carcass
San Joaquin Coachwhip
scr outline
0 0.25 0.5 1 1.5 2
Miles
Katrina Huck
Live Oak Associates, Inc.
10 September 2010


Silver Creek Ranch Reconnaissance Survey
Potential Aquatic Resources
N
scr outline
Water
Potential CTS breeding pond
Potential Vernal Pool
0 0.25 0.5 1 1.5 2
Miles
Katrina Huck
Live Oak Associates, Inc.
10 September 2010

U.S. Fish & Wildlife Service
Sacramento Fish & Wildlife Office
Species Account
BLUNT-NOSED LEOPARD LIZARD
Gambelia sila

CLASSIFICATION: Endangered
Federal Register 32:4001; March 11, 1967
http://ecos.fws.gov/docs/federal_register/fr18.pdf (PDF)
The blunt-nosed leopard lizard was listed as *Crotaphytus wislizenii silus*. In 1975, it was moved to the genus *Gambelia* as a full species, *Gambelia silus*. More recently, the *specific* name was changed to *sila* to match the gender of the genera name.


Blunt-Nosed Leopard Lizard
Adam Zerrenner, USFWS

STATE LISTING STATUS: The blunt-nosed leopard lizard was listed as endangered by the State of California in 1971.

CRITICAL HABITAT: None designated

RECOVERY PLAN: Final
Recovery plan for the upland species of the San Joaquin Valley, California
http://ecos.fws.gov/docs/recovery_plan/980930a.pdf (PDF)

5-year review: Completed February 2010. No change was recommended.
http://www.fws.gov/ecos/ajax/docs/five_year_review/doc3209.pdf (1 MB)
September 30. 1998

DESCRIPTION:

The blunt-nosed leopard lizard (Gambelia silus) is a relatively large lizard the Iguanidae family. It has a long, regenerative tail, long, powerful hind limbs, and a short, blunt snout. Adult males are slightly larger than females, ranging in size from 3.4 to 4.7 inches in length, excluding tail. Females are 3.4 to 4.4 inches long. Males weigh 1.3 to 1.5 ounces, females 0.8 to 1.2.

Blunt-nosed leopard lizards feed primarily on insects (particularly grasshoppers, crickets and moths), other lizards and occasionally plant material.

Although blunt-nosed leopard lizards are darker than other leopard lizards, they exhibit tremendous variation in color and pattern on their backs. Their background color ranges from yellowish or light gray-brown to dark brown, depending on the surrounding soil color and vegetation. Their undersides are uniformly white. They have rows of dark spots across their backs, alternating with white, cream-colored or yellow bands. See the Recovery Plan for more details about identification.

Males are highly combative in establishing and maintaining territories. Male and female home ranges often overlap. The mean home range size varies from 0.25 to 2.7 acres for females and 0.52 to 4.2 acres for males. Density estimates range from 0.1 to 4.2 lizards per acre. Population densities in marginal habitat generally do not exceed 0.2 blunt-nosed leopard lizards per acre. There are no current overall population size estimates for the species.

Breeding activity begins within a month of emergence from dormancy and lasts from the end of April to the end of June. Male territories may overlap those of several females, and a given male may mate with several females. Two to six eggs are laid in June and July, and their numbers are correlated with the size of the female. Under adverse conditions, egg-laying may be delayed one or two months, or reproduction may not occur at all.

Females typically produce only one clutch of eggs per year. But some may produce three or more under favorable environmental conditions. After about two months of incubation, young hatch from late July through early August, rarely to September.

Seasonal above ground activity is correlated with weather conditions, primarily temperature. Lizards are most active on the surface when air temperatures are between 74° and 104° F, with surface soil temperatures between 72° and 97°. Smaller lizards and young have a wider activity range than the adults.

Leopard lizards use small rodent burrows for shelter from predators and temperature extremes. Burrows are usually abandoned ground squirrel tunnels, or occupied or abandoned kangaroo rat tunnels. Each lizard uses several burrows without preference, but will avoid those occupied by predators or other leopard lizards. In areas of low mammal burrow density, lizards will construct shallow, simple tunnels in earth berms or under rocks.

Potential predators are numerous. They include snakes, predatory birds and most carnivorous valley mammals. Blunt-nosed leopard lizards themselves feed primarily on insects (mostly grasshoppers, crickets and moths) and other lizards.

DISTRIBUTION:

This species is found only in the San Joaquin Valley and adjacent foothills, as well as the Carrizo Plain and Cuyama Valley. It inhabits open, sparsely vegetated areas of low relief on the valley floor and the surrounding foothills. It also inhabits alkali playa and valley saltbush scrub. In general, it is absent from areas of steep slope, dense vegetation, or areas subject to seasonal flooding.

Although the boundaries of its original distribution are uncertain, the species probably ranged from Stanislaus County in the north to the Tehachapi Mountains of Kern County in the south, and from the Coast Range mountains, Carrizo Plain and Cuyama Valley in the west to the foothills of the Sierra Nevada in the east.

The currently occupied range consists of scattered parcels of undeveloped land on the Valley floor, most commonly annual grassland and valley sink scrub. See 5-year review (above) for details.

THREATS:

Habitat disturbance, destruction and fragmentation continue as the greatest threats to blunt-nosed leopard lizard populations. Stebbins first recognized, in 1954, that agricultural conversion of its habitat was causing the extirpation of the blunt-nosed leopard lizard.

Livestock grazing can result in removal of herbaceous vegetation and shrub cover and destruction of rodent burrows used by lizards for shelter. However, light or moderate grazing may be beneficial, unlike cultivation of row crops, which precludes use by leopard lizards.

Direct mortality occurs when animals are killed in their burrows during construction, killed by vehicle traffic, drowned in oil, or fall into excavated areas from which they are unable to escape. Displaced lizards may be unable to survive in adjacent habitat if it is already occupied or unsuitable for colonization.

The use of pesticides may directly and indirectly affect blunt-nosed leopard lizards. The insecticide Malathion has been used since 1969 to control the beet leafhopper, and its use may reduce insect prey populations. Fumigants, such as methyl bromide, are used to control ground squirrels. Because leopard lizards often inhabit ground squirrel burrows, they may be inadvertently poisoned. Visit the California Dept. of Pesticide Regulation Endangered Species Project web page for more information.

Cultivation, petroleum and mineral extraction, pesticide applications, off-road vehicle use, and construction of transportation, communication, and irrigation infrastructures collectively have caused the reduction, fragmentation of populations and decline of blunt-nosed leopard lizards.

REFERENCES FOR ADDITIONAL INFORMATION:

Montanucci, R.R. 1970. Analysis of hybridization between *Crotaphytus wislizenii* and *Crotaphytus silus* (Sauria: Iguanidae) in California. Copeia 1970:104-123.

Montanucci, R.R., R.W. Axtell, and H.C. Dessauer. 1975. Evolutionary divergence among collared lizards (*Crotphytus*), with comments on the status of *Gambelia*. Herpetologica 31:336-347.

Stebbins, R.C. 1954. Amphibians and reptiles of western North America. McGraw-Hill Book Co., Inc., NY.

Thelander, C. ed. 1994. Life on the edge: a guide to California's endangered natural resources. BioSystem Books. Santa Cruz, CA. p 272-273.

Photo Credit: Adam Zerrenner, U.S. Fish & Wildlife Service. Public domain.

Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825
Phone (916) 414-6600
FAX (916) 414-6713

Last updated: May 28, 2010

Blunt-nosed leopard lizard
(*Gambelia sila*)

5-Year Review:
Summary and Evaluation

T. Kuhn, U.S. Fish and Wildlife Service 2009

U.S. Fish and Wildlife Service
Sacramento Fish and Wildlife Office
Sacramento, California
February 2010

5-YEAR REVIEW

Blunt-nosed leopard lizard
(*Gambelia sila*)

I. GENERAL INFORMATION

Purpose of 5-Year Reviews:

The U.S. Fish and Wildlife Service (Service) is required by section 4(c)(2) of the Endangered Species Act (Act) to conduct a status review of each listed species at least once every 5 years. The purpose of a 5-year review is to evaluate whether or not the species' status has changed since it was listed (or since the most recent 5-year review). Based on the 5-year review, we recommend whether the species should be removed from the list of endangered and threatened species, be changed in status from endangered to threatened, or be changed in status from threatened to endangered. The blunt-nosed leopard lizard was listed as endangered under the Endangered Species Preservation Act in 1967, and was not subject to the current listing processes and, therefore, did not include an analysis of threats to the lizard. However, a review of Federal and State agency materials and scientific publications written at or near the time of listing indicates that listing was in fact based on the existence of threats that would be attributable to one or more of the five threat factors described in section 4(a)(1) of the Act, and we must consider these same five factors in any subsequent consideration of reclassification or delisting of a species. In the 5-year review, we consider the best available scientific and commercial data on the species, and focus on new information available since the species was listed or last reviewed. If we recommend a change in listing status based on the results of the 5-year review, we must propose to do so through a separate rule-making process defined in the Act that includes public review and comment.

Species Overview

The blunt-nosed leopard lizard is endemic to the San Joaquin Valley of central California (Stejneger 1893; Smith 1946; Montanucci 1965, 1970; Tollestrup 1979a). This species typically inhabits open, sparsely vegetated areas of low relief on the San Joaquin Valley floor and in the surrounding foothills (Smith 1946; Montanucci 1965). Holland (1986) described the vegetative communities that blunt-nosed leopard lizards are most commonly found in as Nonnative Grassland and Valley Sink Scrub communities. Other suitable habitat types on the Valley floor for this species include Valley Needlegrass Grassland (Holland 1986), Alkali Playa (Holland 1986), and Atriplex Grassland (Tollestrup 1976).

The species is a relatively large lizard in the Iguanidae family with a long, regenerative tail; long, powerful hind limbs; and a short, blunt snout (Smith 1946; Stebbins 1985). Though their under surface is uniformly white, the species exhibits tremendous variation in color and pattern on the back (Tanner and Banta 1963; Montanucci 1965, 1970), ranging from yellowish or light gray-brown to dark brown. Males are typically larger and weigh more than females; adults range in size from 3.4 to 4.7 inches (Tollestrup 1982) and weigh between 0.8 and 1.5 ounces (Uptain *et al.* 1985). Blunt-nosed leopard lizards use small rodent burrows for shelter from predators and temperature extremes (Tollestrup 1979b). Burrows are usually abandoned ground squirrel

(*Spermophilus beecheyi*) tunnels, or occupied or abandoned kangaroo rat tunnels (*Dipodomys* spp.) (Montanucci 1965). Each lizard uses several burrows without preference, but will avoid those occupied by predators or other leopard lizards. Montanucci (1965) found that in areas of low mammal burrow density, lizards would construct shallow, simple tunnels in earth berms or under rocks. Blunt-nosed leopard lizards feed primarily on insects (mostly grasshoppers, crickets, and moths) and other lizards, although some plant material is rarely eaten or, perhaps, unintentionally consumed with animal prey. They appear to feed opportunistically on animals, eating whatever is available in the size range they can overcome and swallow.

I.A. Methodology used to complete the review: This review was prepared by a staff biologist for the Sacramento Fish and Wildlife Office (Service). This review is based on the *Recovery Plan for the Blunt-Nosed Leopard Lizard* (Service 1980), the *Revised Blunt-Nosed Leopard Lizard Recovery Plan* (Service 1985), the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Recovery Plan) (Service 1998), as well as published literature, agency reports, biological opinions, completed and draft Habitat Conservation Plans (HCPs), unpublished data, and interviews with species experts. No previous status reviews for this species have been conducted. Due to the lack of a threats analysis within the 1967 listing (32 **FR** 4001), this 5-year review contains updated information on the species' biology and threats, and an assessment of that information since the time that 1980 Recovery Plan was drafted. We focus on current threats to the species that are attributable to the Act's five listing factors. The review synthesizes this available information to evaluate the listing status of the species and provide an indication of its progress towards recovery. Finally, based on this synthesis and the threats identified in the five-factor analysis, we recommend a prioritized list of conservation actions to be completed or initiated within the next 5 years.

I.B. Contacts

Lead Regional Office –Diane Elam, Deputy Division Chief for Listing, Recovery and Habitat Conservation Planning, Region 8, Pacific Southwest Regional Office, (916) 414-6464

Lead Field Office – Kirsten Tarp, Recovery Branch, Sacramento Fish and Wildlife Office, Region 8, (916) 414-6600

Cooperating Field Office: Mike McCrary, Ventura Fish and Wildlife Office, Region 8, (805) 644-1766

I.C. Background

I.C.1. FR Notice citation announcing initiation of this review: 71 **FR** 16584, April 3, 2006. We did not receive any information in response to our request for information.

I.C.2. Listing history

Original Listing
FR notice: 32 **FR** 4001
Date listed: March 11, 1967*
Entity listed: Species – Blunt-nosed leopard lizard (*Crotaphytus wislizenii silus*)
Classification: Endangered
*Note: Listing documents at this time did not use the 5 factor analysis method, and did not provide discussion of status and threats.

I.C.3. Species' Recovery Priority Number at start of review: 2C

The Recovery Priority Number for the blunt-nosed leopard lizard is 2C. This Number reflects a high degree of threat, a high recovery potential, and a taxonomic rank of full species (Service 1983). The ―C" indicates conflict with construction or other development projects or other forms of economic activity. This determination results from continued degradation and fragmentation of its habitat, perceived and realized threats to extant populations, and the potential for recovery of the species.

I.C.4. Recovery Plan or Outline

Name of plan:	Recovery Plan for Upland Species of the San Joaquin Valley, California
Date issued:	September 30, 1998
Dates of Previous Revisions:	Recovery Plan Blunt-Nosed Leopard Lizard (Service 1980), and Revised Blunt-Nosed Leopard Lizard Recovery Plan (Service 1985)

II. REVIEW ANALYSIS

II.A. Application of the 1996 Distinct Population Segment (DPS) policy

II.A.1. Is the species under review listed as a DPS?

____ ***Yes***
__X_ ***No***

II.A.2. Is there relevant new information for this species regarding the application of the DPS policy?

____ ***Yes***
__X_ ***No***

II.B. Recovery Criteria

II.B.1. Does the species have a final, approved recovery plan containing objective, measurable criteria?

__X_ ***Yes***
_____ ***No***

II.B.2. Adequacy of recovery criteria.

II.B.2.a. Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat?

__X_ ***Yes***
_____ ***No***

II.B.2.b. Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and is there no new information to consider regarding existing or new threats)?

_____ ***Yes***
__X__ **No**

II.B.3. List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information. For threats-related recovery criteria, please note which of the 5 listing factors[*] are addressed by that criterion.

The downlisting and delisting criteria for the blunt-nosed leopard lizard in the Recovery Plan are described below. Listing Factor B is not considered relevant to this species.

Downlisting Criteria
Reclassification to threatened status should be evaluated when the species is protected in specified recovery areas from incompatible uses, management plans have been approved and implemented for recovery areas that include survival of the species as an objective, and population monitoring indicates that the species is stable. Downlisting criteria include:

1) *Protection of five or more areas, each about 5,997 acres or more of contiguous, occupied habitat, including one each on (addresses Listing Factor A):*
    A) *Valley floor in Merced or Madera Counties;*
    B) *Valley floor in Tulare or Kern Counties;*
    C) *Foothills of the Ciervo-Panoche Natural Area;*

A) Present or threatened destruction, modification or curtailment of its habitat or range;
B) Overutilization for commercial, recreational, scientific, or educational purposes;
C) Disease or predation;
D) Inadequacy of existing regulatory mechanisms;
E) Other natural or manmade factors affecting its continued existence.

D) *Foothills of western Kern County; and*
E) *Foothills of the Carrizo Plain Natural Area.*

2) *Management Plan approved and implemented for all protected areas identified as important to the continued survival of blunt-nosed leopard lizard that includes survival of the species as an objective (addresses Listing Factor C and E).*
3) *Each protected area has a mean density of 2 or more blunt-nosed leopard lizards 1 per acre through one precipitation cycle (addresses Listing Factor E).*

A brief discussion of each downlisting criterion for the blunt-nosed leopard lizard is presented in the text below, and further abbreviated in Table 1. Appendix A presents detailed information used for analysis of these downlisting criteria in this review, including the level of protection for each of the recovery areas, land management plan status for these areas, and the mean density and stability of blunt-nosed leopard lizard populations. Figures 1 and 2 illustrate the location of known blunt-nosed leopard lizard occurrences reported in the California Department of Fish and Game (CDFG) California Natural Diversity Database (CNDDB) (CNDDB 2006) and the location of large preserves within the range of the blunt-nosed leopard lizard.

1. *Protection of five or more areas, each about 5,997 acres or more of contiguous, occupied habitat, as follows:*

The downlisting criteria for the blunt-nosed leopard lizard require the protection of five or more areas each of about 5,997 acres or more of contiguous, occupied habitat, including one each in the following areas: the Valley floor in Merced or Madera Counties, the Valley floor in Tulare or Kern Counties, the foothills of the Ciervo-Panoche Natural Area, the foothills of western Kern County, and the foothills of the Carrizo Plain Natural Area (Figures 1 and 2). Only in the foothills of the Carrizo Plain Natural Area is the criterion achieved with the protection of 55,000 acres of blunt-nosed leopard lizard habitat by the Carrizo Plain National Monument. There are no preserves containing significant populations of blunt-nosed leopard lizard on the Valley floor in Merced or Madera Counties. Within the Valley floor in Tulare or Kern Counties, the Semitropic Ridge Preserve approaches the criterion by protecting 5,278 acres of contiguous blunt-nosed leopard lizard habitat. Pixley NWR protects 3,000 acres of contiguous habitat in Tulare County. The Lokern Natural Area protects over 13,000 acres in Kern County but in fragmented 10 to 640-acre parcels. Within the Ciervo-Panoche Natural Area, two Areas of Critical Environmental Concern (ACEC), separated by 2 miles, protect 4,800 acres and 3,800 acres of contiguous blunt-nosed leopard lizard habitat, respectively. The ACEC designation is the highest level of protection that the BLM (under Federal Lands Policy and Management Act) can assign to an area; with this designation, the BLM is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, including fish and wildlife resources. Within the foothills of western Kern County, the Occidental Petroleum Ltd. (Oxy), conservation lands protect 2,882 acres of contiguous habitat on the North Flank of Elk Hills and 3,770 acres in Buena Vista Valley. Therefore, the recovery criterion for protection of 5,997 acres of contiguous habitat is achieved in the foothills of the Carrizo Plain Natural Area, but not in the four other specified recovery areas.

Notably, through the development of a draft HCP for Chevron USA, Inc. (Chevron), lands in the *Lokern Natural Area*, and a draft HCP for Oxy of Elk Hills lands in the *Foothills of western Kern County*, the downlisting criterion is expected to also be met for these two areas in the foreseeable future. The draft Chevron Lokern HCP (G. Scott, Chevron, pers. comm. 2006) proposes to protect an additional 11,143 acres in the Lokern area. Thus, in total, approximately 24,303 acres of contiguous blunt-nosed leopard lizard habitat would be protected when added to the other already protected lands in the Lokern area. Similarly, the Oxy Elk Hills HCP (Live Oak & Associates, Inc., *in litt.* 2009) proposes to preserve roughly 38,780 acres of the Naval Petroleum Reserve-1 (NPR-1). Nonetheless, for the purposes of this review, until these HCPs are completed and an incidental take permit for the proposed activities is issued, the habitat protection associated with the proposed HCP remains uncertain.

2. *A management plan has been approved and implemented for all protected areas identified as important to the continued survival of blunt-nosed leopard lizard that includes survival of the species as an objective.*

The downlisting criteria also require that for each protected area a management plan is approved and implemented that includes the survival of blunt-nosed leopard lizard as an objective. The following areas have such management plans: Kern National Wildlife Refuge (NWR); Pixley NWR; the Center for Natural Lands Management (CNLM) lands at Semitropic Ridge Preserve; the CNLM, Plains Exploration & Production Company (PXP), and Bureau of Land Management (BLM) lands in the Lokern Natural Area; the Oxy conservation lands near Elk Hills; the BLM, the Nature Conservancy, and CDFG lands of the Carrizo Plain National Monument; the Coles Levee Ecological Preserve (CLEP); and Kern Water Bank (KWB) Conservation Lands. Whereas, management plans have not been developed for the remaining specified protected areas including: Merced and/or Madera Counties; CDFG lands on the *Semitropic Ridge Preserve;* CDFG and Oxy Lands (outside of the Elk Hills Conservation Area) on the Lokern Natural area; Ciervo-Panoche Natural Area; and, NPR-2. Notably, the management plans for the Carrizo Plain National Monument and the Ciervo-Panoche Natural Area are currently being revised by the BLM. Therefore, the downlisting criterion for the approval and implementation of management plans in all protected areas is partly achieved.

3. *Each protected area has a mean density of 2 or more blunt-nosed leopard lizards per hectare (1 per acre) through one precipitation cycle.*[1]

Long-term population studies have monitored the population trends in blunt-nosed leopard lizard at Elkhorn Plain (Germano *et al.* 2004; Germano and Williams 2005), Semitropic Ridge (Warrick 2006), Lokern (Germano *et al.* 2005; Warrick 2006), Elk Hills (Quad Knopf 2006), Pixley National Wildlife Refuge (NWR; Williams *in litt.* 2006), Buttonwillow Ecological Reserve (ER), Allensworth ER (Selmon *in litt.* 2006), and Coles Levee Ecosystem Preserve (Quad Knopf 2005). Long-term population studies have not been conducted for blunt-nosed leopard lizards in the Cuyama Valley, the Ciervo-Panoche Natural Area, Merced County, or Madera County, the status of these populations is unknown (Stafford *in litt.* 2006).

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[1] A precipitation cycle is defined in the Recovery Plan as a period when annual rainfall includes average to 35 percent above-average through greater than 35 percent below-average and back to average or greater.

Table 1. Summary display of each protected area specified in the Recovery Plan for the blunt-nosed leopard lizard and downlisting criteria.

Region	County	Protected Area	Downlisting Criteria 1 (Land Conservation)	Downlisting Criteria 2 (Management Plan for Species Conservation)	Downlisting Criteria 3 (Population Stability)	Comment
Valley Floor	Merced or Madera		Not Achieved (0 acres protected)	Not Achieved	Not Achieved	Large preserves have been designated in western Merced County (e.g. Grasslands Ecological Area, ~179,000 acres) but are seasonally flooded and do not support blunt-nosed leopard lizard (Juarez *in litt.* 2006)
	Kern and Tulare	*Semitropic Ridge Preserve*	Not Achieved (5,278 contiguous acres protected--3,093 acres CNLM; 2,185 acres CDFG)	Achieved on CNLM lands; Not Achieved on CDFG Lands	Not Achieved	Though only slightly less than the specified 5,997 acres of contiguous habitat, only about 1,500 acres of the area support 2 or more lizards per acre (Warrick *in litt.* 2006).
	Kern	*Kern National Wildlife Refuge*	Not Achieved (2,000 contiguous acres protected)	Achieved	Not Achieved	The majority this area is seasonally flooded, allowing for only roughly 2,000 acres of potential blunt-nosed leopard lizard habitat. No confirmed sightings of lizard have been reported in this area since 1996 (Williams *in litt.* 2006).
	Kern	*Lokern Natural Area*	Not Achieved (13,160 acres of highly fragmented land protected--includes 3,858 acres BLM, 3,332 acres CNLM, 968 acres CDFG, 840 acres Plains Exploration and Production (PXP), and 4,162 acres Occidental of Elk Hills (OXY)	Achieved on BLM, CNLM and PXP lands; Not Achieved on CDFG and Oxy Lands (outside of the Elk Hills Conservation Area)	Not Achieved	The largest contiguous block of habitat is ~2,882 acres. The draft Chevron Lokern HCP (Chevron, *in prep.* 2008) would protect an additional 11,143 acres, and result in ~24,303 acres of protected contiguous habitat in the area, if finalized.

Table 1 continued.

Region	County	Protected Area	Downlisting Criteria 1 (Land Conservation)	Downlisting Criteria 2 (Management Plan for Species Conservation)	Downlisting Criteria 3 (Population Stability)	Comment
Valley Floor	Kern	*Buttonwillow Ecological Reserve*	Not Achieved (1,350 contiguous acres protected)	Achieved	Not Achieved[1]	This area contains one of the largest and most stable populations on the Valley Floor (Selmon *in litt.* 2006).
	Kern	*CLEP, KWB Conservation Lands, Tule Elk State Reserve*	Not Achieved (11,291 acres protected--6,059-acre CLEP, 4,263-acre KWB Conservation Lands, and 969-acre Tule Elk State Reserve)	Achieved	Not Achieved	Although these Preserves are sizeable, habitat contiguity is limited by the California Aqueduct, Alejandro Canal, Interstate 5, Highway 43, and Highway 119
	Tulare	*Pixley National Wildlife Refuge*	Not Achieved (6,833 fragmented acres of protected land--principally comprised of 3 large blocks: 4,445, 1,476, and 800 acres)	Achieved	Not Achieved	
	Kern and Tulare	*Allensworth Ecological Reserve*	Not Achieved (5,243 fragmented acres of protected land--principally comprised of 4 large blocks: 2,482, 1,432, 551, and 536 acres.	Achieved	Not Achieved	Blunt-nosed leopard lizard population in this area has declined over the past 15 years (Selmon *in litt.* 2006); no updated data is available.

Table 1 continued.

Region	County	Protected Area	Downlisting Criteria 1 (Land Conservation)	Downlisting Criteria 2 (Management Plan for Species Conservation)	Downlisting Criteria 3 (Population Stability)	Comment
Foothills	San Benito and Fresno	Ciervo-Panoche Natural Area	Not Achieved (16,600 fragmented acres--the largest contiguous block is roughly 4,800 acres)	Not Achieved	Not Achieved	Much of this area is not suitable habitat due to dense vegetation and high clay soils (Lowe *in litt.* 2006; L. Saslaw, pers. comm. 2006); rather the remaining portions have been noted as some of the best habitat in the Region. However, most prime habitat remains unprotected on private lands. Only 3 of the 21 reported occurrences are within BLM ACEC (CNDDB 2006; Lowe *in litt.* 2006).
	Kern	*Elk Hills Conservation Area*	Not Achieved (7,932 fragmented acres--largest contiguous parcel is roughly 3,770 acres)	Achieved	Not Achieved	The Oxy Elk Hills HCP is in draft form; barring any substantive changes before completion, the HCP is expected to result in the preservation of roughly 38,780 acres of Elk Hills NPR-1 (Live Oak & Associates, *in litt.* 2009).
	Kern	*NPR-2*	Not Achieved (9,000 highly fragmented acres within NPR-2 and the adjacent Buena Vista Valley)	Not Achieved	Not Achieved	The Caliente Resource Management Plan is scheduled to be revised to include BLM lands within NPR-2.
	Kern	*Wind Wolves Preserve*	Not Achieved (2,000 contiguous acres protected)	Achieved	Not Achieved	Blunt-nosed leopard lizards have not been observed at the site since the early 1990s.

Table 1 continued.

Region	County	Protected Area	Downlisting Criteria 1 (Land Conservation)	Downlisting Criteria 2 (Management Plan for Species Conservation)	Downlisting Criteria 3 (Population Stability)	Comment
Foothills	San Luis Obispo	Carrizo Plain Natural Area	Achieved (~250,000 largely contiguous acres protected within the BLM National Monument and adjacent CDFG Ecological Reserve, and the Upper Cuyama Valley (Saslaw *in litt.* 2006).	Achieved	Not Achieved for Carrizo Plain Natural Area	The Resource Management Plan for these areas is currently being revised the BLM; though conserving listed species and habitat will continue to be a primary focus of the revisions.

NOTES: [1]Quantified population density estimates are not currently available for Buttonwillow ER due to a lack of surveys.

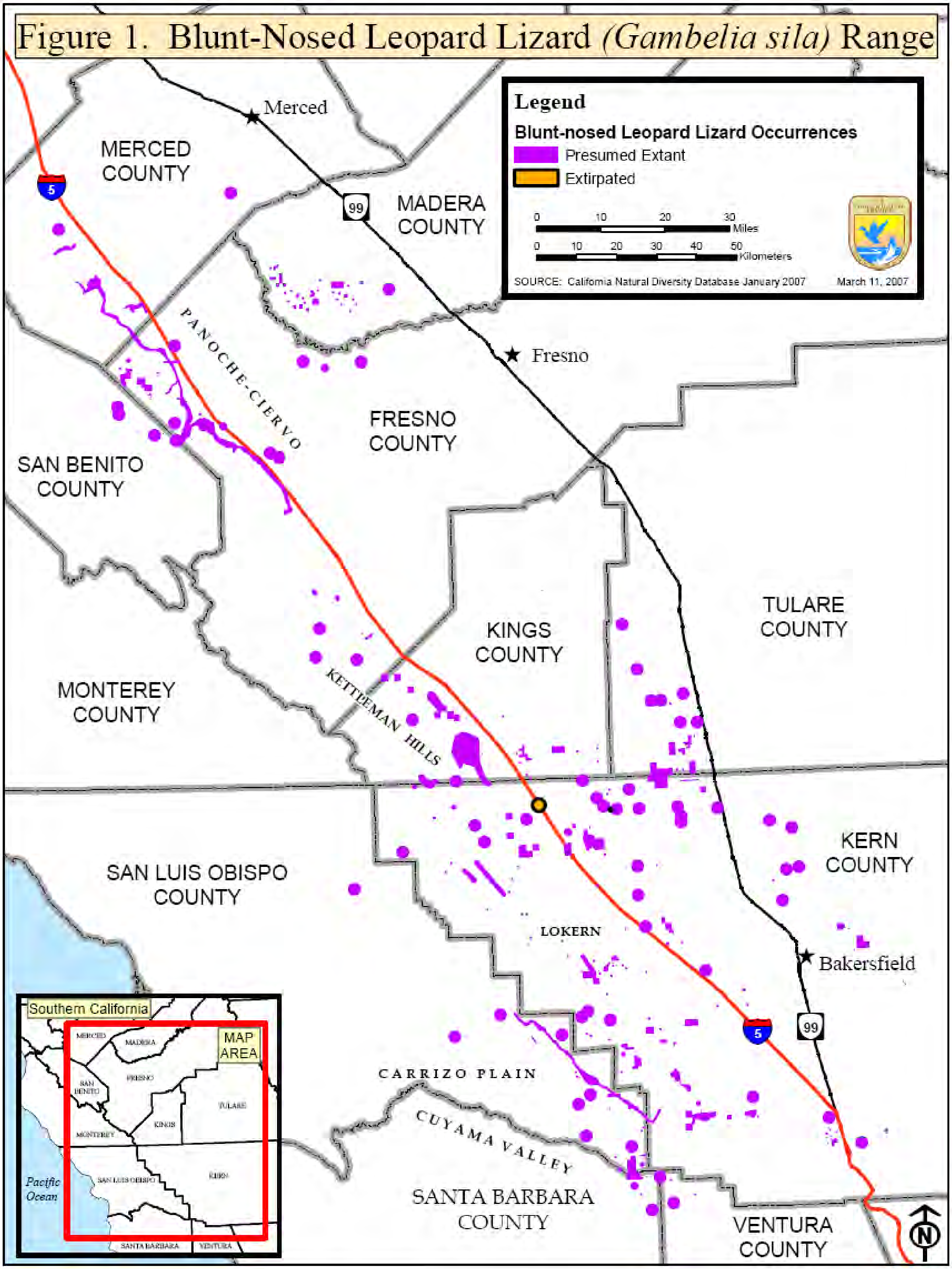

Figure 1. Blunt-Nosed Leopard Lizard (Gambelia sila) Range
Legend
Blunt-nosed Leopard Lizard Occurrences
Presumed Extant
Extirpated
0 10 20 30 Miles
0 10 20 30 40 50 Kilometers
SOURCE: California Natural Diversity Database January 2007
March 11, 2007
Merced
MERCED COUNTY
MADERA COUNTY
Fresno
FRESNO COUNTY
PANOCHE-CIERVO
SAN BENITO COUNTY
KINGS COUNTY
TULARE COUNTY
MONTEREY COUNTY
KETTLEMAN HILLS
KERN COUNTY
SAN LUIS OBISPO COUNTY
LOKERN
Bakersfield
CARRIZO PLAIN
CUYAMA VALLEY
SANTA BARBARA COUNTY
VENTURA COUNTY
Southern California
MAP AREA
Pacific Ocean
5
99
N

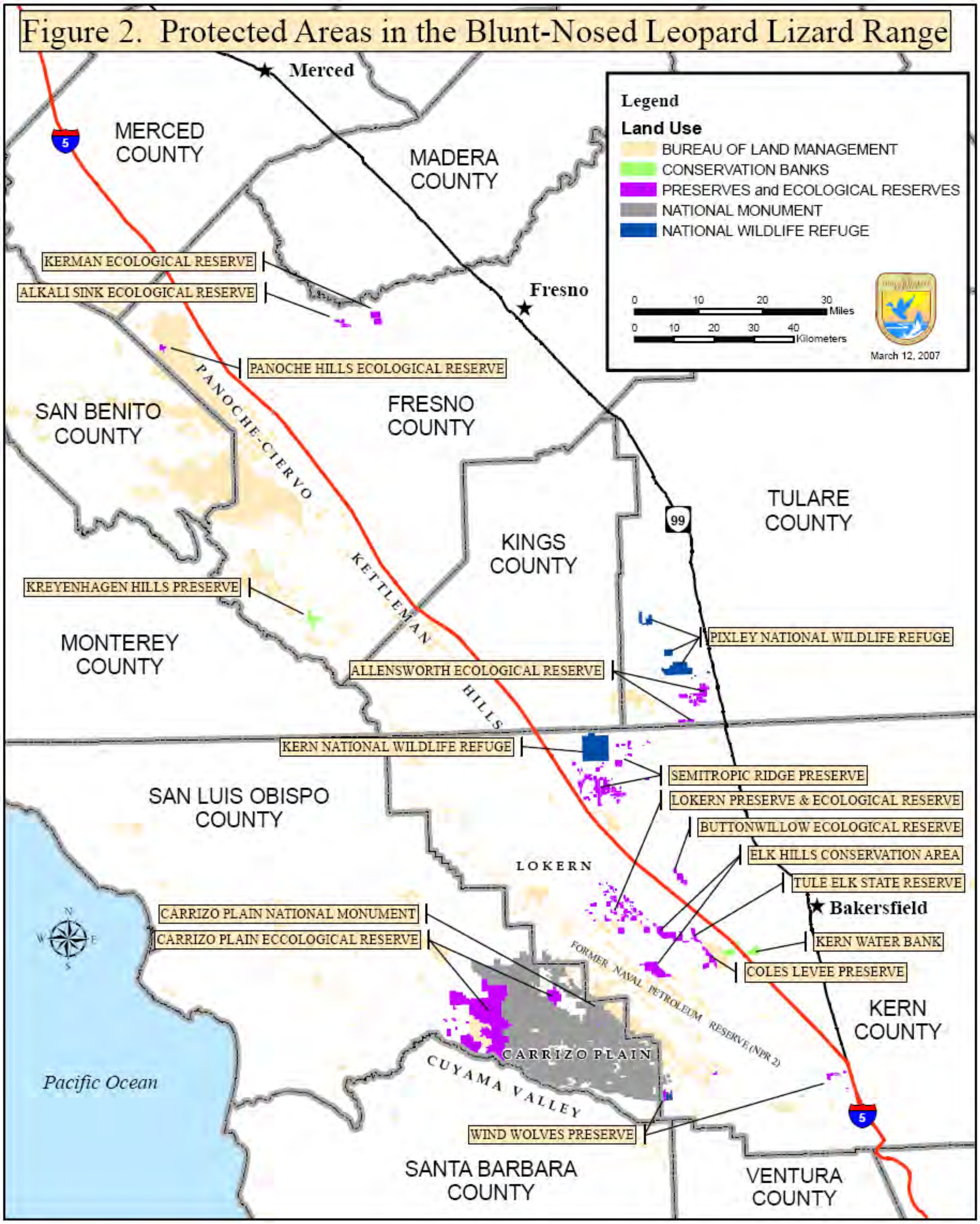

Figure 2. Protected Areas in the Blunt-Nosed Leopard Lizard Range
Merced
MERCED COUNTY
MADERA COUNTY
Legend
Land Use
BUREAU OF LAND MANAGEMENT
CONSERVATION BANKS
PRESERVES and ECOLOGICAL RESERVES
NATIONAL MONUMENT
NATIONAL WILDLIFE REFUGE
Miles
Kilometers
March 12, 2007
KERMAN ECOLOGICAL RESERVE
ALKALI SINK ECOLOGICAL RESERVE
Fresno
PANOCHE HILLS ECOLOGICAL RESERVE
SAN BENITO COUNTY
FRESNO COUNTY
PANOCHE-CIERVO
TULARE COUNTY
99
KINGS COUNTY
KETTLEMAN
KREYENHAGEN HILLS PRESERVE
MONTEREY COUNTY
PIXLEY NATIONAL WILDLIFE REFUGE
ALLENSWORTH ECOLOGICAL RESERVE
HILLS
KERN NATIONAL WILDLIFE REFUGE
SEMITROPIC RIDGE PRESERVE
SAN LUIS OBISPO COUNTY
LOKERN PRESERVE & ECOLOGICAL RESERVE
BUTTONWILLOW ECOLOGICAL RESERVE
ELK HILLS CONSERVATION AREA
LOKERN
TULE ELK STATE RESERVE
Bakersfield
CARRIZO PLAIN NATIONAL MONUMENT
CARRIZO PLAIN ECCOLOGICAL RESERVE
KERN WATER BANK
FORMER NAVAL PETROLEUM RESERVE (NPR 2)
COLES LEVEE PRESERVE
KERN COUNTY
CARRIZO PLAIN
CUYAMA VALLEY
Pacific Ocean
5
WIND WOLVES PRESERVE
SANTA BARBARA COUNTY
VENTURA COUNTY

Annual blunt-nosed leopard lizard surveys show that the population density decreased below 2 per hectare during the wet years in the late 1990s at Pixley NWR, while the density remains below 2 per hectare in the Lokern area, the Elk Hills, Coles Levee Ecosystem Preserve, and KWB Conservation Lands. Population density estimates at Semitropic Ridge Preserve were also well below 2 per hectare during spring road surveys in 2005. Elkhorn Plain, however, has been reported to have the highest abundance and density of blunt-nosed leopard lizards recorded in any area with densities up to 16 adults per hectare and 35.6 hatchlings per hectare (Germano and Williams 2005). Therefore, the downlisting criterion for population stability has not been achieved for any of the specified protected areas in the Recovery Plan.

Delisting Criteria

Delisting will be considered when, in addition to the criteria for downlisting, all of the following conditions have been met:

1) *Three additional areas with about 5,997 acres or more of contiguous, occupied habitat including:*
    - A) *One on the Valley floor;*
    - B) *One along the western Valley edge in Kings or Fresno Counties; and*
    - C) *One in the Upper Cuyama Valley of eastern San Luis Obispo and eastern Santa Barbara Counties.*
2) *A management plan has been approved and implemented for all protected areas identified as important to the continued survival of blunt-nosed leopard lizard that includes survival of the species as an objective.*
3) *Each protected area has a mean density of 2 or more blunt-nosed leopard lizards per hectare (1 per acre) through one precipitation cycle.*

Summary of Recovery Criteria

Due to the lack of protection of sufficient habitat in specified recovery areas, the lack of approval and implementation of management plans, and the lack of population stability, the downlisting criteria for blunt-nosed leopard lizard have not been met. Therefore, the delisting criteria for blunt-nosed leopard lizard have also not been met. The acreage of contiguous blunt-nosed leopard lizard habitat protected, adequacy of management plans, and population trends are discussed below for each of the recovery areas specified in the delisting criteria. None of the delisting recovery criteria for protection of habitat, approval and implementation of management plans (except for the Kettleman Hills ACEC), and population stability have been achieved for the specified areas: western Valley edge in Fresno or Kings Counties, Upper Cuyama Valley, and other Valley floor areas. Appendix A includes detailed information used for the analysis of the delisting criteria.

II.C. Updated Information and Current Species Status

Note this section typically includes updated information on species status since the time of listing. However, given the brevity of information included within the 1967 listing rule (Service 1967), and that no previous status reviews for this species have been conducted, the following update presents new information since the issuance of the *Recovery Plan for the Blunt-Nosed Leopard Lizard* (Service 1980).

II.C.1. Biology and Habitat

II.C.1.a. Abundance, population trends, spatial distribution, and biology

Abundance and Population Trend Surveys
Long-term localized population census and plot-based research studies have been conducted in areas on the Valley Floor (Pixley NWR and Lokern Natural Area) and Foothill Regions (Elk Hills Conservation Area, and Elkhorn Plain) in the southern Valley (see Table 2). As these surveys were conducted to achieve various goals and according to different methods, and given that they represent only a small proportion of the species range, they are not directly comparable. However, they provide some insight to abundance and population trends of this species in specific locations.

Long-term studies show blunt-nosed leopard lizard population instability, especially during years of above average precipitation (Germano *et al.* 2004; Germano *et al.* 2005; Germano and Williams 2005; Germano *in litt.* 2006; Williams *in litt.* 2006). The largest and most stable population of blunt-nosed leopard lizards on the Valley Floor is thought to be at Semitropic Ridge Preserve. However, the number of all lizards at Semitropic Ridge Preserve has been decreasing since 2003 for unknown reasons. Establishing corridors between existing natural areas on the Valley floor in Tulare and Kern Counties will be important for maintaining these populations (especially at the smaller Buttonwillow ER). Relocation of blunt-nosed leopard lizards to some areas such as Allensworth ER (where numbers have plummeted in the past 15 years) will also be necessary for persistence of the population (Selmon *in litt.* 2006). Based on population instability and on-going modification and conversion of existing habitat to agriculture, residential or commercial developments, and for petroleum and mineral extraction activities, overall species abundance is considered to be decreasing across its range.

Table 2. Blunt-nosed leopard lizard survey results for Valley Floor and Foothill Protection Areas; note the surveyed areas account for only a small portion of the species range.

County	Survey Location	Duration of Study	Survey Results (interannual trends)	Comments	Source
Valley Floor					
Tulare	Pixley NWR	1993-2006	Decline	Population fluctuations seemed to be negatively correlated with annual precipitation	Williams *in litt.* 2006
Kern	Lokern Natural Area	1997-2005	Variable	Methods included ten-day census surveys of four grazed and four non-grazed plots; more individuals observed in grazed plots than ungrazed in all but one year	Germano *et al.* 2005
Foothill					
Kern	Elk Hills Conservation Area (Oxy conservation lands--North Flank of the Elk Hills, and Buena Vista Valley)	2000-2005	Increase	Combined road and foot surveys	Quad Knopf 2006
Kern	Elkhorn Plain	1988-2003	Variable	One grazed and one non-grazed plot	Williams *et al.* 1993; Germano and Williams 2005

Spatial Distribution (Current Range)

Historically, blunt-nosed leopard lizards occurred in arid lands throughout much of the San Joaquin Valley and adjacent foothills, ranging from San Joaquin County in the north, to the Tehachapi Mountains in the south, as well as in the Carrizo Plain and Cuyama Valley (Montanucci 1965; Germano and Williams 1992a; McGuire 1996). At the time of listing, the blunt-nosed leopard lizard was found in scattered locations in San Joaquin Valley, in the foothills of Tulare and Kern Counties and up the eastern portions of the Coast Range foothills; Fresno, Kern, Madera, Merced, San Luis Obispo and Tulare Counties (Stebbins 1954, and California Department of Fish and Game 1972 as reported in BLM 1972). Due to widespread agricultural development of natural habitat in the San Joaquin Valley, the current distribution of blunt-nosed leopard lizards is restricted to less than 15 percent of its historic range (Germano and Williams

1992a; Jennings 1995). In the remaining habitat that exists, blunt-nosed leopard lizards occur in alkali sink scrub, saltbush scrub, as well as native and nonnative grasslands on the Valley floor and in the surrounding foothills areas (Montanucci 1965; Germano *et al.* 2001; Stebbins 2003).

Although the blunt-nosed leopard lizard has been listed as endangered for nearly 40 years, there has never been a comprehensive survey of the species entire historical range; thus, any changes in the range of the species from the time of listing are currently unknown. It has been reported that the contemporary range of blunt-nosed leopard lizards was confined to a few areas scattered from southern Merced County to southern Kern County, between elevations of 100-2,400 feet (Tollestrup 1979a). However, as reported in the Recovery Plan (Service 1998), blunt-nosed leopard lizards have been found near Firebaugh and Madera (Williams 1990), Ciervo, Tumey, Panoche Hills, Anticline Ridge, Pleasant Valley, Lone Tree, Sandy Mush Road, Whimesbridge, Horse Pasture, and Kettleman Hills Essential Habitat Areas (CDFG 1985). Also, as recently as May 2009, the Endangered Species Recovery Program (ESRP) of California State University, Stanislaus, reported that blunt-nosed leopard lizards had been observed on the Madera Ranch in western Madera County from surveys conducted for the Madera Irrigation District (Kelly *et al.* 2009).

Biology

Microhabitat use and home range characteristics of blunt-nosed leopard lizards were compared at two sites near Elk Hills in Buena Vista Valley that differed in ground cover (Warrick *et al.* 1998). These authors reported that blunt-nosed leopard lizard microhabitat use differed significantly between the two study sites. At the more densely vegetated site, blunt-nosed leopard lizards used dry wash areas significantly more than grassland, floodplain, and road habitats. Conversely, at the more sparsely vegetated site, grassland was used more than wash habitat, and hills were used less than all other habitats.

Warrick *et al.* (1998) also compared home range size, core area size, and amount of overlap of ranges between the sites. The average male home range size was 10.48 acres, and the average female home range size was 4.99 acres. Female home ranges and core areas were overlapped extensively by male ranges at an average of 79.8 percent and 50.3 percent, respectively. Female home ranges were found to overlap the ranges of up to four other males, but were not observed to overlap with other females.

The span of seasonal activity for both adults and hatchlings described in the Recovery Plan Results was corroborated by results of a two-plot study on the Elkhorn Plain (Germano and Williams 2005). This study further postulated that activity levels can be strongly affected by environmental factors—temperature, precipitation and vegetation characteristics. These factors affect lizard behavior by effecting thermoregulation, metabolism, prey densities, and predatory success or mobility. For example, these authors reported that activity was completely absent for 21 months from July 1989 until April 1991 when individuals remained below ground due to dry conditions. In spite of this anomaly, Germano *et al.* (2004) supported the capacity of a 10-day survey to detect the blunt-nosed leopard lizard presence during typical environmental conditions compared to full-season surveys ($r^2 = 0.96$ for adults, $r^2 = 0.99$ for hatchlings/juveniles). Notably CDFG's standardized protocol survey methods (CDFG 2004) require a minimum of 12 days of surveys to assess presence/absence for new ground disturbance during specific ambient air and ground temperature conditions.

Germano and Williams (2005) also compared data from the Elkhorn Plain study to data previously collected in Valley floor habitat and noted the following differences in behavior among the two regions. On the Elkhorn Plain, females were generally gravid by late April or early May, while some females were found with eggs in early July. Clutch size on the Elkhorn Plain ranged from 1 to 6 eggs, with a mean clutch size of 3.4 eggs (varying from 3.1 to 3.8 yearly). Many females produced multiple clutches in a year with up to four clutches observed in a single female. On Valley floor sites, clutch size ranged from 2 to 5 eggs with a mean of 2.9 to 3.3 eggs per clutch, and only a few females produced a second clutch (Montanucci 1967; Tollestrup 1982). The greater clutch size and greater frequency of multiple clutches observed on the Elkhorn Plain compared to the Valley floor was attributed to greater prey abundance with the irruptive population growth of grasshoppers in 1992 (Germano and Williams 2005).

II.C.1.b. Genetics, genetic variation, or trends in genetic variation

Gambelia sila and *G. wislizenii* from the San Joaquin Valley and Mojave Desert, respectively, hybridize in the upper Cuyama Valley near the Santa Barbara – San Luis Obispo County line (Montanucci 1978; Slack 2002). The greatest heterogeneity in color pattern and morphology is concentrated near Ballinger Canyon, with most of the *sila*-like lizards occurring to the north and *wislizenii*-like lizards to the south. The leopard lizard hybrid zone covers about 200 acres in Los Padres National Forest and is associated with an ecotone between *Stipa-Atriplex* grasslands and *Pinus-Juniperus-Artemisia* Great Basin shrub desert (Slack 2002). Most evidence shows that natural selection is opposing the production of hybrids between the two forms of leopard lizards. The intermediate phenotypes have a lower fitness than those approaching the parental species (Montanucci 1978). The hybridization likely began 20,000 years ago when the ranges of the two species overlapped in the vicinity of Ballinger Canyon. Climatic changes since then have resulted in the isolation of the hybrid population (Montanucci 1979). Thus, though not currently protected, the hybrid population is at risk of extinction due to the degradation of its habitat by heavy off-road vehicle (ORV) use, the conversion of 95 percent of its habitat into alfalfa fields, and the construction of roads and oil development activities (Montagne 1979; Slack 2002; Stafford *in litt.* 2006).

II.C.1.c. Taxonomic classification or changes in nomenclature

The blunt-nosed leopard lizard was federally listed in 1967 as *Crotaphytus wislizenii silus* (Service 1967). At the time of listing (Service 1967), this species was named *Crotaphytus silus*, according to Stejneger (1890) first description and nomenclature of the species. However, the precise taxonomic split between the collared and leopard lizard remained largely in debate until Montanucci (1970) argued for specific status based upon the study of hybrids between the long-nosed and blunt-nosed leopard lizards. The taxonomic debate was resolved when Montanucci (1970) separated the genera *Gambelia* from *Crotaphytus*, resulting in the generic epithet name *Gambelia silus* for the blunt-nosed leopard lizard. Montanucci *et al.* (1975) separated all leopard lizards from collared lizards, placing both *silus* and *wislizenii* into the genus *Gambelia* at full species status. Most recently, the specific spelling was changed to *sila* such that its gender agreed with the genera name *Gambelia* (Frost and Collins 1988; Collins 1990; Germano and Williams 1992b).

II.C.2. Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

The following five-factor analysis describes and evaluates the threats attributable to one or more of the five listing factors outlined in section 4(a)(1) of the Act. The final ruling to list the blunt-nosed leopard lizard as endangered did not include a discussion of the threats to the lizard. The Service is using reports from the California Department of Fish and Game (Laughrin 1970; Morrell 1972, 1975), and the 1980 *Recovery plan for the blunt-nosed leopard lizard* to address threats that affected the lizard at the time of its listing.

II.C.2.a. Factor A, Present or threatened destruction, modification or curtailment of its habitat or range

This section summarizes the threats included under Factor A, and also covers the conservation efforts implemented to reduce threats over the known range of the blunt-nosed leopard lizard. At the time that the blunt-nosed leopard lizard was listed, the conversion of native habitat to agriculture was considered to be the primary threat to species. Additional threats to the blunt-nosed leopard lizard included habitat fragmentation, mineral development (primarily for oil and gas extraction), inappropriate grazing levels, and agricultural pest control, primarily spraying for the beet leafhopper (Montanucci 1965).

Past research on this species reported that collective habitat loss has caused the reduction and fragmentation of populations and decline of blunt-nosed leopard lizards (Stebbins 1954; Montanucci 1965; Service 1980, 1985; Germano and Williams 1993). Since listing, the Service has identified additional potential threats to the blunt-nosed leopard lizard including: landscape leveling and cultivation which caused habitat disturbance, destruction and fragmentation; grazing (under- or over-grazing); mineral development, primarily oil and gas extraction; and, agricultural pest control, primarily spraying for the beet leafhopper (Montanucci 1965). The 1998 Recovery Plan added mortality from vehicle-strikes with roadway traffic and/or ORV (discussed in Factor E) to the threat list.

The loss and modification of habitat due to agricultural conversion and urban development remain the largest threat to the blunt-nosed leopard lizard. Mineral exploration and extraction, and water banking activities also affect a significant portion of the blunt-nosed leopard lizards range. More recently the proposed siting of solar facilities in blunt-nosed leopard lizard habitat is an emerging threat that has the potential to substantially affect blunt-nosed leopard lizard. Specific information of these on-going and recent threats and habitat conservation activities are described in detail below.

Collective habitat loss has caused the reduction and fragmentation of populations and decline of blunt-nosed leopard lizard (Stebbins 1954; Montanucci 1965; Service 1980, 1985; Germano and Williams 1993). Land conversions contribute to declines in blunt-nosed leopard lizard abundance directly and indirectly by increasing mortalities from sources including: displacement and habitat fragmentation, reducing feeding, breeding, and sheltering sites, and by reducing the carrying capacity and prey populations for occupied sites.

Dramatic loss of blunt-nosed leopard lizard habitat has continued to occur since the drafting of the 1980 Recovery Plan. According to Service files and a preliminary assessment of issued biological opinions from 1987 to 2006, roughly 120 projects permitted incidental take of blunt-nosed leopard lizard. In total, these projects allowed for the incidental take of approximately 220 individuals and roughly 21,200 acres of impacts to blunt-nosed leopard lizard habitat. Of these activities, the habitat disturbance was authorized for oil exploration and power generation (2,433 acres permanent and 1,215 acres temporary), road construction and repair (1,387 acres permanent and 469 acres temporary), general operation and maintenance activities (15 acres permanent and 5,120 acres temporary), pipeline construction and repair (264 acres permanent and 853 acres temporary), transmission line and fiber optic cables construction (410 acres permanent and 418 acres temporary), hazardous waste facilities construction (844 acres permanent and 16 acres temporary), prison facilities construction (283 acres permanent and 74 acres temporary), water banking (KWB operations 6,000 acres permanent), and other agricultural, residential, and commercial development activities (covered under the Metropolitan Bakersfield HCP 15,200 acres permanent).

Note, these figures account for only those projects that were reviewed under the Act; the estimations do not include any loss of habitat or adverse effects from habitat conversion that was not reported to the Service. Presently, additional habitat loss can be expected due to on-going modification and conversion of existing habitat for agriculture, residential or commercial developments, oil and gas exploration activities, the construction of water banking facilities, and solar power developments.

Habitat Threats from Agriculture and Urban Development

Conversion of land for agricultural purposes continues to be the most critical threat to the blunt-nosed leopard lizard. Although the increment of habitat loss attributable to urban development appears to be increasing, this activity remains less significant than agriculture for this species. Agricultural conversion is generally not subject to any environmental review and is not directly monitored or regulated. Conversion of privately owned habitat without use of federally supplied water typically does not result in section 7 consultation with the Service, nor is it common for there to be an application for a section 10 incidental take permit (which would include a habitat conservation plan to reduce the effects of the take on the species). In addition, CVP water is used for groundwater recharge by some districts in the San Joaquin Valley. Such recharge may allow nearby landowners to pump groundwater for uses that may affect listed and proposed species.

Conversion of natural lands to agriculture has continued since the listing of the blunt-nosed leopard lizard. The 1980 Recovery Plan reported that between 1976 and 1979, habitat loss for the blunt-nosed leopard lizard was occurring at a rate of approximately 19,200 acres per year (Service 1980). By 1979, roughly 95 percent (approximately 8.1 million acres out of a total 8.5 million acres) of habitat on the San Joaquin Valley floor had been converted or otherwise destroyed (Service 1980; Williams 1985). The California Department of Water Resources has predicted continued loss of wildland habitat to agricultural conversion at a rate of 10,000 to 30,000 acres per year. The California Department of Forestry (1988) predicted wildland habitat losses totaling 465,000 acres in the San Joaquin Valley region between 1980 and 2010 as a result of agricultural conversion and urbanization. Much of the projected loss is likely to occur in the remaining blocks of habitat for listed and proposed species, where conversion also isolates populations by increasing habitat fragmentation, and limits availability of suitable habitat for future recovery of the species

The conversion of blunt-nosed leopard lizard habitat into agricultural fields continues to be a threat to blunt-nosed leopard lizard on private lands on the Valley floor. For example, in August 2006, about 1,300 acres of saltbush scrub and sink scrub habitat were illegally disced for cultivation of melons on the Valley floor along Interstate 5 north of the Kings – Kern County line. Blunt-nosed leopard lizards occur in several locations a few miles from the site (Vance *in litt.* 2006). Another similar instance of illegal discing of saltbush habitat was reported on the Valley floor in Kern County (Krise *in litt.* 2006).

The Panoche Valley was identified an important area for blunt-nosed leopard lizard within the Ciervo-Panoche Natural Area (Service 1998). However, the majority of the Panoche Valley remains unprotected on private lands. In September 2006, the real estate company Schuil and Associates sold a 1,200-acre parcel of rangeland in the Panoche Valley to private interests, and another 9,000 acres of Panoche Valley rangeland are on sale for potential home sites zoned for agricultural rangeland 40-acre minimum site size. The Panoche Creek and Silver Creek were identified as important dispersal corridors within the Ciervo-Panoche Natural Area (Service 1998; Lowe *et al.* 2005; L. Saslaw, BLM, pers. comm. 2006), but the majority of these areas remain unprotected and subject to residential and agricultural development.

Between 1970 and 2000, the human population of the San Joaquin Valley doubled in size; it is expected to more than double again by 2040 (Field *et al.* 1999; Teitz *et al.* 2005). The increasing population combined with the concurrent high demand for limited supplies of land, water, and other resources, has been identified as a principal underlying cause of habitat loss and degradation (Bunn *et al.* 2007).

Numerous large residential housing developments have been proposed in blunt-nosed leopard lizard habitat within the Metropolitan Bakersfield HCP (MBHCP) service area, including the 4,000 acre Gateway Specific Plan, and the 890 acre Canyons residential housing development. Impacts from these large-scale developments would likely extend beyond their physical footprint, considering potential effects upon dispersal corridors and habitat connectivity across the Valley floor. Additionally, the City of Taft recently proposed to expand its sphere of influence to cover roughly 157,570 acres of land (246.2 square miles), including approximately 9,622 acres of land within existing City limits and 147,948 acres of land within the proposed Expansion Area (City of Taft 2009). The recent economic recession in combination with other factors have delayed planning and construction of proposed development in Bakersfield and throughout the Valley; in some cases the applicants have withdrawn their proposals entirely. Nonetheless, blunt-nosed leopard lizard habitat degradation in, and around, Bakersfield, Taft and other urban areas remains a threat on unprotected private lands.

Habitat Threats from Oil and Gas Exploration

Oil and natural gas exploration activities continue to degrade blunt-nosed leopard lizard habitat in western Kern, Kings, and Fresno Counties. The construction of facilities related to oil and natural gas production, such as well pads, wells, storage tanks, sumps, pipelines, and their associated service roads degrade habitat and cause direct mortality to blunt-nosed leopard lizards. Leakage of oil from pumps and transport pipes, and storage facilities, surface mining, and ORV use also degrade blunt-nosed leopard lizard habitat (Madrone Associates 1979; Chesemore 1980; Mullen 1981; Service 1985; Kato and O'Farrell 1986; Service 1998).

From 2001 to present, 38 projects have been permitted through the Oil and Gas Programmatic biological opinion (BLM 2008) with potential to affect blunt-nosed leopard lizards. These 38 projects have impacted approximately 19 acres of occupied or potential habitat. Additionally, under this programmatic opinion the incidental take of four individual blunt-nosed leopard lizards has been reported: one presumed vehicle strike at the Carneros Devils Den area, and one at Kettleman Hills Middle Dome area; and, two assumed predation mortalities. Under the Oil and Gas Programmatic biological opinion, impacts to blunt-nosed leopard lizard habitat are generally minimized by applying a ratio of 3:1 for the purchase and protection of other existing habitat for each acre of suitable habitat impacted (Service 2001, 2003). However, this only results in the protection of existing habitat and not the creation of new blunt-nosed leopard lizard habitat; thus, each project effectively represents a net loss in total habitat.

Formal consultation between the BLM and the Service was initiated on April 10, 2008, for the development of a programmatic biological opinion for seismic exploration projects for which the BLM is the Federal nexus. Thus far, this programmatic opinion is expected to cover four specific projects, and others that may arise in the future. The four seismic exploration projects that have submitted formal requests include: the Buena Vista Seismic Exploration Project near Taft (roughly 128,000 acres) (Occidental of Elk Hills, Inc., *in litt.* 2008); the Chevron's Kettleman Hills Seismic Exploration Project (roughly 131,500 acres) (BioEnvironmental Associates, *in litt.* 2008a); the Aera Energy LLC Seismic Exploration Project near McKittrick (roughly 73,600 acres) (BioEnvironmental Associates, *in litt.*2008b); and, the Belgian Anticline Seismic Exploration Project (roughly 33,270 acres) (E&B Natural Resource Management, *in litt.* 2008). Disturbances associated with these projects are predominantly temporary and are dispersed across large land areas but, nonetheless, have potential to impact blunt-nosed leopard lizards, or adversely affect their habitat. At the time of this review, impacts of these projects on the blunt-nosed leopard lizard are not known. Nonetheless, it is anticipated that blunt-nosed leopard lizards are likely to be adversely affected by vehicle strikes, entombment in burrows, temporary loss or degradation of their habitat, and harassment from noise and vibration. Some blunt-nosed leopard lizards may escape direct injury if burrows are destroyed, but become displaced into adjacent areas. They may be vulnerable to increased predation, exposure, or stress through disorientation, loss of foraging and food base, or loss of shelter. Furthermore, it is expected that any positive results from seismic testing will subsequently result in proposals for oil and gas extraction projects; if these proposals are within listed species habitat, a separate consultation with the Service would be required.

Habitat Threats from the Construction of Water Banking Facilities

The on-going need to provide and secure water supplies for continued urban and rural use throughout California has increased the demand for new construction of water banking facilities. This need was formalized by Executive Order S-06-08 (signed on June 4, 2008 by Governor Arnold Schwarzenegger), which officially declared a statewide drought, and a state of emergency in nine Central Valley Counties with exceptionally urgent water needs: Sacramento, San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare and Kern. Currently, the Service is engaged in informal consultation with two proposed water banks that have potential to impact blunt-nosed leopard lizards—Madera Irrigation District's Madera Water Supply Enhancement Project, and Semitropic's Stored Water Recovery Unit. These projects potentially threaten the blunt-nosed leopard lizard by: directly removing habitat (through flooding, or the establishment of infra-structure); changing habitat quality (vegetation structure, higher predation, reduced prey, etc.); and, increasing the incidence of take through vehicle strikes.

The proposed 10,000-acre Madera Water Supply Enhancement Project is proposed as a groundwater recharge bank in western Madera County. The presence of blunt-nosed leopard lizards throughout the proposed site was verified by May 2009 surveys. At this time specific impacts of the project to the blunt-nosed leopard lizards have not yet been determined. However impacts associated with the project are likely given that the project entails the flooding of roughly 700 acres of swale habitat, and the construction of roughly 3,000 acres of percolation ponds. Additional effects to this species, beyond the flooding of suitable habitat, would be attributable to the permanent conversion of habitat to water bank infrastructure including the construction of access roads, powerlines, pipeline and canal conveyance systems, and numerous water extraction well pads. Requirements under the California Environmental Quality Act (CEQA) were completed in September 2005, and the applicant has initiated informal consultation with the Service for this project.

Currently, the Semitropic Water District is proposing the development of a large groundwater extraction project—the Stored Groundwater Recovery Unit—southeast of the Kern NWR, near Semitropic, California (Entrix, GEI Consultants, Inc., and Live Oak & Associates *in litt*. 2008). This project includes the following activities that have potential to affect the blunt-nosed leopard lizard: construction of a well extraction field across five sections of land (roughly 3,000 acres), ancillary well connection pipes, roughly 4 miles of open canal, and 7 miles of large diameter (120-inch) pipeline. The proposed project is located on blunt-nosed leopard lizard habitat near the Semitropic Ridge Preserve and the Kern NWR. At this time, however, potential impacts of the project to the blunt-nosed leopard lizard have not been assessed, but impacts are likely through the permanent conversion of habitat to water bank infrastructure including construction of access roads, powerlines, pipeline and canal conveyance systems, and roughly 65 water extraction well pads. Moreover, the proposed water bank will likely augment the conversion of native lands to agriculture by increasing water supply availability in the southern San Joaquin Valley.

Habitat Threats from Solar Power Developments

Solar power development projects pose potential threats to blunt-nosed leopard lizards and may impact vast amounts of habitat. These projects can destroy, fragment, or impact blunt-nosed leopard lizard habitat by: altering landscape topography, vegetation, and drainage patterns; increasing vehicle-strike mortality; and, reducing habitat quality through interception of solar energy normally reaching the ground surface, affecting ambient air temperatures through habitat shading, and altering soil moisture regimes (Smith 1984; Smith *et al*. 1987). Moreover, recently proposed solar projects tend to be large contiguous blocks of disturbance in undeveloped habitat lands, ranging from hundreds to several thousand acres. Currently, eight solar power farms have been proposed (see Table 3).

Table 3. Solar power projects that have been proposed within blunt-nosed leopard lizard habitat.

Project Name (Applicant)	Location (Region/County/Protected Area)	Proposed Habitat Disturbance (acres)[1]	Status
SunGen (Complete Energy Holdings, Inc., and La Paloma Generating Company LLC)	Valley Floor/Kern	270-290 (P)	Informal consultation has been initiated.
Cymric	Valley Floor/Kern	Unknown	Informal consultation has been initiated.
California Valley Solar Ranch (High Plains Ranch II, LLC, Sun Power Corporation, Systems)	San Luis Obispo/Carrizo Plain	4,365 (P)	Informal consultation has been initiated.
Topaz Solar Farm (First Solar, Inc.)	San Luis Obispo/Carrizo Plain	6,200 (P)	Informal consultation has been initiated.
Carrizo Thermal Solar Farm (Ausra, Inc.)	San Luis Obispo/Carrizo Plain	640 (P); 380 (T)	Formal consultation has been initiated; Ausra, Inc. was purchased by First Solar, Inc. in 2009.
San Joaquin Solar 1 & 2 (San Joaquin Solar, LLC)	Foothills/Fresno/Coalinga	640 (P)	Informal consultation has been initiated.
Sun City and Sun Drag	Foothills/Kings/Avenal	Approximately 1000 (P)	Informal consultation has Not been initiated
Solargen Solargen Energy, Inc.	Foothills/Fresno/Panoche Valley	Total amount not determined but will be between 7,000 and 29,000 (P)	Informal consultation has been initiated.
Notes: [1] Permanent Impacts denoted as (P), Temporary Disturbance denoted as (T).			

Conservation Efforts and Habitat Protection

A total of 14 HCPs have been prepared (13 completed and one HCP currently in draft) for which the permits include take of blunt-nosed leopard lizard and/or impacts to its habitat. These HCPs area summarized in Table 4 below, and described in further detail in Appendix B. Effectively, through section 10 consultations and the HCP process, 89,288 acres of habitat land have been conserved, while a total 30052.6 acres of permanent impacts and 1,527.1 acres of temporary disturbance have been authorized (note, these figures include the California Aqueduct San Joaquin Field Division HCP that is currently in draft).

The Central Valley Project (CVP) was constructed to protect the Central Valley from water shortages and floods. Irrigation water provided through the CVP subsequently facilitated the conversion of native habitats to agricultural lands (Bureau of Reclamation 2006). The effect of this large-scale loss of native habitat reduced populations of several species, which resulted in the listing of over twenty species in the San Joaquin Valley under the under the Act.

Subsequently, Congress passed the Central Valley Project Improvement Act (CVPIA) in 1992, mandating changes in the management of the CVP particularly for the protection, restoration, and enhancement of fish and wildlife. The CVPIA is comprised of several programs, including the CVPIA Habitat Restoration Program (HRP; §3406(b)(1) of the CVPIA). The Central Valley Project Conservation Program (CVPCP) was the result of a section 7 consultation with the Bureau of Reclamation (BOR) for Friant Dam water contracts.

Under the CVPCP, the blunt-nosed leopard lizard was designated as a very high priority for recovery due its imminent threat of extinction, and the fact that CVP actions significantly contributed to the species decline, either directly or indirectly and given that the species is considered to have an imminent threat of extinction. The CVPCP program is funded at approximately 2.3 million dollars annually, and has thus far funded 84 total projects since its commencement; 11 of the 84 are within alkali scrub or annual grassland habitat and specifically include the blunt-nosed leopard lizard as a focal species. Principally these projects have included habitat protection and restoration through the establishment of conservation easements and land acquisition in fee title (see Table 5). Other CVPCP goals for the recovery of the blunt-nosed leopard lizard include: determine habitat management and compatible land uses; conduct surveys for species presence and absence; and, protect key habitat areas within the known range of the species.

A principal program under the CVPIA HRP is the Land Retirement Program (Law 102-575 Title 34, Section 3408(h)), which is designed to reduce irrigated agricultural drainage problems. It comprises an interagency Department of Interior Land Retirement Team and includes representatives from BOR, the Service, and the BLM. It was estimated that by 2040 approximately 400,000 to 554,000 acres of land would become unsuitable for irrigated agriculture if no actions were taken to remedy drainage problems. Under this program, those irrigated agricultural lands that are characterized by low productivity, poor drainage, shallow water tables, and high groundwater selenium concentrations would be retired from irrigated

Table 4. Since the time of listing, 14 HCPs have been developed and implemented (note the California Aqueduct San Joaquin Field Division HCP is currently in draft form); additional information is provided in Appendix B.

HCP	Location (Region/County/Protected Area)	Habitat Protection (acres)	Compensation Area Location	Authorized Impacts to Blunt-Nosed Leopard Lizard Habitat (acres)[1]	Comments
Coles Levee	Valley Floor/Kern	990	Coles Levee Ecosystem Preserve	270 (P)	HCP is not currently valid
Coalinga Cogeneration	Foothills/Fresno	179	On-site	49.6 (P); 27.6 (T)	June 23, 2006, the project used up all of its compensation credits and completed the mitigation requirements.
California Department of Corrections Delano Prison	Valley Floor/Kern	348/514	On-site /Allensworth ER	287 (P); 348 (T)	Compensation includes habitat enhancement and revegetation
California Department of Corrections Statewide Electrified Fence Project	Valley Floor/Kern	282/800[2]	Allensworth ER	Take of 2 Individuals	A restoration plan for the mitigation lands was finalized and approved in February 2003 (EDAW 2003)
Chevron Pipeline	Valley Floor/Kern/Lokern	28	Lokern Area	25.5 (T)	
Granite Construction Phase I	Foothills/Fresno/Coalinga	162	Semitropic Ridge ER	54 (P)	

Table 4 continued.

HCP	Location (Region/County/Protected Area)	Habitat Protection (acres)	Compensation Area Location	Authorized Impacts to Blunt-Nosed Leopard Lizard Habitat (acres)[1]	Comments
Kern County Waste Facilities	Valley Floor/Kern	755[3]	Coles Levee Ecosystem Preserve	251 (P)[3]	Project impacts are limited to 2 acres of blunt-nosed leopard lizard habitat near Lost Hills and 47 acres near Taft in Kern County
KWB Authority	Valley Floor/Kern	4,263	On-site	12,081 (P); 291 (T)	
Metropolitan Bakersfield	Valley Floor/Kern	3:1 compensation for Natural Lands	Off-site	15,200 (P)	Acquired throughout the duration of the HCP as impacts are incurred; the HCP is valid until 2014.
Nuevo Torch	Valley Floor/Kern	840	Lokern Area	850 (P)	Now called PXP
California Aqueduct San Joaquin Field Division	Valley Floor/Kern	567/3,474[4]	On-site	340 (P); 835 (T)	HCP is currently in draft form. Total impacts are limited to 1,295 acres: 1,185 acres of impact will be compensated at time of issuance, 110 acres of impacts will be compensated as they occur

Table 4 continued.

HCP	Location (Region/County/Protected Area)	Habitat Protection (acres)	Compensation Area Location	Authorized Impacts to Blunt-Nosed Leopard Lizard Habitat (acres)[1]	Comments
Seneca and Enron Oil and Gas	Valley Floor/Kern			650 (P)	
Enviro Cycle	Valley Floor/Kern			20 (P)	
Pacific Gas and Electric	Valley Floor and Foothill Regions/ Nine Counties of the San Joaquin Valley/All Protected Areas except Carrizo Plain	360	Areas of occupied and/or suitable habitat to be conserved in perpetuity via future conservation easement	9 (P); 690 (T)	An additional 3, 930 acres of covered activities may occur in suitable habitat
Total		**89,288[5]**		**29,382.6 (P); 1,527.1 (T)**	

Notes: [1]Permanent Impacts denoted as (P), Temporary Disturbance denoted as (T); [2]Compensation included acquisition and enhancement of 282 acres of high quality alkali sink/scrub habitat and an additional 800 acres of low quality laser-leveled farmland, both at Allensworth ER; [3]These figures are comprehensive for compensation and impacts associated with the HCP, and not specific to blunt-nosed leopard lizard impacts specifically; [4]567 acres will be compensated through traditional Service procedures, while the 3,474 acres will be managed to conserve habitat to the maximum extent possible (i.e., habitat may be disturbed or impacted during emergency maintenance and operational procedures); and, [5]This total does not include habitat conservation lands acquired by CDFG through the Metropolitan Bakersfield HCP, and also does not include the 3,474 acres that DWR will manage under the proposed draft California Aqueduct San Joaquin Field Division HCP.

agriculture through a willing seller program. The original goal under the Land Retirement Program was set at 15,000 acres (see Table 5). However, the actual acreage retired thus far for restoration is limited to 9,306 acres: 7,216 acres at Atwell Island in southwestern Tulare County and 2,090 acres at the Tranquility in western Fresno County. The restoration of former irrigated agricultural lands to arid upland and alkali sink habitat are expected to benefit the blunt-nosed leopard lizard. As noted in Table 5, goals for Atwell Island are set at 70 percent restored uplands (alkali scrub), 20 percent flood management, 5 percent riparian, and 5 percent farming. Thus, only 70 percent of the 7,216 acres, or 5,051 acres at Atwell Island would be restored to alkali sink habitat suitable to support blunt-nosed leopard lizards; 2,090 acres at the Tranquility site would be restored to uplands or alkali sink.

Under the CVPCP, HRP or Land Retirement Program there was no obligation for BOR to purchase and conserve a specific amount of land. Conversely however, the California State Water Resources Control Board (SWRCB) in Decision-1641 imposed a mitigation requirement on the Bureau of Reclamation for agricultural land conversions that occurred prior to December 29, 1999 outside the CVP contract supply Consolidated Place of Use. The requirement is referred to as the Encroachment Mitigation. This Decision, which included specific requirements for alkali scrub habitat and grassland habitat, is significant for the recovery of blunt-nosed leopard lizard. The SWRCB identified 45,390 acres of habitat including 23,165 acres of alkali scrub habitat (primarily in the Westlands Water District of western Fresno County) that was converted without authorization under the Act to plowed and irrigated agriculture land, and that needs to be mitigated with in-kind habitat acquired by 2010 (SWRCB 2000). As of May 2009 roughly 9,397 acres (or 40.6 percent of the required 23,165 acres) of alkali scrub habitat had been acquired by BOR (D. Kleinsmith, BOR, *in litt.* 2009). Furthermore, in total only 25,706 acres of habitat for any species had been acquired by May 2009 (as noted in Table 5, 4,960 acres of grassland habitat is speculated to be suitable for blunt-nosed leopard lizards (D. Kleinsmith, *in litt.* 2009).

Although these land acquisition and retirement programs may protect habitat suitable for blunt-nosed leopard lizards, it should be qualified that the suitability of these lands to support blunt-nosed leopard lizard has been only coarsely determined by BOR at this time; the suitability in terms of habitat quality and landscape connectivity has not yet been evaluated by the Service. The biological opinion for the Land Retirement Program (Service 1999) recommended a 5-year Habitat Restoration Study (HRS) to determine the responses of wildlife to land retirement and restoration efforts. HRS objectives were to determine the efficacy of revegetation with native plants and microtopographic contouring for upland habitat restoration and to examine the responses of plants and wildlife at the 800-acre Tranquility study site. Beginning in 1999, vegetation, invertebrates, amphibians, reptiles, birds, and small mammals were all monitored throughout the duration of the project. The California king snake (*Lampropeltis getulus californiae*), gopher snake (*Pituophis melanoleucus*), and western whiptail (*Cnemidophorus tigris multiscutatus*) were the only reptile species observed at the Tranquility site. It is anticipated that species in the vicinity of the Tranquility Site will re-inhabit the area; however due to the distance to the nearest known population, blunt-nosed leopard lizards would most likely have to be reintroduced to the retired lands. To date, there is no available research on

Table 5. Summarized status of BOR acquired mitigation, from the 2007 Consolidated Place of Use Encroachment, which espouses habitat compensation from existing programs, including: CVPCP, HRP, Land Retirement Program projects, as well as BOR's wetlands program (D. Kleinsmith, *in litt.* 2009).

Project Name	Habitat Type	Special Status Species from CPOU FEIR Being Compensated[1]	Project Size (Acres)	Purpose of Project	Location (County)	Estimated Completion Date	Reclamation Percent of Total Funding	Pro-rated Acreage Based on Percent funding
ALKALI SCRUB:								
Allensworth Ecological Reserve Addition	Alkali scrub	San Joaquin kit fox, Tipton kangaroo rat, San Joaquin antelope squirrel, Blunt-nosed leopard lizard.	360	Protection	Tulare and Kern	1998	100%	360
Carrizo Plains National Monument Inholdings	Alkali scrub	San Joaquin kit fox, San Joaquin antelope squirrel, giant kangaroo rat, Blunt-nosed leopard lizard, San Joaquin wooly-threads, California jewel flower, Hoover's wooly star.	665	Protection	Kern	2007	100%	665
Elgorriago Ranch	Alkali scrub	Giant kangaroo rat, San Joaquin antelope squirrel, Blunt-nosed leopard lizard, San Joaquin wooly-threads.	1,231	Protection	Fresno and San Benito	2007	100%	1,231

Table 5 continued.

Project Name	Habitat Type	Special Status Species from CPOU FEIR Being Compensated[1]	Project Size (Acres)	Purpose of Project	Location (County)	Estimated Completion Date	Reclamation Percent of Total Funding	Pro-rated Acreage Based on Percent funding
Goose Lake Land Acquisition	Alkali scrub	Blunt-nosed leopard lizard, Tipton kangaroo rat, San Joaquin kit fox.	Parcel not yet selected.	Protection	Kern	Parcel not yet selected.	100%	Parcel not yet selected.
Land Retirement Demonstration Project (Atwell Island and Tranquility)	Alkali scrub	Potential for all San Joaquin Valley species.	7,141 (5,051 and 2,090, respectively)[2]	Restoration	Fresno, Kings, and Tulare	Unknown	100%	7,141
TOTAL ACRES FOR ALKALI SCRUB		**23,165 acres owed**	**9,397 acres acquired**					**9397**
ANNUAL GRASSLAND: 17,573 acres owed								
Bayou Vista Property	Annual grassland	Swainson's hawk, Tipton kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard.	515	Protection	Tulare	2004	46%	236.9

Table 5 continued.

Project Name	Habitat Type	Special Status Species from CPOU FEIR Being Compensated[1]	Project Size (Acres)	Purpose of Project	Location (County)	Estimated Completion Date	Reclamation Percent of Total Funding	Pro-rated Acreage Based on Percent funding
Carrizo Plains National Monument Inholdings	Annual grassland	San Joaquin kit fox, San Joaquin antelope squirrel, giant kangaroo rat, Blunt-nosed leopard lizard, San Joaquin wooly-threads, California jewel flower, Hoover's wooly star.	800	Protection	Kern	2007	100%	800
Elgorriago Ranch	Annual grassland	Giant kangaroo rat, San Joaquin antelope squirrel, Blunt-nosed leopard lizard, San Joaquin wooly-threads.	1,400	Protection	Fresno and San Benito	2007	100%	1,400
Goose Lake Land Acquisition	Annual grassland	Blunt-nosed leopard lizard, Tipton kangaroo rat, San Joaquin kit fox.	Parcel not yet selected.	Protection	Kern	Parcel not yet selected.	100%	Parcel not yet selected.
Pixley NWR Acquisition	Annual grassland	San Joaquin kit fox, blunt-nosed leopard lizard, Tipton kangaroo rat.	345	Protection	Tulare	2006	100%	345

Table 5 continued.

Project Name	Habitat Type	Special Status Species from CPOU FEIR Being Compensated[1]	Project Size (Acres)	Purpose of Project	Location (County)	Estimated Completion Date	Reclamation Percent of Total Funding	Pro-rated Acreage Based on Percent funding
Romero and Simon-Neuman Ranches	Annual grassland	San Joaquin kit fox, blunt-nosed leopard lizard.	24,589	Protection	Stanislaus, Santa Clara, Merced	1988 to 1999	9.40%	2,311.4
TOTAL ACRES FOR ANNUAL GRASSLAND		**17,573 acres owed**	**4.960 acquired**					**4,960**

Note: [1]The suitability of these lands to support blunt-nosed leopard lizard has been determined by BOR, and has not been reviewed by the Service.[2]Thus far, BOR has acquired 9,306 acres—7,216 acres at Atwell Island and 2,090 acres at Tranquility; however unlike the Tranquility site, restoration goals for Atwell Island are 70 percent restored uplands (alkali scrub), 20 percent flood management, 5 percent riparian, and 5 percent farming. Thus, only 70 percent of the 7,216 acres (5,051.2 acres) at Atwell Island would be alkali sink habitat suitable for the blunt-nosed leopard lizard; whereas, all 2,090 acres at the Tranquility site would be restored to uplands or alkali sink. The total upland habitat or alkali sink habitat for land retirement is 5,051.2 + 2,090 = 7,141.2.

the ability of blunt-nosed leopard lizard to recolonize fallow fields and whether the Land Retirement Program will be successful in providing habitat for the species.

Additionally, the future ownership and status of these lands—whether they would be restored to habitat, or utilized for other purposes (i.e., dry-farmed)—remains unknown. The Land Retirement Program, however, while preventing the application of CVP water to agricultural fields, does not prevent the application of irrigation water from other sources or require the restoration of the lands to native habitat. Often an alternative irrigation supply is provided to the land, which in turn prevents the return of most agricultural fields back to natural habitat.

Furthermore, at present, Reclamation does not plan to pursue any further land acquisitions under the land retirement program authorization (D. Kleinsmith, pers. comm. 2009). Thus it is unlikely that BOR will acquire the additional 16,141 acres by the court ordered deadline.

In conclusion, it is currently unknown whether these programs will offset the blunt-nosed leopard lizard habitat losses that have occurred. Further assessment on the effects of these programs, combined with supplemental research, will be required to determine their contribution on blunt-nosed leopard lizard recovery.

Summary of Factor A Threats

In summary, broad-scale land conversion of natural habitat has resulted in substantial reduction of available blunt-nosed leopard lizard habitat. Service databases report that roughly 35,000 acres of permanent impacts and 10,000 acres of temporary disturbance have been authorized within blunt-nosed leopard lizard habitat (note: these values do not include those acres of additional impacts to scrub and grassland from those programs described above, under the CVP).

Fragmentation of residual habitat, which further isolates remaining blunt-nosed leopard lizard populations, continues due to on-going agricultural conversion of natural habitat, residential development, oil and gas exploration and extraction activities. Though several HCPs and biological opinions, as well as the CVPCP, CVPIA, and Decision-1641 have resulted in the conservation of substantial amounts of land acreage, the use and recolonization of these conserved lands by blunt-nosed leopard lizards is limited by the fragmentation and isolation of the parcels, the distribution of remaining populations, and dispersal abilities of the species.

II.C.2.b. Factor B, Overutilization for commercial, recreational, scientific, or educational purposes

At the time of listing, overutilization for commercial, recreational, scientific, or educational purposes was not considered to be a threat, and is not discussed as a threat in the 1998 Recovery Plan. There are no updates relevant to this factor, nor has the potential of this threat increased noticeably since the 1998 Recovery Plan.

II.C.2.c. Factor C, Disease or predation

At the time of listing predation was not considered a potential threat to survival of the species and its recovery. Montanucci (1965) reported that the list of predators in Madera and Fresno

Counties of the blunt-nosed leopard lizard included the following species: spotted skunk (*Spilogale putorius*), ground squirrel (*Citellus beecheyi*), shrike (*Lanius ludovicianus gambeli*), American kestrel (*Falco sparverius*), burrowing owl (*Speotyto cunicularia hypugaea*), roadrunner (*Geococcyx californianus*), whipsnake (*Masticophis flagellum ruddocki*), gopher snake (*Pituophis catenifer*), coyote (*Canis latrans*), kit fox (*Vulpes macrotis*), and badger (*Taxidea taxus*).

The following animals are currently known to prey on blunt-nosed leopard lizards: whip snakes, gopher snakes, glossy snakes (*Arizona elegans*), western long-nosed snakes (*Rhinocheilus lecontei*), northern Pacific rattlesnakes (*Crotalus viridis oreganus*), common king snakes, western rattlesnakes, loggerhead shrikes (*Lanius ludovicianus*), American kestrels (*Falco sparverius*), prairie falcons (*Falco mexicanus*), burrowing owls (*Athene cunicularia*), greater roadrunners (*Geococcyx californianus*), golden eagles (*Aquila chrysaetos*), red-tailed hawks (*Buteo jamaicensis*), California ground squirrels, spotted skunks (*Spilogale putorius*), striped skunks (*Mephitis mephitis*), American badgers (*Taxidea taxus*), coyotes (*Canis latrans*), and San Joaquin kit foxes (Montanucci 1965; Tollestrup 1979b; Hansen *et al.* 1994; Germano and Carter 1995; Germano and Brown 2003). This list is likely not exhaustive for all incidences of predation that occur across the range of the blunt-nosed leopard lizard, nor has the magnitude of effects derived by predation on population trend and stability been researched at this time. Thus it remains unknown as to whether predation is a major threat to the survival and recovery of this species.

Without mammal burrows, blunt-nosed leopard lizards are more susceptible to predation (Hansen *et al.* 1994). The construction of artificial perches (i.e., fence posts) for burrowing owls, and other predators increases the risk of predation on blunt-nosed leopard lizards (L. Saslaw, BLM, pers. comm. 2006). Additionally, the territorial behavior of blunt-nosed leopard lizard males may expose them to higher rates of predation than if they were secretive (Tollestrup 1982, 1983; Germano and Carter 1995; Lappin and Swinney 1999).

There are no known diseases in blunt-nosed leopard lizards, but endoparasites (nematodes) and ectoparasites (mites and harvest mites) have been reported (Montanucci 1965). The overall effect of the parasites on the blunt-nosed leopard lizard is not currently known.

II.C.2.d. Factor D, Inadequacy of existing regulatory mechanisms

The blunt-nosed leopard lizard was listed as endangered under the Act in 1967, and subsequently listed as an endangered species by the State of California in 1971. At the time of Federal listing, many of the current environmental laws did not yet exist.

There are several State and Federal laws and regulations that are pertinent to federally listed species, each of which may contribute in varying degrees to the conservation of federally listed and non-listed species. These laws, most of which have been enacted in the past 30 to 40 years, have greatly reduced or eliminated the threat of wholesale habitat destruction, although the extent to which they prevent the conversion of natural lands to agriculture is less clear.

State Laws and Regulations in California

The State's authority to conserve rare wildlife and plants is comprised of four major pieces of legislation: the California Endangered Species Act, the Native Plant Protection Act, the California Environmental Quality Act, and the Natural Community Conservation Planning Act.

California Endangered Species Act (CESA): The CESA (California Fish and Game Code, section 2080 *et seq*.) prohibits the unauthorized take of State-listed threatened or endangered species. The blunt-nosed leopard lizard was listed as endangered by the State of California in 1971. The CESA requires State agencies to consult with the California Department of Fish and Game on activities that may affect a State-listed species and mitigate for any adverse impacts to the species or its habitat. Pursuant to CESA, it is unlawful to import or export, take, possess, purchase, or sell any species or part or product of any species listed as endangered or threatened. The State may authorize permits for scientific, educational, or management purposes, and to allow take that is incidental to otherwise lawful activities. The blunt-nosed leopard lizard was listed as State endangered species under CESA on June 27, 1971.

California Department of Fish and Game Code §5050--Fully Protected Reptiles and Amphibians Species: The blunt-nosed leopard lizard is a fully-protected animal under the California Fish and Game Code §5050; fully protected species may not be taken or possessed at any time and no licenses or permits may be issued for their take except for collecting these species for necessary scientific research. Therefore salvage and relocation for this species is not currently an option under State law.

California Environmental Quality Act (CEQA): The CEQA requires review of any project that is undertaken, funded, or permitted by the State or a local governmental agency. If significant effects are identified, the lead agency has the option of requiring mitigation through changes in the project or to decide that overriding considerations make mitigation infeasible (CEQA section 21002). Protection of listed species through CEQA is, therefore, dependent upon the discretion of the lead agency involved.

Natural Community Conservation Planning Act: The Natural Community Conservation Program is a cooperative effort to protect regional habitats and species. The program helps identify and provide for area wide protection of plants, animals, and their habitats while allowing compatible and appropriate economic activity. Many Natural Community Conservation Plans (NCCPs) are developed in conjunction with Habitat Conservation Plans (HCPs) prepared pursuant to the Federal Endangered Species Act.

Federal Laws and Regulations

National Environmental Policy Act (NEPA): NEPA (42 U.S.C. 4371 *et seq*.) provides some protection for listed species that may be affected by activities undertaken, authorized, or funded by Federal agencies. Prior to implementation of such projects with a Federal nexus, NEPA requires the agency to analyze the project for potential impacts to the human environment, including natural resources. In cases where that analysis reveals significant environmental effects, the Federal agency must propose mitigation alternatives that would offset those effects

(40 **CFR** 1502.16). These mitigations usually provide some protection for listed species. However, NEPA does not require that adverse impacts be fully mitigated, only that impacts be assessed and the analysis disclosed to the public.

Clean Water Act: Under section 404, the U.S. Army Corps of Engineers (Corps or USACE) regulates the discharge of fill material into waters of the United States, which include navigable and isolated waters, headwaters, and adjacent wetlands (33 U.S.C. 1344). In general, the term ―wetland” refers to areas meeting the Corps's criteria of hydric soils, hydrology (either sufficient annual flooding or water on the soil surface), and hydrophytic vegetation (plants specifically adapted for growing in wetlands). Any action with the potential to impact waters of the United States must be reviewed under the Clean Water Act, National Environmental Policy Act, and Endangered Species Act. These reviews require consideration of impacts to listed species and their habitats, and recommendations for mitigation of significant impacts.

Although the blunt-nosed leopard lizard is an upland species typically found in landscapes with limited jurisdictional waters under the Clean Water Act, the Corps has frequently assumed the role of the Federal nexus for both large and small projects in their entirety, even though these projects may only impact a minor amount of jurisdictional water. This approach by the Corps has facilitated numerous consultations under section 7 of the Act that would have otherwise likely required a section 10 permit.

Historically, the Corps interpreted ―the waters of the United States” expansively to include not only traditional navigable waters and wetlands, but also other defined waters that are adjacent or hydrologically connected to traditional navigable waters. However, recent Supreme Court rulings have called into question this definition. On June 19, 2006, the U.S. Supreme Court vacated two district court judgments that upheld this interpretation as it applied to two cases involving ―isolated” wetlands. Currently, Corps regulatory oversight of such wetlands (e.g., vernal pools) is in doubt because of their ―isolated” nature. In response to the Supreme Court decision, the Corps and the U.S. Environmental Protection Agency (USEPA) have recently released a memorandum providing guidelines for determining jurisdiction under the Clean Water Act. The guidelines provide for a case-by-case determination of a ―significant nexus” standard that may protect some, but not all, isolated wetland habitat (USEPA and USACE 2007). The overall effect of the new permit guidelines on loss of isolated wetlands, such as vernal pool habitat, is not known at this time.

Endangered Species Act of 1973, as amended (Act): The Act is the primary Federal law providing protection for this species. The Service's responsibilities include administering the Act, including sections 7, 9, and 10 that address take. Since listing, the Service has analyzed the potential effects of Federal projects under section 7(a)(2), which requires Federal agencies to consult with the Service prior to authorizing, funding, or carrying out activities that may affect listed species. A jeopardy determination is made for a project that is reasonably expected, either directly or indirectly, to appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing its reproduction, numbers, or distribution (50 **CFR** 402.02). A non-jeopardy opinion may include reasonable and prudent measures that minimize the amount or extent of incidental take of listed species associated with a project.

Section 9 prohibits the taking of any federally listed endangered or threatened species. Section 3(18) defines ―take” to mean ―to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” Service regulations (Service 2003) define ―harm” to include significant habitat modification or degradation which actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. Harassment is defined by the Service as an intentional or negligent action that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. The Act provides for civil and criminal penalties for the unlawful taking of listed species. Incidental take refers to taking of listed species that results from, but is not the purpose of, carrying out an otherwise lawful activity by a Federal agency or applicant (50 **CFR** 402.02). For projects without a Federal nexus that would likely result in incidental take of listed species, the Service may issue incidental take permits to non-Federal applicants pursuant to section 10(a)(1)(B). To qualify for an incidental take permit, applicants must develop, fund, and implement a Service-approved Habitat Conservation Plan (HCP) that details measures to minimize and mitigate the project's adverse impacts to listed species. Regional HCPs in some areas now provide an additional layer of regulatory protection for covered species, and many of these HCPs are coordinated with California's related Natural Community Conservation Planning program.

Conversion of land for agricultural purposes continues to be the most critical threat to listed species. Although the increment of habitat loss attributable to urban development appears to be increasing, these activities remain less significant than agriculture for most species. Agricultural conversion is generally not subject to any environmental review and is not directly monitored or regulated. Conversion of privately owned habitat without use of federally supplied water typically does not result in section 7 consultation with the Service, nor is it usual for there to be an application for a section 10 incidental take permit (which would include a habitat conservation plan to reduce the effects of the take on the species). In addition, CVP water is used for groundwater recharge by some districts in the San Joaquin Valley. Such recharge may allow nearby landowners to pump groundwater for uses that may affect listed and proposed species.

Sikes Act: The Sikes Act (16 U.S.C. 670) authorizes the Secretary of Defense to develop cooperative plans with the Secretaries of Agriculture and the Interior for natural resources on public lands. The Sikes Act Improvement Act of 1997 requires Department of Defense installations to prepare Integrated Natural Resource Management Plans (INRMPs) that provide for the conservation and rehabilitation of natural resources on military lands consistent with the use of military installations to ensure the readiness of the Armed Forces. The INRMPs incorporate, to the maximum extent practicable, ecosystem management principles and provide the landscape necessary to sustain military land uses. While INRMPs are not technically regulatory mechanisms because their implementation is subject to funding availability, they can be an added conservation tool in promoting the recovery of endangered and threatened species on military lands.

Federal Land Policy and Management Act of 1976 (FLPMA): The Bureau of Land Management is required to incorporate Federal, State, and local input into their management decisions through Federal law. The FLPMA (Public Law 94-579, 43 U.S.C. 1701) was written ―to establish public land policy; to establish guidelines for its administration; to provide for the management, protection, development and enhancement of the public lands; and for other purposes." Section 102(f) of the FLPMA states that ―the Secretary [of the Interior] shall allow an opportunity for public involvement and by regulation shall establish procedures … to give Federal, State, and local governments and the public, adequate notice and opportunity to comment upon and participate in the formulation of plans and programs relating to the management of the public lands." Therefore, through management plans, the Bureau of Land Management is responsible for including input from Federal, State, and local governments and the public. Additionally, Section 102(c) of the FLPMA states that the Secretary shall ―give priority to the designation and protection of areas of critical environmental concern" in the development of plans for public lands. Although the Bureau of Land Management has a multiple-use mandate under the FLPMA which allows for grazing, mining, and off-road vehicle use, the Bureau of Land Management also has the ability under the FLPMA to establish and implement special management areas such as Areas of Critical Environmental Concern, wilderness, research areas, etc., that can reduce or eliminate actions that adversely affect species of concern (including listed species).

National Wildlife Refuge System Improvement Act of 1997: This act establishes the protection of biodiversity as the primary purpose of the National Wildlife Refuge system. This has lead to various management actions to benefit federally listed species.

Summary of Factor D

In summary, the Endangered Species Act is the primary Federal law that provides protection for this species since its listing as endangered in 1967. Other Federal and State regulatory mechanisms provide discretionary protections for the species based on current management direction, but do not guarantee protection for the species absent its status under the Act. Therefore, we continue to believe other laws and regulations have limited ability to protect the species in absence of the Endangered Species Act.

II.C.2.e. Factor E, Other natural or human made factors affecting its continued existence

Although the final rule listing for the blunt-nosed leopard lizard did not include a discussion of threats to the species, agricultural pesticides especially for control of beet leafhopper was identified as a threat near the time of listing (Montanucci 1965). Since the time of listing we have identified the following additional threats: altered vegetation; climate change; broad-scale pesticide use and application; and, vehicle (roadway traffic and ORV) induced mortality. In addition, altered vegetation communities (grazing, exotic grasses, and wildfire regime), vehicle strikes, waterfowl blinds, broad-scale pesticide application, and climate change continue to impact blunt-nosed leopard lizard populations. Furthermore, research has reported that collective habitat loss has caused the reduction and fragmentation of populations and decline of blunt-nosed leopard lizard (Stebbins 1954; Montanucci 1965; Service 1980, 1985; Germano and Williams 1993).

Altered vegetation communities (grazing, exotic grasses, wildfire regime)
The southern San Joaquin Valley of California, as with much of western North America, has been invaded by non-native plant species, since European cattle were brought to the region in the 1500s. Research has reported that the exponential increase in exotic plants has paralleled the increase in human population growth in California (Randall *et al.* 1998). The following exotic species are frequently observed within blunt-nosed leopard lizard habitat, and have adversely affected the species: *Bromus rubens madritensis* (red brome), *Vulpia myuros* (mouse tail fescue) *Schismus arabicus* (Arabian grass), *Hordium murinum glaucum* (foxtail), *Bromus diandrus* (ripgut brome), and *Bromus bordeaceus* (soft chess) (Biswell 1956; Heady 1977; Germano *et al.* 2001). The timing of germination for these introduced grasses is often earlier than most native species, which effectively gives the non-native species a competitive advantage over native plant species for water, nutrients, and sun light. Additionally, an overabundance of residual thatch from the previous year's non-native grass production can have similar adverse effects by shading out or obstructing native seedlings.

Vegetation changes include levels of biomass, cover, density, community structure, or soil characteristics. Changes have generally been attributed to the negative affects of off-highway vehicle use, overgrazing by domestic livestock, agriculture, urbanization, construction of roads and utility corridors, air pollution, military training exercises, and other activities (Lovich and Bainbridge 1999). These authors also reported that secondary contributions to degradation include the proliferation of exotic plant species, higher frequency of anthropogenic fire events, and increased nitrogen deposition. Effects of these impacts include alteration or destruction of macro- and micro-vegetation elements, establishment of annual plant communities dominated by exotic species, destruction of soil stabilizers, soil compaction, and increased erosion.

Introduced grasses and herbs often create an impenetrable thicket for small ground-dwelling vertebrates. Blunt-nosed leopard lizard movement is restricted in dense herbaceous cover, as observed with the ease of catching them by hand in dense grass compared to more open habitats (Germano *et al.* 2001; Germano *et al.* 2004). Radiotelemetry studies near the Elk Hills have documented that blunt-nosed leopard lizards are generally restricted to more open habitats (e.g. washes, roads, grazed pastures) when grass cover is thick, but they may utilize grassland areas if the herbaceous cover is sparse (Warrick *et al.* 1998).

The detrimental ecological effects of livestock grazing have been documented on western lands (Fleischner 1994; Noss 1994). Overgrazing may negatively affect blunt-nosed leopard lizards by soil compaction, damaging rodent burrows that the lizards depend on for cover, and stripping away vegetative cover used by both the lizard and its prey (Hansen *et al.* 1994). However, the cessation of grazing is likely to be even more detrimental to blunt-nosed leopard lizard due to the dense growth of exotic grasses as discussed below (Germano *et al.* 2001; Germano *et al.* 2005).

Long-term studies of blunt-nosed leopard lizard population trends on the Elkhorn Plain and Pixley NWR have shown dramatic declines in numbers following consecutive wet years (Germano *et al.* 2004; Germano and Williams 2005; Williams *in litt.* 2006). On Elkhorn Plain, the decline in blunt-nosed leopard lizard numbers was shown to occur with consecutive years of dense herbaceous cover above 0.65 ounces/ft^2 in the 1990s (Germano *et al.* 2004). Annual grazing studies in the Lokern area from 1997 to 2005 have demonstrated the benefits of livestock grazing in reducing exotic grasses and increasing blunt-nosed leopard lizard numbers (Germano *et al.* 2005). Therefore, recent decisions to severely restrict or eliminate livestock grazing from conservation lands may negatively affect blunt-nosed leopard lizards, especially during wet years (Germano *et al.* 2001). The BLM offices in Hollister and Bakersfield, California, are currently updating their Resource Management Plans (RMP) with respect to grazing in the Ciervo-Panoche areas and the Carrizo Plain National Monument, respectively. Grazing on the Carrizo Plain National Monument is particularly controversial.

Prescribed fire has been analyzed as an alternative habitat management tool, but in an unpublished study, it was less effective than grazing at controlling exotic grasses, and the positive effects lasted for less than one year (L. Saslaw *in litt.* 2006). Additionally, a prescribed burn had the unintended negative consequence of permanently removing native saltbush (Germano *et al.* 2001; Warrick 2006).

The preponderance of exotic grasses in blunt-nosed leopard lizard habitat in the San Joaquin Valley may be partly attributed to elevated levels of atmospheric nitrogen (N) deposition in ecosystems that are naturally N-limited. Weiss (1999) found that dry N deposition from smog in the San Francisco Bay Area has enabled the invasion of exotic annual grasses into native grasslands on nutrient-poor, serpentitic soils resulting in the loss of habitat for the federally threatened bay checkerspot butterfly (*Euphydras editha bayensis*). Other researchers found that increased levels of soil N from elevated atmospheric N deposition in the Mojave Desert could increase the dominance of exotic annual grasses and thereby raise the frequency of fire (Brooks 1999, 2003; Brooks and Pyke 2001).

Of the protected areas with management plans (see Table 1), grazing is employed as a management technique to reduce exotic weed infestations in the following areas:

- All of Pixley NWR, except about 1,000 acres, is managed for blunt-nosed leopard lizard by grazing from November through April each year (Williams *in litt.* 2006);
- The entire Wind Wolves Preserve site is currently grazed by livestock (D. Clendenen, Wildlands Conservancy, pers. comm. 2006);
- The portion of the Semitropic Ridge Preserve administered by the CNLM is grazed by sheep (Warrick *in litt.* 2006), while none of the CDFG administered lands currently have any grazing leases;
- The 1,369 acre Research Natural Area of Kern NWR is managed by winter grazing for blunt-nosed leopard lizard and Tipton kangaroo rat;
- Less than one-fourth of the KWB Conservation Lands are currently grazed by sheep to control exotic grasses that threaten blunt-nosed leopard lizard habitat (KWB Authority 2006).

<u>Vehicle strikes</u>
Blunt-nosed leopard lizard mortality is known to occur as a result of regular automobile traffic and ORV use (Tollestrup 1979b; Uptain *et al.* 1985; Williams and Tordoff 1988). Roads typically surround and often bisect remaining fragments of habitat, increasing the risk of mortality by vehicles and further isolating populations (Service 1998). The blunt-nosed leopard lizard's preference for open areas, such as roads (Warrick *et al.* 1998), makes them especially vulnerable to mortality from vehicle strikes. On May 22, 2005, a blunt-nosed leopard lizard was

reported killed by a vehicle strike on an access road in the Devils Den Oilfield of northwestern Kern County; the road is used by oilfield personnel and ranchers (Booher *in litt.* 2005). On July 19, 2006, a blunt-nosed leopard lizard was reported killed by a vehicle strike on an access road at the Carneros Devils Den area in Kern County, and also at the Kettleman Hills Middle Dome site in Kings County (Garcia *in litt.* 2006; BLM 2008).

During habitat conversion activities, individuals could be killed or injured by operation of heavy equipment (crushing, burial by earthmoving equipment, discing, grading, mowing) or flooding of habitat. Individuals could be harassed during construction by noise, ground vibrations and compaction of burrows, construction lighting, and disruption of foraging and breeding behavior. Individuals not killed directly by operation of equipment would probably find themselves in suboptimal habitat with a decreased carrying capacity due to lower availability of foraging and breeding habitat and greater vulnerability to predation. If individuals were displaced from converted lands into nearby native habitat population densities, intraspecific competition, and predation pressure would be likely to increase. Animals which lost their fear of humans could become more vulnerable to shooting, poisoning, and roadkill.

<u>Waterfowl blinds</u>

Waterfowl blinds are large drums dug part way into the ground and placed at the edges of playas to conceal hunters. When left uncovered, these structures are pitfall traps for blunt-nosed leopard lizards and other reptiles and small mammals resulting in their mortality. In 1991, six blunt-nosed leopard lizards were retrieved from waterfowl blinds around two playas at the Semitropic Ridge Preserve. In 1994, 10 blunt-nosed leopard lizards and 17 Tipton kangaroo rats were found dead in waterfowl blinds (Germano 1995). This author also recommended that hunting clubs should be informed of this problem and active waterfowl blinds should be covered when not in use; abandoned blinds should be removed or filled in. At this time, however, waterfowl blinds are only being retrofitted with covers, or removed on a case by case basis.

<u>Pesticides Use</u>

Pesticide use may directly and indirectly affect blunt-nosed leopard lizards (Jones and Stokes 1977; California Department of Food and Agriculture (CDFA) 1984; Service 1985; Williams and Tordoff 1988; Germano and Williams 1992b). The use of pesticides reduces food available for reproducing blunt-nosed leopard lizards in the spring, and later for hatchlings when they should be storing fat to sustain themselves during their first winter (Kato and O'Farrell 1986). The most expansive pesticide program within the range of the blunt-nosed leopard lizard is the broad-scale use of malathion. Malathion is a pesticide regulated by the California Department of Food and Agriculture, and is typically aerially distributed across much of the blunt-nosed leopard lizard range to reduce impacts of the curly top virus on sugar beet production. The most important effect of malathion upon blunt-nosed leopard lizard survival and recovery is the associated reduction in insect prey populations which can last between 2 to 5 days (CDFA 1984).

In a 2000 biological opinion, the Service authorized the renewal of a five-year pesticide use permit to CDFA for use of malathion which included measures to protect the blunt-nosed leopard lizard (Service 2000). These measures allow the aerial application of malathion in some blunt-nosed leopard lizard conservation areas prior to April 15 and after October 15; thus, avoiding the primary blunt-nosed leopard lizard activity period. Notably, in 2006 CDFA treated 53,965 acres with malathion in Kern, Kings, and Fresno Counties (CDFA 2006). The CDFA pesticide use permit for malathion is currently being revised through formal consultation with the Service. Other unregulated pesticides (e.g., common household pyrethroids [California Department of Pesticide Regulation 2006; Keith 2006]) likely pose additional threats to blunt-nosed leopard lizards by reducing insect prey populations. One recent study on the effects of malathion on insect abundance showed a significant decline in the number of ants in malathion-treated plots relative to control plots (Redak 2006); ants are a likely food source for blunt-nosed leopard lizards. Germano *et al.* (2007) reported that the effects of spraying malathion within blunt-nosed leopard lizard habitat remained largely speculative, but warrant expeditious research.

Fumigating rodents in burrows may also harm blunt-nosed leopard lizards that shelter in those burrows (Hansen *et al.* 1994). The U.S. Environmental Protection Agency (USEPA) bulletins governing use of rodenticides have greatly reduced the risk of significant mortality to blunt-nosed leopard lizard populations. The California EPA, CDFA, county agricultural departments, CDFG, and the USEPA collaborated with the Service in the development of County Bulletins that both are efficacious and acceptable to land owners (Service 1998). However, the use of rodenticides in blunt-nosed leopard lizard habitat continues to be a potential threat to the species as this effectively reduces the number of rodents available to dig burrows for secondary use by blunt-nosed leopard lizards.

<u>Climate change</u>
Long-term monitoring studies (Germano *et al.* 1994; Germano *et al.* 2004; Germano and Williams 2005; Williams *in litt.* 2006) show that blunt-nosed leopard lizard populations drastically decline during consecutive years of drought or above average precipitation. Also, blunt-nosed leopard lizard aboveground activity is highly dependent upon temperature. Optimal activity occurs when air temperatures are 74 to 104 degrees Fahrenheit and ground temperatures are 72 to 97 degrees Fahrenheit (Service 1985, 1998). Therefore, blunt-nosed leopard lizard population stability and behavior is very sensitive to any changes in precipitation or temperature. Climate models predict for California an overall warming of 3.0 to 10.4 degrees Fahrenheit by 2100 (Cayan *et al.* 2006) but vary in their predictions for precipitation. VanRheenen *et al.* (2004), however, predicts a decrease in precipitation in the southern San Joaquin. Any significant changes in temperature or precipitation could have drastic effects on blunt-nosed leopard lizard populations. Climate change will likely result in changes in the vegetative communities of blunt-nosed leopard lizard habitat and potentially increase exotic species. However, there is insufficient data available at this time to predict the effects of climate change on the blunt-nosed leopard lizard.

Summary of Factor E
In summary the following threats, since the time of listing the following additional threats to the blunt-nosed leopard lizard have been identified: altered vegetation; climate change; broad-scale pesticide use and application; and, vehicle (roadway traffic and ORV) induced mortality. In addition, altered vegetation communities (grazing, exotic grasses, and wildfire regime), vehicle strikes, waterfowl blinds, broad-scale pesticide application, and climate change continue to impact blunt-nosed leopard lizard populations. These on-going threats pose additional challenges to successful blunt-nosed leopard lizard recovery.

II.D. Synthesis

At the time the species was listed, conversion of natural habitat into agricultural lands in the San Joaquin Valley resulted in the reduction of blunt-nosed leopard lizard habitat to less than 15 percent of its historic range (Service 1985; Germano and Williams 1992a; Jennings 1995). Remaining habitat is highly fragmented and confined to a few scattered areas from southern Merced County to western Kern County (Hansen *et al.* 1994). The blunt-nosed leopard lizard continues to be threatened by degradation to its habitat from the on-going modification and conversion of existing habitat to agriculture, petroleum and mineral extraction, residential and commercial development. In addition, altered vegetation communities (due to grazing, nonnative grasses, and altered wildfire regime), vehicle strikes, waterfowl blinds, broad-scale pesticide application, rodenticide application, and climate change continue to impact blunt-nosed leopard lizard populations. Research has reported that collective habitat loss has caused the reduction and fragmentation of populations and decline of blunt-nosed leopard lizard (Stebbins 1954; Montanucci 1965; Service 1980, 1985; Germano and Williams 1993).

Although some progress in recovery of the species has been made within the southern range of blunt-nosed leopard lizard, the majority of the recovery criteria outlined in the Recovery Plan have not been achieved (see Table 1). The downlisting criteria for the blunt-nosed leopard lizard require the protection of at least 5,997 acres of contiguous habitat in five specified recovery areas representing the geographic range of the species (three in the foothills and two on the Valley floor). Also required for each protected area is the stability of the population (greater than 2 blunt-nosed leopard lizards per hectare through a precipitation cycle) and the approval and implementation of a management plan that includes the survival of blunt-nosed leopard lizard as an objective. Only in the Carrizo Plain Natural Area is the acreage requirement surpassed with the establishment of the Carrizo Plain National Monument; however, long-term population surveys show significant declines in the population during wet years. The 5,278 acre Semitropic Ridge Preserve approaches the acreage requirement for Valley floor habitat in Kern County, but blunt-nosed leopard lizard population densities there are too low. Blunt-nosed leopard lizard habitat is protected in smaller fragments in the foothills of western Kern County and the Ciervo-Panoche area; however, there are no preserves protecting blunt-nosed leopard lizard populations on the Valley floor in Merced or Madera Counties. Therefore, the downlisting criteria have not been met.

In summary, based on the lack of protection of sufficient habitat representing the geographic range of the species, the low density and instability of the populations, and the continuation of threats to the species, we conclude that the blunt-nosed leopard lizard continues to meet the definition of endangered, and is in danger of extinction throughout its known range.

III. RESULTS

III.A. Recommended Classification:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist (*Indicate reasons for delisting per 50 CFR 424.11):*
____ *Extinction*
____ *Recovery*
____ *Original data for classification in error*
__X__ No change is needed

III.B. New Recovery Priority Number __N/A__

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

The five most important actions that should be taken within the next five years to facilitate the recovery of the blunt-nosed leopard lizard include:

1. Facilitate research on the effects of solar projects on blunt-nosed leopard lizard behavior and compatibility.
2. Establish corridors between existing natural areas in Kern and Tulare Counties (i.e., Buena Vista Valley, Elk Hills, Lokern Natural Area, Buttonwillow ER, Semitropic Ridge Preserve, Kern NWR, Allensworth ER, Pixley NWR) (Service 1998; Selmon *in litt.* 2006) to enhance the metapopulation recovery strategy.
3. Establish a preserve or conservation easement on the natural lands of Madera Ranch in western Madera County (Service 1998). Protect blunt-nosed leopard lizard habitat in the Panoche Valley and in dispersal corridors in western Fresno County—Panoche Creek and Silver Creek (Service 1998; Lowe *et al.* 2005), Anticline Ridge, the western rim of Pleasant Valley, Guijarral Hills, and the north end of the Kettleman Hills (Service 1998).
4. Include the flexibility to alter the dates and stocking rates of livestock within all RMP where blunt-nosed leopard lizards have potential to occur, including the Carrizo Plain National Monument RMP, Bakersfield RMP, Caliente RMP and Hollister RMP to adaptively manage annual plant production and prevent the dominance of exotic grasses in blunt-nosed leopard lizard habitat (Germano *et al.* 2001); grazing prescriptions should be tailored to suit the ecological needs specific to the area.
5. Coordinate with hunting clubs for blunt-nosed leopard lizard protection: active waterfowl blinds should be covered when not in use, and abandoned blinds should be removed or filled in to prevent entrapment of blunt-nosed leopard lizard and other wildlife (Germano 1995).

Other important actions that are important to facilitate blunt-nosed leopard lizard recovery include the following items.

Kern County--completion of HCPs and issuance of incidental take permits

- Complete the Kern County Valley Floor HCP
- Complete the Chevron Lokern HCP
- Complete the Oxy of Elk Hills HCP
- Encourage Crimson Resource Management to start an HCP or section 7 formal consultation to protect lands in Buena Vista Valley, NPR-2, and Buena Vista Hills

Habitat management

- Assist the Lokern Coordination Team in the development of the 44,000-acre Lokern Natural Area in western Kern County

Future research and monitoring

- Continue long-term monitoring of population trends on the Valley floor (e.g., Pixley NWR, Lokern Natural Area, Semitropic Ridge Preserve, Buttonwillow ER) and in the foothills (e.g., Carrizo Plain Natural Area , Elk Hills) (Germano and Williams 1992b; Service 1998)
- Census and monitor blunt-nosed leopard lizard populations in western Madera County, central Merced County, and the Ciervo-Panoche Natural Area (Service 1998)
- Study the effects of grazing on blunt-nosed leopard lizard along precipitation gradients in the Elkhorn and Carrizo Plains to determine appropriate grazing prescriptions specific for each area
- Facilitate research on the effects of CVPCP and CVPIA programs on blunt-nosed leopard lizard recovery. Study the effects of translocation (e.g., Allensworth ER) and agricultural land retirement (e.g., Tranquility and Atwell Island sites) on blunt-nosed leopard lizard (Service 1998; Germano and Williams 1992b; Selmon *in litt.* 2006)
- Assess potential effects of malathion upon the prey base of the blunt-nosed leopard lizard (Germano *et al.* 2007) and apply findings to the CDFA Curly Top Virus Control Program.

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Appendix A—Analysis of downlisting Criteria for Blunt-nosed Leopard Lizard 5-Year Review

Summary

The downlisting criteria for the blunt-nosed leopard lizard require the protection of five or more areas each about 5,997 acres or more of contiguous, occupied habitat, including one each in the following areas: the Valley floor in Merced or Madera Counties, the Valley floor in Tulare or Kern Counties, the foothills of the Ciervo-Panoche Natural Area, the foothills of western Kern County, and the foothills of the Carrizo Plain Natural Area (Figures 1 and 2). Only in the foothills of the Carrizo Plain Natural Area is the criterion achieved with the protection of 55,000 acres of blunt-nosed leopard lizard habitat by the Carrizo Plain National Monument. There are no preserves containing significant populations of blunt-nosed leopard lizard on the Valley floor in Merced or Madera Counties. Within the Valley floor in Tulare or Kern Counties, the Semitropic Ridge Preserve approaches the criterion by protecting 5,278 acres of contiguous blunt-nosed leopard lizard habitat. Pixley NWR protects 3,000 acres of contiguous habitat in Tulare County. The Lokern Natural Area protects over 13,000 acres in Kern County but in fragmented 10 – 640-acre parcels. Within the Ciervo-Panoche Natural Area, two ACECs separated by 2 miles protect 4,800 acres and 3,800 acres of contiguous blunt-nosed leopard lizard habitat, respectively. Within the foothills of western Kern County, the Oxy conservation lands protect 2,882 acres of contiguous habitat on the North Flank of Elk Hills and 3,770 acres in Buena Vista Valley. Therefore, the recovery criterion for protection of 5,997 acres of contiguous habitat is achieved in the foothills of the Carrizo Plain Natural Area , but not in the four other specified recovery areas.

The downlisting criteria also require that for each protected area a management plan is approved and implemented that includes the survival of blunt-nosed leopard lizard as an objective. The following areas have such management plans: Kern NWR; Pixley NWR; the CNLM lands at Semitropic Ridge Preserve; the CNLM, PXP, and BLM lands in the Lokern Natural Area; the Oxy conservation lands near Elk Hills; the BLM lands of the Carrizo Plain National Monument; the Coles Levee Ecosystem Preserve; and KWB Conservation Lands. Therefore, the downlisting criterion for the approval and implementation of a management plan in all protected areas is partly achieved.

Lastly, the downlisting criteria require population stability in the protected areas with the mean population density remaining above 2 per hectare through one precipitation cycle. Annual blunt-nosed leopard lizard surveys show that the population density decreased below 2 per hectare during the wet years in the late 1990s at Pixley NWR (Figure 3) while the density remains below 2 per hectare in the Lokern area, the Elk Hills, Coles Levee Ecosystem Preserve, and KWB Conservation Lands. Population density estimates at Semitropic Ridge Preserve were also well below 2 per hectare during spring road surveys in 2005. There is not sufficient data available at this time to determine whether the Ciervo-Panoche Natural Area or any of the other protected areas achieve the population stability criteria. Therefore, the downlisting criterion for population stability has not been achieved for any of the specified recovery areas.

Analysis of Recovery Criteria

1. ***Protection of five or more areas, each about 2,428 hectares (5,997 acres) or more of contiguous, occupied habitat, as follows:***

Summary

The downlisting criterion for the protection of contiguous blunt-nosed leopard lizard habitat has been achieved in the following areas:

- Foothills of the Carrizo Plain Natural Area

Whereas currently the downlisting criterion for blunt-nosed leopard lizard habitat protection has yet to be met for the following areas:

- Valley floor in Merced or Madera Counties
- Valley floor in Tulare or Kern Counties
  - *Semitropic Ridge Preserve*
  - *Kern National Wildlife Refuge*
  - *Lokern Natural Area*
  - *Buttonwillow Ecological Reserve*
  - *Coles Levee Ecological Preserve (CLEP), Kern Water Bank (KWB) Conservation Lands, and the Tule Elk State Reserve*
  - *Pixley National Wildlife Refuge*
  - *Allensworth Ecological Reserve*
- Foothills of the Ciervo-Panoche Natural Area
- Foothills of western Kern County
  - *Elk Hills Conservation Area*
  - *Naval Petroleum Reserve #2*
  - *Wind Wolves Preserve*

Assessment

Valley floor in Merced or Madera Counties
There are no large preserves in Merced or Madera Counties containing significant populations of blunt-nosed leopard lizard. The preserves in western Merced County (e.g. Grasslands Ecological Area, roughly 179,000 acres) are seasonally flooded and do not support blunt-nosed leopard lizard (Juarez *in litt.* 2006). Therefore, the downlisting criterion for the protection of contiguous blunt-nosed leopard lizard habitat on the Valley floor in Merced or Madera Counties has not been met.

Valley floor in Tulare or Kern Counties
Several large preserves have been established on the Valley floor in Tulare and Kern Counties containing populations of blunt-nosed leopard lizard (Figure 2). These preserves include Semitropic Ridge Preserve, Kern National Wildlife Refuge (NWR), Lokern Natural Area, Buttonwillow Ecological Reserve (ER), Coles Levee Ecosystem Preserve, Kern Water Bank (KWB), Tule Elk State Reserve, Pixley NWR, and Allensworth ER.

Semitropic Ridge Preserve

The Semitropic Ridge Preserve currently protects about 5,278 acres—comprised of 3,093 acres administered by the Center for Natural Lands Management (CNLM), and 2,185 acres administered by CDFG—of contiguous blunt-nosed leopard lizard habitat on the Valley floor of northwestern Kern County (Cypher *in litt.* 2006, Kern County Recorder 2006, Warrick *in litt.* 2006). About 570 acres of CDFG land west of Goose Lake Canal was excluded from the calculation of contiguous lands at Semitropic Ridge because the canal acts as a barrier to blunt-nosed leopard lizard movement (Warrick *in litt.* 2006). Another 120-acre parcel is currently in escrow for the CDFG (Peterson-Diaz *in litt.* 2006), which when protected would bring the total acres of contiguous lands to 5,398 acres. Therefore, the Semitropic Ridge Preserve comes close to the 5,997-acre downlisting criterion; however, only about 1,500 acres of the preserve meet the criterion of maintaining a blunt-nosed leopard lizard population density of greater than 2 per hectare (Warrick *in litt.* 2006). Therefore, the downlisting criteria for the protection of 5,997 acres of contiguous blunt-nosed leopard lizard habitat on the Valley floor of Kern or Tulare Counties and population stability has not been met.

Kern National Wildlife Refuge

The Kern NWR is located in northwestern Kern County about 4 km (2.5 miles) north of the Semitropic Ridge Preserve. The majority of the Kern NWR is seasonally flooded and does not provide habitat for blunt-nosed leopard lizard. About 2,000 acres of Kern NWR are considered to be potential blunt-nosed leopard lizard habitat; however, there have been no confirmed sightings of blunt-nosed leopard lizard there since 1996 (Williams *in litt.* 2006). Surveys for blunt-nosed leopard lizard were conducted in the 1,369-acre Research Natural Area (Units 11 and 12) in 2001 and 2004, but none were found. In the summer of 2006, surveys were conducted in the recently acquired 631-acre Unit 15, which contains better quality blunt-nosed leopard lizard habitat than Units 11 and 12, but no blunt-nosed leopard lizard were observed there either. More intensive surveys are planned for 2007 (Williams *in litt.* 2006), though at the time of this review, results had not been obtained. Therefore, the downlisting criterion for the protection of 5,997 acres of contiguous blunt-nosed leopard lizard habitat on the Valley floor of Kern or Tulare Counties has not been met.

Lokern Natural Area

The Lokern Natural Area is located in western Kern County about 23 km (14.5 miles) south of the Semitropic Ridge Preserve. Currently, 13,160 acres of the Lokern area are protected on Federal or State lands or under conservation easements. The protected Lokern lands include Bureau of Land Management (BLM) lands (3,858 acres), Center for Natural Lands Management (CNLM) lands (3,332 acres), CDFG lands (968 acres), and Plains Exploration & Production Company (PXP; 840 acres) and Occidental of Elk Hills, Inc. (Oxy; 4,162 acres) conservation lands (Service 1995; Nuevo Energy Company and Torch Operating Company 1999; Kern County Recorder 2006; Quad Knopf 2006; G. Warrick, CNLM, pers. comm. 2006). The protected lands, however, are highly fragmented into parcels ranging in size from 10 to 640 acres creating a checkerboard pattern of protected lands. The largest block of contiguous protected lands in the Lokern area is 2,882 acres of Oxy conservation lands (Elk Hills Conservation Area) at the southern end of the Lokern area on the North Flank of the Elk Hills. Therefore, the downlisting criterion for contiguous land protection the Valley floor of Kern or Tulare Counties has not been met.

Chevron USA, Inc. (Chevron), the largest landowner in the Lokern area (17,329 acres), owns the intervening 640-acre sections of the checkerboard pattern of protected lands in the Lokern Natural Area. The draft Chevron Lokern Habitat Conservation Plan (Chevron, *in prep.,* 2008) proposes to protect 11,143 acres in the Lokern area and limit permanent disturbance of its undeveloped Lokern lands to 10 percent per 640-acre section, and temporary disturbance to an additional 5 percent. In total approximately 24,303 acres of contiguous blunt-nosed leopard lizard habitat would be protected when added to the other already protected lands in the Lokern area. On August 17, 2006, Chevron reasserted its commitment to complete the proposed HCP and proceed with acquiring and/or protecting the proposed habitat lands (G. Scott, Chevron, pers. comm. 2006). Still, until the HCP is finalized the habitat loss and protection associated with the proposed HCP remains speculative.

Buttonwillow Ecological Reserve
The Buttonwillow ER is located in western Kern County about 21 km (13 miles) southeast of the Semitropic Ridge Preserve and 16 km (10 miles) east-northeast of the Lokern Natural Area. The Buttonwillow ER protects about 1,350 acres of contiguous blunt-nosed leopard lizard habitat. Buttonwillow ER contains one of the largest and most stable blunt-nosed leopard lizard populations (Selmon *in litt.* 2006). Due to the small size of the preserve, however, the Buttonwillow ER does not meet the downlisting criterion for contiguous land protection.

Coles Levee Ecological Preserve, Kern Water Bank Conservation Lands, and the Tule Elk State Reserve
The 6,059-acre Coles Levee Ecosystem Preserve (CLEP), 4,263-acre Kern Water Bank (KWB) Conservation Lands, and 969-acre Tule Elk State Reserve are contiguous protected areas in western Kern County located east of the Elk Hills. However, blunt-nosed leopard lizard movement among and within the three preserves is limited by the California Aqueduct, Alejandro Canal, Interstate 5, Highway 43, and Highway 119.

The California Aqueduct bisects the CLEP creating a barrier to blunt-nosed leopard lizard movement and partitioning the preserve into about 1,280 acres to the west and 4,779 acres to the east. Additionally, portions of the CLEP are highly disturbed by high-density oil and gas drilling activities. Although the permit for CLEP HCP (ARCO Western Energy 1995) is not currently valid—as the current land owner, Aera Energy LLC, failed to initially comply with the terms of the HCP—the area is still managed according to its initial conservatory intent. Notably, no blunt-nosed leopard lizards have been observed at CLEP in recent years (Quad Knopf 2005; J. Jones, Quad Knopf, pers. comm. 2006).

Interstate 5 acts as a barrier to blunt-nosed leopard lizard movement and divides the KWB Conservation Lands into 2,589-acre and 1,674-acre parcels (Jones *in litt.* 2006).

The KWB Conservation Lands are protected under the KWB Authority HCP (KWB Authority 1996) and associated biological opinion (Service 1997). However, there are no records of blunt-nosed leopard lizard on the KWB Conservation Lands except for blunt-nosed leopard lizard introductions (Jones *in litt.* 2006, KWB Authority 2006). Although protocol-level blunt-nosed leopard lizard surveys have not been conducted on the KWB lands, these lands have had numerous other reconnaissance and meandering surveys over the years. Given the repetitive negative results from all of these surveys, the blunt-nosed leopard lizard is considered absent from the area (Jones *in litt.* 2006).

Therefore, due to the lack of blunt-nosed leopard lizard sightings and the barriers to blunt-nosed leopard lizard movement among and within the three preserves—Coles Levee Ecological Reserve, Kern Water Bank Conservation Lands, and Tule Elk State Reserve—the downlisting criterion for the Valley floor of Kern or Tulare Counties.

Pixley National Wildlife Refuge

The 6,833-acre Pixley NWR in southwestern Tulare County is divided into three large sections and several smaller sections; all parcels, with one exception, are separated by at least 1.6 km (1 mile). The largest section (Pixley-Main) covers 4,445 acres, but less than 3,000 acres are considered suitable habitat for blunt-nosed leopard lizard due to seasonal flooding of the wetlands and dense vegetative growth. The second largest section (Los Feliz) is roughly 1,476 acres. Very little reconnaissance has been done in this area, however given that the entire area is grazed it is speculatively considered potential blunt-nosed leopard lizard habitat as suitable vegetation conditions may be present. The third largest section (Horse Pasture) contains 800 acres of potential blunt-nosed leopard lizard habitat although the presence of blunt-nosed leopard lizard has not been documented (Williams *in litt.* 2006). In summary, the largest contiguous block of blunt-nosed leopard lizard habitat at Pixley NWR is 3,000 acres; thus, this downlisting criterion has not been met.

Allensworth Ecological Reserve

The Allensworth ER is owned by CDFG and located in southwestern Tulare County. This ER contains four large blocks of land containing suitable habitat for the species. However, the blocks are separated from each other and do not form contiguous habitat as required by this downlisting criterion. The largest block totals 2,482 acres and is not large enough by itself to meet the recovery goal of 5,997 acres of contiguous blunt-nosed leopard lizard habitat. In addition, the blunt-nosed leopard lizard population at Allensworth Ecological Reserve has been declining over the past 15 years (Selmon, pers. comm. 2006). Therefore, this recovery criterion has not been met for the Valley floor of Kern or Tulare Counties.

The sizes of the blocks are 2,482 acres, 1,432 acres, 551 acres, and 536 acres. The largest block is located about 3 km (1.9 miles) southeast of the Pixley-Main section of the Pixley NWR. The second largest and southernmost block is located about 5 km (3.1 miles) southwest of the largest block and about 18 km (11.2 miles) northeast of Kern NWR. Habitat planning goals include connecting the blocks of natural lands at Allensworth ER with Pixley NWR through land acquisition and retirement of agricultural fields; however, Deer Creek acts a barrier to blunt-nosed leopard lizard movement along the southern boundary of Pixley-Main (P. Williams, Kern NWR Complex, pers. comm. 2006). The number of blunt-nosed leopard lizards at Allensworth ER has also declined over the past 15 years (Selmon *in litt.* 2006). In summary, the largest block at Allensworth ER is 2,482 acres and is not sufficient to meet this downlisting criterion for the Valley floor of Kern or Tulare Counties.

Foothills of the Ciervo-Panoche Natural Area

The BLM owns about 34,000 acres in the Ciervo-Panoche Natural Area that are considered to be blunt-nosed leopard lizard habitat (Lowe 2006). However, only the Areas of Critical Environmental Concern (ACECs) have regulatory protection under the Federal Land Policy and Management Act of 1976. The BLM allows oil and gas leasing with limited surface use stipulations for threatened and endangered species on the four ACECs (BLM 1984, 1997) and thus confer some protection to approximately 16,600 acres of blunt-nosed leopard lizard habitat (Terry 2006).

Some of the best blunt-nosed leopard lizard habitat in the region, however, remains unprotected on private lands in the Panoche Valley and near Silver Creek. Only 3 of the 21 (14 percent) reported occurrences of blunt-nosed leopard lizard are within an ACEC (CNDDB 2006; Lowe *in litt.* 2006). Much of the rest of the Ciervo-Panoche Natural Area is not suitable habitat for blunt-nosed leopard lizard due to dense vegetative cover and clay soils (Lowe *in litt.* 2006; L. Saslaw, pers. comm. 2006). Since the largest protected block of blunt-nosed leopard lizard habitat is 4,800 acres, it does not meet this downlisting criterion for the foothills of the Ciervo-Panoche Natural Area.

Foothills of western Kern County

The foothills of western Kern County contain blunt-nosed leopard lizard habitat on both public and private lands. Protected areas and other public lands containing blunt-nosed leopard lizard habitat occur in the Elk Hills, Naval Petroleum Reserve #2 (NPR-2), and the Wind Wolves Preserve.

Elk Hills Conservation Area

The Oxy conservation lands (Elk Hills Conservation Area) consist of 4,162 acres on the North Flank of the Elk Hills near Lokern and another 3,770 acres in the Buena Vista Valley (Buena Vista Valley) along the southern edge of the Elk Hills. Within the North Flank, only 2,882 acres (mentioned above in the Lokern Natural Area) are contiguous. All 3,770 acres of the Oxy conservation lands in the Buena Vista Valley area are contiguous (Quad Knopf 2006) but are not sufficient to meet this downlisting requirement.

Currently, Oxy has proposed an Oxy Elk Hills HCP (Live Oak & Associates, Inc., *in litt.* 2009) that would permit an additional permanent disturbance of up to 4,000 acres and temporary disturbance of up to 3,000 acres within Elk Hills for oil and gas development. The HCP proposes to preserve 81.8 percent (roughly 38,780 acres) of the 47,409-acre Elk Hills NPR-1 (Live Oak & Associates, Inc., *in litt.* 2009). Until the HCP is finalized and the Service issues the incidental take permit, habitat loss and protection associated with the proposed HCP is speculative.

Naval Petroleum Reserve #2
The BLM owns approximately 9,000 acres in NPR-2 and Buena Vista Valley, mostly in a checkerboard of 640-acre parcels. In 2003 the Service programmatic biological opinion (#1-1-01-F-0063) which covered oil and gas extraction activities on BLM lands was amended to include NPR-2 (Service 2003). However, even though the limits disturbance of high quality habitat (Red Zone Lands) to less than 10 percent per 640-acre section and lower quality habitat (Green Zone Lands) to less than 25 percent (Service 2001), residual habitat on BLM lands has been degraded by past oil and gas exploration activities. Unfortunately, several sections within NPR-2 had already exceeded the disturbance thresholds when the BLM acquired the properties. The biological opinion also limits total permanent disturbance of blunt-nosed leopard lizard habitat on BLM lands throughout Kings and Kern Counties to 180 acres (Service 2001, 2003). Since the BLM lands at NPR-2 are highly fragmented they do not meet the downlisting criterion for the foothills of western Kern County.

Wind Wolves Preserve
About 2,000 acres of potential blunt-nosed leopard lizard habitat is protected on the edge of the large Wind Wolves Preserve. Wildlands Conservancy, a non-profit group, purchased this southwestern Kern County site in 2001. In the early 1990s a blunt-nosed leopard lizard sighting was reported in the Preserve at Rincon Flat near Interstate 5 (CNDDB 2006). However, no blunt-nosed leopard lizards have been observed on the Preserve since that initial report. The 2,000 acres of potential blunt-nosed leopard lizard habitat do not meet the downlisting criterion for the foothills of western Kern County.

Foothills of the Carrizo Plain Natural Area
The 250,000-acre BLM Carrizo Plain National Monument and adjacent CDFG Ecological Reserve protect blunt-nosed leopard lizard populations on the Carrizo Plain Natural Area (about 55,000 acres) and roughly 1,000 acres of the Upper Cuyama Valley (Saslaw *in litt.* 2006). These lands meet the downlisting criterion for the protection of 5,997 acres of contiguous blunt-nosed leopard lizard habitat in the foothills of the Carrizo Plain Natural Area.

2. *A management plan has been approved and implemented for all protected areas identified as important to the continued survival of blunt-nosed leopard lizard that includes survival of the species as an objective.*

Summary

The downlisting criterion for an approved and implemented management plan that includes the continued survival of blunt-nosed leopard lizard as an objective has been met for the following protected areas:

- CNLM lands of the Semitropic Ridge Preserve

- CNLM, PXP, and BLM lands of the Lokern Natural Area
- Oxy lands of the Elk Hills Conservation Area
- Kern and Pixley NWRs
- BLM Hollister RMP
- BLM, TNC, and CDFG lands of the Carrizo Plain National Monument

All other protected areas, including CDFG lands of the Semitropic Ridge, California State Parks Tule Elk State Reserve, Buttonwillow Ecological Reserve Allensworth Ecological Reserve, and Wind Wolves Preserve have not currently been drafted, or do not include the continued survival of the blunt-nosed leopard lizard as an objective. A joint-management plan for the Carrizo Plain Natural Area—Carrizo Plain National Monument (BLM), the Carrizo Plain ER (CDFG), and lands administered by the Nature Conservancy (TNC)—and, the Caliente RMP are also currently being revised. Therefore, the downlisting criterion is only partly met.

Assessment

The CNLM lands of the Semitropic Ridge Preserve and Lokern Natural Area have an approved management plan with a management goal to ―prevent the extinction of threatened and endangered species through maintenance of high quality native habitat which supports viable, self-sustaining populations" (Warrick *in litt.* 2006). The Semitropic Ridge Preserve is grazed by sheep to control exotic grasses but the grazing is not very effective during unusually wet years (Warrick *in litt.* 2006). None of the CDFG lands currently have an approved management plan (E. Cypher, pers. comm. 2006; S. Juarez, CDFG, pers. comm. 2006). CDFG does not have any grazing leases for its lands at Semitropic Ridge but would like to at some point (Warrick *in litt.* 2006). Therefore, the criterion has been met for the CNLM lands at Semitropic Ridge and Lokern but not for the CDFG lands.

The Kern NWR and Pixley NWR both have management plans that include the survival of blunt-nosed leopard lizard as an objective. The 1,369-acre Research Natural Area of Kern NWR is managed by winter grazing for blunt-nosed leopard lizard and Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*). Approximately 2,890 acres of Pixley-Main has been designated as endangered species habitat. All of Pixley NWR, except about 1,000 acres, is managed for blunt-nosed leopard lizard by grazing from November through April each year (Williams *in litt.* 2006). Therefore, this criterion has been met for the Kern and Pixley NWRs.

The Caliente Resource Management Plan (RMP) (BLM 1997) covers all BLM lands under the jurisdiction of the Bakersfield field office, but not the more recently acquired NPR-2 lands. The management plan includes the survival of listed species including blunt-nosed leopard lizard as an objective. The BLM is currently revising its Caliente RMP. The new RMP will include NPR-2 and will also provide measures for the protection of the blunt-nosed leopard lizard (L. Saslaw, BLM, pers. comm. 2006). Therefore, the downlisting criterion has been met for the BLM lands under the jurisdiction of the Bakersfield office, except for NPR-2.

The Carrizo Plain Natural Area Management Plan (BLM 1996) established the cooperative management of the 250,000 acres within the Carrizo Plain Natural Area, comprised of: the Carrizo Plain National Monument (BLM), the Carrizo Plain ER (CDFG), and lands administered

TNC. This joint-management plan includes measures for the protection of blunt-nosed leopard lizard. The BLM is currently preparing the Carrizo Plain National Monument RMP that will specifically address management of the Carrizo Plain National Monument (L. Saslaw, pers. comm. 2006). The draft RMP and Environmental Impact Statement (EIS) are currently in preparation, and are expected to be available for public review in fall 2009. Concurrently CDFG is revising its management plan for the protection of blunt-nosed leopard lizard within the Carrizo Plain ER (Stafford *in litt.* 2007). Based on the approval and implementation of the pending revision for the joint-management plans of the Carrizo Plain Natural Area, the downlisting criterion has been met for the BLM, CDFG, and TNC lands of the Carrizo Plain National Monument.

Service biological opinion (file number 1-8-07-F-19) for the revised Hollister RMP was issued in June 2007 (Service 2007), and the RMP was finalized on September 7, 2007. This plan established resource management goals for areas where blunt-nosed lizard habitat was known or had potential to occur, including: the Panoche Hills management unit has approximately 7,800 acres of habitat for sensitive species in the plateau area; and, the Griswold/Tumey Hills management unit includes 2,500 acres of habitat areas for sensitive species in the plateau area in the northern Tumey Hills. Blunt-nosed leopard lizards have been observed on private lands adjacent to the Tumey Hills management unit in the eastern Panoche valley. Lastly, the Coalinga management unit has 14,660 acres designated for sensitive species, including the blunt-nosed leopard lizard. Given BLM's commitment to implement the resource management goals, the biological opinion permitted BLM to take blunt-nosed leopard lizards or impact its habitat by conducting its grazing management, energy and minerals program, vegetation management program, and transportation program. The Hollister RMP therefore achieves this downlisting criterion.

Oxy is currently managing its 7,801 acres of conservation lands (Elk Hills Conservation Area) in Lokern and the Buena Vista Valley for the survival of blunt-nosed leopard lizard and other listed species in accordance with the Elk Hills biological opinion (Service 1995) and the 1998 Conservation Management Agreement. Also within the Elk Hills area, Berry Petroleum was authorized under the North Midway Sunset biological opinion (Service 2006) to develop a management plan that includes the survival of blunt-nosed leopard lizard as an objective for its 1,725 acres of conservation lands in Lokern, Buena Vista Valley, and Midway Valley. Therefore, the downlisting criterion has been met for the Elk Hills Conservation Area, but not yet for the Berry Petroleum lands.

The PXP, Coles Levee, and KWB Authority HCPs contain management plans which include the survival of blunt-nosed leopard lizard as an objective in the Lokern Natural Area, Coles Levee Ecosystem Preserve, and KWB Conservation Lands, respectively (ARCO Western Energy 1995; KWB Authority 1996; Nuevo Energy Company and Torch Operating Company 1999). Less than one-fourth of the KWB Conservation Lands, however, are currently grazed by sheep to control exotic grasses that threaten blunt-nosed leopard lizard habitat (KWB Authority 2006). Chevron and Oxy are currently preparing HCPs for their lands in the Lokern area and Elk Hills, respectively; however, it is unknown when the HCPs will be finalized and approved. Additionally, no management plans have been implemented for blunt-nosed leopard lizard habitat on private lands in the Ciervo-Panoche Natural Area and in western Kern County.

Therefore, the criterion for the approval and implementation of a management plan that includes the survival of blunt-nosed leopard lizard as an objective has been met for the PXP conservation lands in Lokern but not for the Chevron or Oxy lands (outside of the Elk Hills Conservation Area).

In the Lokern area, an interagency cooperative acquisition and management plan for the conservation of the 44,000-acre Lokern Natural Area is in draft form. Participants include Federal agencies (BLM, Service), State agencies (CDFG, California Energy Commission, California State University Bakersfield), private environmental groups and biological consulting firms (The Nature Conservancy [TNC], CNLM, ESRP, McCormick Biological, Inc.), and private oil companies (Chevron; Oxy; Aera Energy, LLC [Aera]; PXP) (Service 1998). The parties periodically meet to coordinate their efforts, but there is no estimate for when the Lokern Natural Area management plan will be approved and implemented. Therefore outside of the CNLM and PXP conservation lands, the recovery criterion has not been met for the Lokern Natural Area.

In summary, only the CNLM lands of the Semitropic Ridge Preserve, the CNLM, PXP, and BLM lands of the Lokern Natural Area, the Oxy lands of the Elk Hills Conservation Area, the Kern and Pixley NWRs, and the BLM, TNC, and CDFG lands of the Carrizo Plain National Monument have a management plan for blunt-nosed leopard lizard that has been approved and implemented. The management plans for the Carrizo Plain National Monument and the Ciervo-Panoche Natural Area are currently being revised by the BLM. Therefore, the downlisting criterion is only partly met.

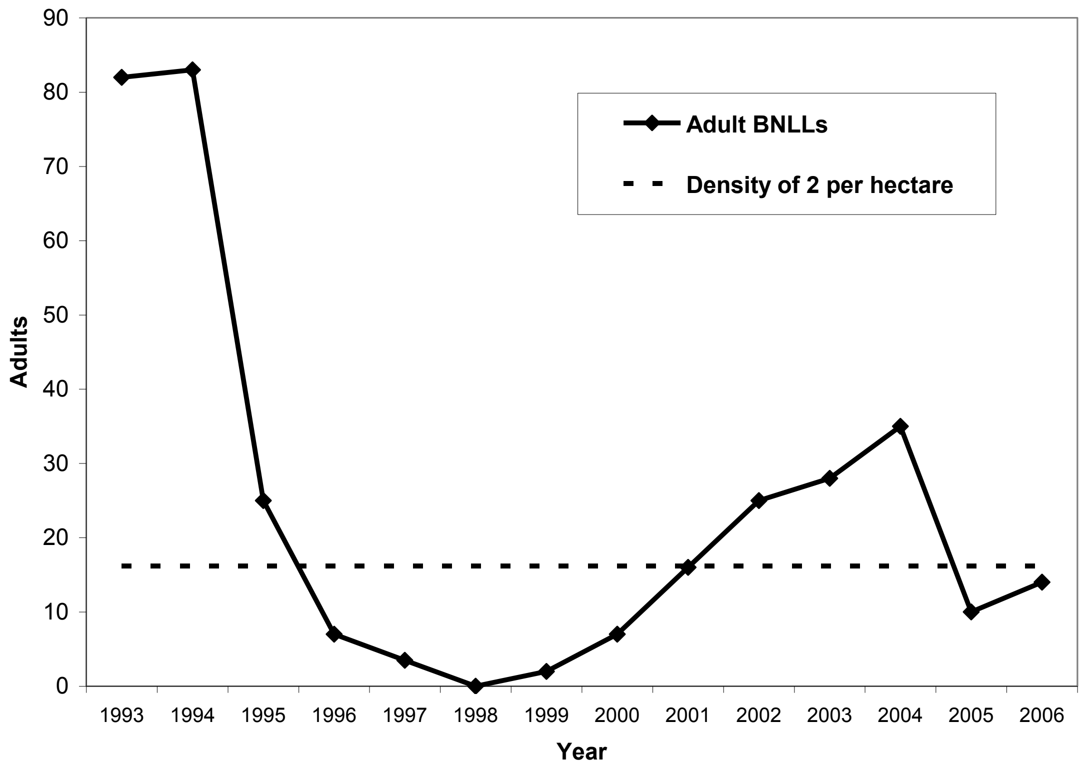
3. *Each protected area has a mean density of 2 or more blunt-nosed leopard lizards per hectare (1 per acre) through one precipitation cycle*.

Long-term population studies have monitored the population trends in blunt-nosed leopard lizard at Elkhorn Plain (Germano *et al.* 2004, Germano and Williams 2005), Semitropic Ridge (Warrick 2006), Lokern (Germano *et al.* 2005, Warrick 2006), Elk Hills (Quad Knopf 2006), Pixley NWR (ESRP, Williams *in litt.* 2006), Buttonwillow ER, and Allensworth ER (Selmon *in litt.* 2006), and Coles Levee Ecosystem Preserve (Quad Knopf 2005). However, long-term population studies have not been conducted for blunt-nosed leopard lizard in the Cuyama Valley, the Ciervo-Panoche area, Merced County, or Madera County, the status of these populations is unknown (Stafford *in litt.* 2006).

Pixley NWR
Figure 3 illustrates the population instability of blunt-nosed leopard lizard at Pixley NWR. Spring surveys of adult blunt-nosed leopard lizards from 1993 to 2006 show that the density was below 2 per hectare from 1996 to 2000 during years of above average precipitation. No blunt-nosed leopard lizards were found during surveys in 1998 due to flooding. Blunt-nosed leopard lizard numbers increased from 2001 to 2004 during years of below average precipitation but declined again below 2 per hectare during the wet years 2005 to 2006. Previous short-term studies observed blunt-nosed leopard lizard population densities at Pixley NWR of 0.3 to 10.8 per hectare (Uptain *et al.* 1985), 3.3 per hectare (Tollestrup 1979), and 6.7 to 7.0 per hectare (Williams and Germano 1991). In summary, due to the decline in blunt-nosed leopard lizard numbers during wet years, this downlisting criterion has not been met at Pixley NWR.

Elkhorn Plain
ESRP has monitored population trends of blunt-nosed leopard lizards on the Elkhorn Plain biannually since 1989 (Williams *et al.* 1993; Germano *et al.* 2004; Germano and Williams 2005). From 1989 to 1994, the population density ranged from 4.9 to 20.2 adults per hectare, except for 1990 when the density decreased to 1.7 adults per hectare following two years of severe drought. Then, after several years of above average precipitation, the population density of blunt-nosed leopard lizard decreased in 1995 and remained between 1.7 to 4.9 adults per hectare through 2003. The density remained below 1.8 adults per hectare during the wettest years from 1998 to 2000. Therefore, due to the decline in blunt-nosed leopard lizard numbers during consecutive wet years or years of severe drought, this downlisting criterion has not been met on the Elkhorn Plain.

Figure 3, The number of adult blunt-nosed leopard lizards observed during spring surveys on the Deer Creek West 20-acre plot, Pixley National Wildlife Refuge, Tulare County (Source: ESRP, Williams *in litt.* 2006)



Kern County Valley floor
The largest and most stable population of blunt-nosed leopard lizard is thought to be at Semitropic Ridge Preserve. However, the number of all lizards at Semitropic Ridge Preserve has been decreasing since 2003 (Selmon *in litt.* 2006). At Semitropic Ridge Preserve, road surveys during May and June, 2005, found an average of 6 blunt-nosed leopard lizards per 32-km (20-mile) survey (Warrick 2006), which is far below the criterion for 2 blunt-nosed leopard lizards per hectare. Road surveys, however, are likely overestimates of blunt-nosed leopard lizard population density in an area because of the preference of the species for roads (Warrick *et al.* 1998; Warrick *in litt.* 2006). Additionally, the land manager at Semitropic Ridge Preserve stated that only about 1,500 acres of the preserve comes close to supporting a population density of 2 blunt-nosed leopard lizards per hectare (Warrick *in litt.* 2006). Therefore, the downlisting criterion has not been met at the Semitropic Ridge Preserve. No population density estimates are available at this time for Buttonwillow ER. Blunt-nosed leopard lizard numbers at Allensworth ER are reported to have declined over the past 15 years (Selmon *in litt.* 2006), but no data are available at this time.

At Lokern, road surveys in May and June, 2005, observed an average of 32.7 blunt-nosed leopard lizards per 82-km (51-mile) survey (Warrick 2006). Therefore, the population density estimate—ranging from 0.40 to 1.33 blunt-nosed leopard lizards per hectare—is well below the recovery criterion (Warrick *in litt.* 2006). Additionally, grazed and ungrazed plots on the Lokern were surveyed annually between 1997 to 2005, using a 10-day census survey method. These results indicated that the density of blunt-nosed leopard lizards on ungrazed plots remained less than 0.5 per hectare (notably according to Germano *et al.* (2005) no blunt-nosed leopard lizards were observed during 2000 – 2003); and, densities on grazed plots ranged from 0.06 – 0.25 per hectare during 1997 to 2001, and increased to 0.46 – 1.50 per hectare during 2002 to 2005 (Germano *et al.* 2005). Nonetheless, the downlisting criterion has not been met at Lokern.

At Coles Levee Ecosystem Preserve, blunt-nosed leopard lizard surveys have been conducted annually from 1996 to 2004 (Quad Knopf 2005). Only 10 blunt-nosed leopard lizards were observed during the surveys and no blunt-nosed leopard lizards have been observed in the last three years (Quad Knopf 2005). However, incidental observations of blunt-nosed leopard lizards are occasionally made during other monitoring activities (Quad Knopf 2005). Therefore, the downlisting criterion has not been met at Coles Levee Ecosystem Preserve.

At the KWB Conservation Lands, no protocol-level surveys for blunt-nosed leopard lizards have been conducted and the species has not been observed on numerous reconnaissance and meandering surveys over the years. Thus, the population density is most likely well below 2 blunt-nosed leopard lizards per hectare (Jones *in litt.* 2006; Warrick *in litt.* 2006). Therefore, the downlisting criterion has not been met at the KWB Conservation Lands.

Elk Hills Conservation Area
At a site near the Elk Hills Conservation Area, blunt-nosed leopard lizard population density was previously estimated at 0.40 adults per hectare (Kato *et al.* 1987). More recently, blunt-nosed leopard lizard population trends have been monitored in spring and early fall by means of road and foot surveys from 2001 to 2005 in the North Flank and Buena Vista Valley lands of the Elk Hills Conservation Area (Quad Knopf 2006). Population density estimates from 2000 - 2005—

calculated from the average sightings per mile of road survey (with a width of 50 meters)—remained below 0.02 blunt-nosed leopard lizards per hectare in both the North Flank and Buena Vista Valley (J. Jones, Quad Knopf, Inc., pers. comm. 2006). Foot surveys conducted during the same time periods, supported these low observation numbers, and reported 0.01 blunt-nosed leopard lizards per hectare in the North Flank and from 0.01 – 0.07 blunt-nosed leopard lizards per hectare in Buena Vista Valley. Therefore, due to the continually low densities observed in the North Flank and in Buena Vista Valley, the downlisting criterion has not been met at the Elk Hills Conservation Area.

<u>*Delisting Criteria*</u>

Delisting will be considered when, in addition to the criteria for downlisting, all of the following conditions have been met:

1) *Three additional areas with about 2,428 hectares (5,997 acres) or more of contiguous, occupied habitat including:*
   A) *One on the Valley floor;*
   B) *One along the western Valley edge in Kings or Fresno Counties; and*
   C) *One in the Upper Cuyama Valley of eastern San Luis Obispo and eastern Santa Barbara Counties.*
2) *A management plan has been approved and implemented for all protected areas identified as important to the continued survival of blunt-nosed leopard lizard that includes survival of the species as an objective.*
3) *Each protected area has a mean density of 2 or more blunt-nosed leopard lizards per hectare (1 per acre) through one precipitation cycle.*

<u>Other Valley Floor</u>

The protection of blunt-nosed leopard lizard habitat on the Valley floor in Kern and Tulare Counties and in Merced and Madera Counties is discussed above in the above section on the Downlisting Criteria. None of the protected areas meet the downlisting criterion for the protection of 5,997 acres of contiguous blunt-nosed leopard lizard habitat on the Valley floor in these areas. Therefore, the delisting criterion has also not been met.

<u>Western Valley edge in Kings or Fresno Counties</u>

Alkali Sink Ecological Reserve

The Alkali Sink ER protects 933 acres of alkali sink scrub and Valley annual grasslands blunt-nosed leopard lizard habitat in northwestern Fresno County (Figure 2). The purpose of the Alkali Sink ER Interim Management Plan (Ashford 1990a) is to preserve the remaining Alkali Sink Scrub habitat type, protect habitat for the Fresno kangaroo rat and blunt-nosed leopard lizard from agricultural conversion. There are no population data available at Alkali Sink ER at this time. The 12,000-acre Mendota Wildlife Area is located immediately to the south of the Alkali Sink ER. However, over two-thirds of the Wildlife Area are seasonally flooded and do not support blunt-nosed leopard lizard habitat. No blunt-nosed leopard lizards have been observed at the Mendota Wildlife Area (S. Juarez, CDFG, pers. comm. 2006). Therefore, the Alkali Sink ER and Mendota

Wildlife Area do not meet the delisting criterion for the western Valley edge in Kings or Fresno Counties.

Kerman Ecological Reserve
The Kerman ER is located about 5 miles east of the Mendota Wildlife Area and protects 1,718 acres of Valley Annual Grasslands in northwestern Fresno County (Figure 2). In the Kerman ER Interim Management Plan (Ashford 1990b), protection of Fresno kangaroo rat and blunt-nosed leopard lizard habitat is the principal management focus. Livestock grazing is occasionally permitted to control exotic grasses. Hunting is allowed but vehicles are restricted to roads. There is no population data available for Kerman ER. Therefore, due to its small size, the Kerman ER does not meet the delisting criterion for the western Valley edge in Kings or Fresno Counties.

Kreyenhagen Hills Conservation Bank
The 1,295-acre Kreyenhagen Hills Conservation Bank is located in the foothills of southwestern Fresno County. The conservation bank was established by Wildlands, Inc. for providing mitigation credits for impacts to San Joaquin kit fox (*Vulpes macrotis mutica*) habitat in portions of Fresno and Kings Counties. No blunt-nosed leopard lizards have been observed there (Lopez *in litt.* 2006; Warrick *in litt.* 2006); however, the site has numerous washes that could provide suitable habitat for the species (Lopez *in litt.* 2006). There is one reported occurrence of blunt-nosed leopard lizard approximately one mile off-site within the Jacalitos Creek Watershed (CNDDB 2006, Lopez *in litt.* 2006). In summary, due to the small size of the preserve and lack of sightings of blunt-nosed leopard lizard, the Kreyenhagen Hills Conservation Bank does not meet the delisting criteria for the western Valley edge in Kings or Fresno Counties.

Kettleman Hills Area of Critical Environmental Concern
The BLM's Kettleman Hills ACEC consists of 6,730 acres within the Kettleman Hills of western Kings County. The BLM lands, however, are mostly in a checkerboard pattern of 640-acre and smaller parcels. It is not known how much of the ACEC supports blunt-nosed leopard lizard. The Caliente RMP (BLM 1997) covers the ACEC and meets the criterion for the approval and implementation of a management plan that includes the survival of blunt-nosed leopard lizard as an objective. However, due to the highly fragmented nature of the protected lands, the Kettleman Hills ACEC does not meet the delisting criteria for the western Valley edge in Kings or Fresno Counties.

<u>Upper Cuyama Valley</u>
About 1,000 acres of blunt-nosed leopard lizard habitat is protected on the southern edge of the Carrizo Plain National Monument and Ecological Reserve (Saslaw *in litt.* 2006). Most of the rest of the Cuyama Valley, however, is unprotected on private lands and has been degraded by farming activities. There is no population data for blunt-nosed leopard lizard in Cuyama Valley but the populations are likely decreasing there due to an increasing amount of habitat conversion to intensive irrigated agriculture (Stafford *in litt.* 2006). Therefore, due to the lack of population monitoring data and the lack of protection of sufficient habitat, the delisting criteria for the upper Cuyama Valley have not been met.

Appendix B: Habitat Conservation Plans related to the Blunt-Nosed Leopard Lizard and Biological Opinions

A total of 14 HCPs have been prepared (13 completed and one HCP currently in draft) for which the permit included take of blunt-nosed leopard lizard and/or impacts to its habitat. These HCPs are summarized in Table 4 in the review. Effectively through the HCP process 89,288 acres of habitat land has been conserved, while a total 30,052.6 acres of permanent impacts and 1,527.1 acres of temporary disturbance have been authorized (note, these figures include the California Aqueduct San Joaquin Field Division HCP that is currently in draft). Also, according to a preliminary assessment of issued biological opinions from 1992 to 2006, roughly 120 projects—take of approximately 220 individuals, and roughly 21,200 acres of impacts—were permitted incidental take of blunt-nosed leopard lizard. Of these activities, the greatest amount of habitat disturbance authorized were for oil exploration and power generation (2,433 acres permanent and 1,215 acres temporary), road construction and repair (1,387 acres permanent and 469 acres temporary), general operation and maintenance activities (15 acres permanent and 5,120 acres temporary), pipeline construction and repair (264 acres permanent and 853 acres temporary), transmission line and fiber optic cables construction (410 acres permanent and 418 acres temporary), hazardous waste facilities construction (844 acres permanent and 16 acres temporary), prison facilities construction (283 acres permanent and 74 acres temporary), water banking (KWB 6,000 acres permanent), and other agricultural, residential, and commercial development activities (MBHCP 15,200 acres permanent).

Details of 11 of the HCPs affecting the blunt-nosed leopard lizard are discussed below.

1. The ARCO Western Energy Coles Levee HCP (currently managed by Aera) authorizes the permanent disturbance of 330 acres of natural lands including 270 acres of blunt-nosed leopard lizard habitat (ARCO Western Energy 1995). Mitigation for the disturbance is the preservation of 990 acres through the 6,059-acre Coles Levee Ecological Reserve conservation bank.

2. The Coalinga Cogeneration HCP (Aera Energy and Chervon 1991) authorizes the permanent disturbance of 49.6 acres and temporary disturbance of 27.6 acres of blunt-nosed leopard lizard habitat in the oilfield near Coalinga in southwestern Fresno County. Mitigation for the project is the protection of 179 acres of blunt-nosed leopard lizard habitat near the site. On June 23, 2006, the project used up all of its compensation credits and completed the mitigation requirements.

3. The California Department of Corrections Delano Prison HCP (California Department of Corrections 1991) authorizes the permanent disturbance of 287 acres and temporary disturbance of 348 acres of blunt-nosed leopard lizard habitat near Delano in northern Kern County. Mitigation for the project is the enhancement and revegetation of 348 acres of blunt-nosed leopard lizard habitat on-site and the acquisition of 514 acres of blunt-nosed leopard lizard habitat for protection within the Allensworth ER.

4. The California Department of Corrections Statewide Electrified Fence Project HCP authorizes the incidental take of up to 2 blunt-nosed leopard lizards by electrocution at eight

state prisons in a 5-year period during the 50-year duration of the permit (EDAW 1999). Mitigation for impacts to blunt-nosed leopard lizard includes acquisition and enhancement of 282 acres of high quality alkali sink/scrub habitat and the acquisition and enhancement of an additional 800 acres of low quality laser-leveled farmland at Allensworth ER. However, at this time it is not known whether the restoration of farmland to native habitat will benefit the blunt-nosed leopard lizard. A restoration plan for the mitigation lands was finalized and approved in February 2003 (EDAW 2003). The major components of the plan include: acquisition of 200 acres of privately-owned land next to the existing reserve boundary; installation of protective fencing and seasonal grazing to reduce non-native annual grass cover (as needed) on the newly acquired land; and patrol and maintenance of fences, monitoring of sensitive population trends, trash removal, and management of grazing leases on the existing reserve lands. As of June 11, 2006, the Wildlife Conservation Board (WCB) had identified two potential parcels for acquisition and was pursuing state-required appraisals prior to escrow. However, due to hesitation on the part of the sellers, CDFG and WCB have identified potential alternative acquisitions to satisfy the mitigation requirement (EDAW 2006).

5. The Chevron Pipeline HCP authorizes the temporary disturbance of 25.5 acres of blunt-nosed leopard lizard habitat in the 27G Pipeline Replacement Project (Chevron Pipeline Company 1995). Mitigation for impacts to blunt-nosed leopard lizard is the protection of 28 acres of blunt-nosed leopard lizard habitat within Chevron's Lokern lands.

6. The Granite Construction Phase I HCP authorizes the permanent disturbance of 54 acres of blunt-nosed leopard lizard habitat for quarrying activities near Coalinga in Fresno County (Granite Construction, Inc. 1993). Mitigation for impacts to blunt-nosed leopard lizard is the protection of 162 acres of blunt-nosed leopard lizard habitat within the Northern Semitropic Ridge ER.

7. The Kern County Waste Facilities HCP authorizes the permanent disturbance of 251 acres of natural lands including 2 acres of blunt-nosed leopard lizard habitat near Lost Hills and 47 acres of blunt-nosed leopard lizard habitat near Taft in Kern County (Kern County Waste Management Department 1997). Mitigation for impacts to blunt-nosed leopard lizard and other listed species is the protection of 755 acres of habitat at Coles Levee Ecosystem Preserve.

8. The KWB Authority HCP authorized the permanent disturbance of 12,081 acres and temporary disturbance of 291 acres of blunt-nosed leopard lizard habitat in Kern County for up to 75 years. Within the 19,900 acre-KWB, 5,900 acres are for routine recharge activities, 481 acres are for permanent water banking facilities, 960 acres are for plant preserves, 5,592 acres between the water basins will be allowed to revert to habitat, 530 acres are mitigation for the Department of Water Resources projects, 3,170 acres are for farming, and 3,267 acres are for conservation banking for third parties (490 acres of which KWB Authority may use for commercial development). Therefore, 4,263 acres of potential blunt-nosed leopard lizard habitat are protected by the KWB Authority HCP.

9. The Metropolitan Bakersfield HCP (MBHCP) and associated biological opinion (Service 1994) covers an area of 408 square miles around Bakersfield, California. The MBHCP allows the permanent disturbance of 15,200 acres of natural lands but does not estimate how much blunt-nosed leopard lizard habitat would be disturbed. The MBHCP states that mitigation for impacts to natural lands is 3:1 and for impacts to open lands (i.e. agricultural lands) is 1:1. However, the MBHCP does not explicitly state that impacts to a listed species must be mitigated for by the acquisition of lands that support the species. About 1,176 acres of blunt-nosed leopard lizard habitat disturbance has been authorized thus far through the MBHCP (Strait *in litt.* 2006); it is not known at this time how much of the habitat acquired as mitigation through the MBHCP supports blunt-nosed leopard lizard.

10. The Nuevo Torch HCP (currently managed by PXP) authorizes the permanent disturbance of 850 acres of blunt-nosed leopard lizard habitat (Nuevo Energy Company and Torch Operating Company 1999). Thus far, an 840-acre conservation easement in the Lokern area is currently being established as mitigation (R. Garcia, PXP, pers. comm. 2006).

11. The California Aqueduct HCP is currently in draft form. The area covered by the HCP includes seven pumping plants, two maintenance centers, and roughly 121 miles of Aqueduct and ROW within 11,816 acres of Kings and Kern Counties. Impacts from project related activities permitted under the HCP could total up to 1,295 acres—895 acres of impact by DWR, 290 acres of impact by third party water contractors, and an additional 110 acres of impact by other third party activities. Notably, the HCP only provides compensation for impacts by DWR and third party water contractors. Compensation for impacts associated with other third parties entering into a Compliance Agreement under the HCP will be provided via off-site compensation land consistent with Wildlife Agency requirements and subject to their approval prior to the initiation of the impacts. Compensation will be achieved through a combination of two approaches: 1) adaptive management of ROW lands to provide suitable habitat for listed species, and; 2) the conservation of three large blocks of habitat near the Buena Vista Pumping Plant, Teerink Pumping Plant, and Chrisman Pumping Plant. Thus, terms and conditions described within the HCP require DWR to manage 3,474 acres of on-site ROW land to minimize impacts to covered species to the maximum extent practicable. While total compensation acreage provided shall be 817 acres, which can be partitioned into: 242 acres of compensation for past completed emergency consultations; and, 567 acres as compensation for HCP covered activities and impacts

In addition to HCPs, numerous biological opinions have authorized disturbance of blunt-nosed leopard lizard habitat. In some earlier cases no compensation was required. For example, the biological opinion for the Laidlaw Environmental Services, Inc. hazardous waste disposal facility (Service 1988) authorized the permanent disturbance of 320 acres of blunt-nosed leopard lizard habitat in the Lokern area without requiring any compensation. In most cases, however, compensation was set at a ratio of 3:1 for permanent disturbance of natural lands.

In summary, the HCP process has facilitated the conservation of 89,288 acres of habitat land has been conserved, while a total 30052.6 acres of permanent impacts and 1,527.1 acres of temporary disturbance have been authorized (note, these figures include the California Aqueduct San Joaquin Field Division HCP that is currently in draft). Also, according to a preliminary assessment of issued biological opinions under section 7 of the Act from 1992 to 2006, roughly 120 projects—take of approximately 220 individuals, and roughly 21,200 acres of impacts—were permitted incidental take of blunt-nosed leopard lizard.

U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW

Blunt-Nosed Leopard Lizard (*Gambelia sila*)

Current Classification ______Endangered______

Recommendation resulting from the 5-Year Review

____ **Downlist to Threatened**
____ **Uplist to Endangered**
____ **Delist**
__X__ **No change is needed**

Review Conducted By __Sacramento Fish and Wildlife Office Staff________

FIELD OFFICE APPROVAL FOR REGION 8:

Lead Field Supervisor, Fish and Wildlife Service

Approve ____________________ Date 2·16·10

Lead Field Supervisor, Cooperating Field Office, Fish and Wildlife Service

Concur Diane K. Noda Date 2/12/10

22 September 2010

Eric Cherniss, VP Project Development
Solargen Energy, Inc.
20400 Stevens Creek Boulevard, Suite 700
Cupertino, CA 95014

Preliminary Write-up of Golden Eagle Non-Breeding Season Surveys and Raptor Survey

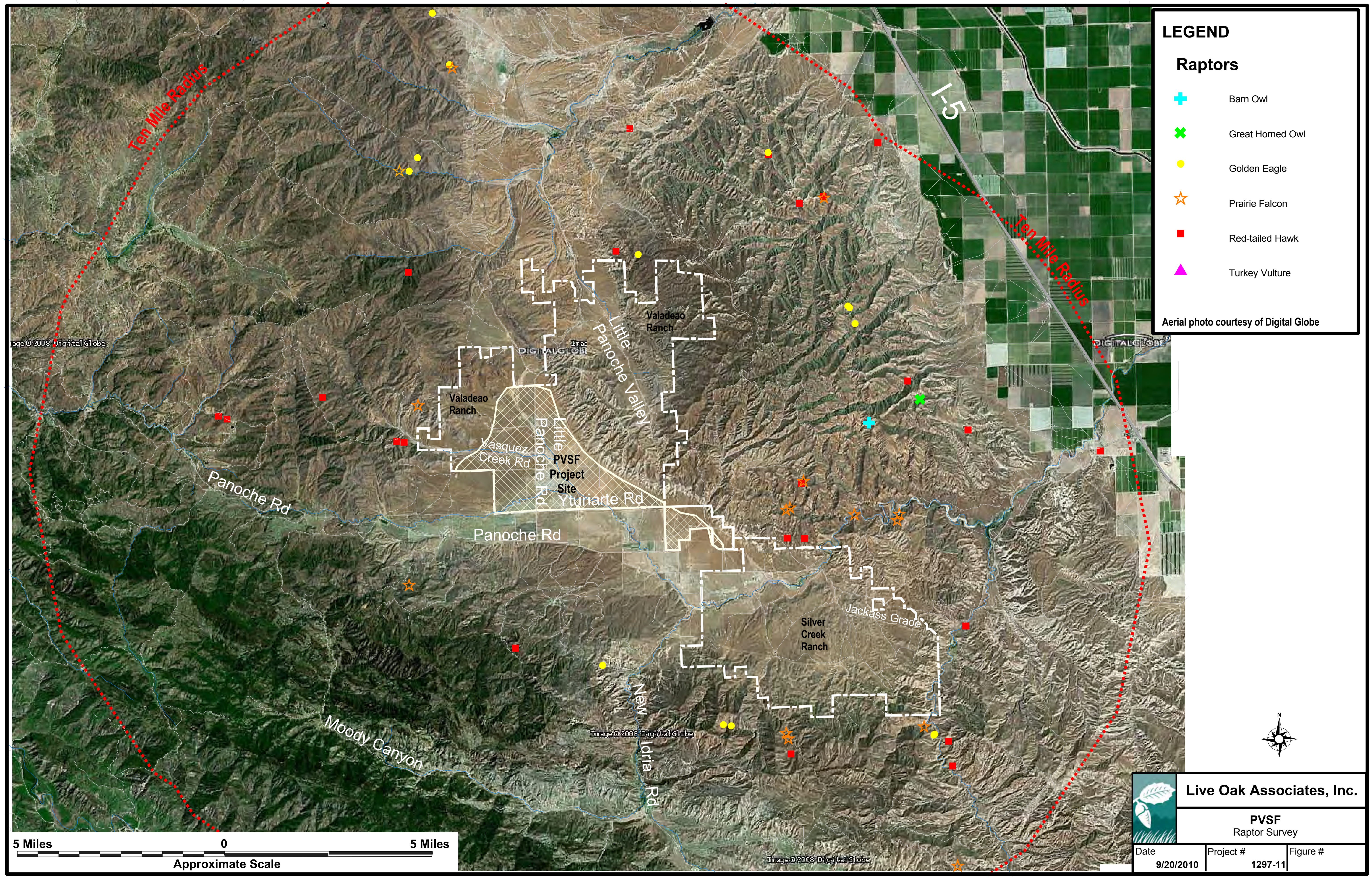
Helicopter-based golden eagle (*Aquila chryseatos*; GOEA) surveys were conducted under the supervision of raptor biologist Pete Bloom and flown for a few days beginning on 5 August 2010 during a non-breeding period. Survey were specifically targeted for GOEA occupancy via individual and nest sightings according to the *U.S. Fish and Wildlife Service Interim Guidelines for Golden Eagle Surveys*. Blue Sky Helicopters of Redlands, CA flew two biologists (Pete Bloom and Scott Thomas) over the site and within a 10-mile radius of the site. During the flight, one biologist observed at all times while the other recorded and marked data when appropriate. Two GPS units, one primary and one backup, were used to document geographic locations of importance and the routes taken; these coordinates were also entered in field notes, and mapped by Live Oak Associates, Inc. (LOA)(Figure 1)

Fifteen GOEA nests were observed within the 10-mile radius of the Project site. Four of those nests showed evidence of having young fledged this year. No GOEA nests occurred within 2 miles of the project boundary.

The raptor species observed are included in Table 1. Photos of observed individuals are available from LOA upon request.

Table 1. Raptor species' nest and/or individuals observed during GOEA flight survey, 2010.

Species	Number of Nests/Individuals
Turkey vulture	1
Red-tailed hawk	24
Golden eagle	15
Prairie falcon	17
Common barn owl	1
Great-horned owl	1



Live Oak Associates, Inc.

PVSF
Raptor Survey

Date	Project #	Figure #
9/20/2010	1297-11	

LIVE OAK ASSOCIATES, INC.
an Ecological Consulting Firm

SUMMARY OF THE CONSERVATION STRATEGY FOR FEDERALLY AND STATE LISTED SPECIES FOR THE PANOCHE VALLEY SOLAR FARM

April 27, 2010

This summary of the conservation strategy proposed by Solargen Energy Inc. for its Panoche Valley Solar Farm (PVSF) outlines measures to avoid, minimize and compensate for take of federal (FESA) and state (CESA) listed species that may be affected by construction and operation of their solar farm (Figure 1). This is not intended to be a comprehensive treatise for the conservation strategy proposed for the PVSF, but provides sufficient detail as to the important components of the plan that have been completed along with on-going analysis and data collection intended to resolve data gaps.

The conservation strategy summarized here, will serve as the foundation for both the Biological Assessment (BA) that is to be submitted to the USFWS for species listed under FESA and the 2081 Application that will be submitted to CDFG for species listed under CESA.

The covered species included in this mitigation plan include the following federal and state listed species:

- Vernal Pool Fairy Shrimp; *Branchinecta lynchi*; Federal threatened
- California Tiger Salamander; *Ambystoma californiense*; Federal and State Threatened
- Blunt-nosed Leopard Lizard; *Gambelia sila*; Federal and State Endangered/California Fully Protected
- Western Burrowing Owl; (*Athene cunicularia*); California Species of Special Concern/Federal Migratory Bird Treaty Act and Fish & Game Code 3501.5
- San Joaquin Antelope Squirrel; *Ammospermophilus nelsoni*; State Threatened
- Giant Kangaroo Rat; *Dipodomys ingens*; Federal and State Endangered
- San Joaquin Kit Fox; *Vulpes macrotis mutica*; Federal Endangered/State Threatened

Two species for which take cannot be authorized by CDFG (blunt-nosed leopard lizard and western burrowing owl) are included in this summary document, for completeness. The USFWS may provide take authorization for impacts to habitat for the blunt-nosed leopard lizard (BNLL), but they may not authorize take of individuals of either the BNLL or the Western burrowing owls (WBO).

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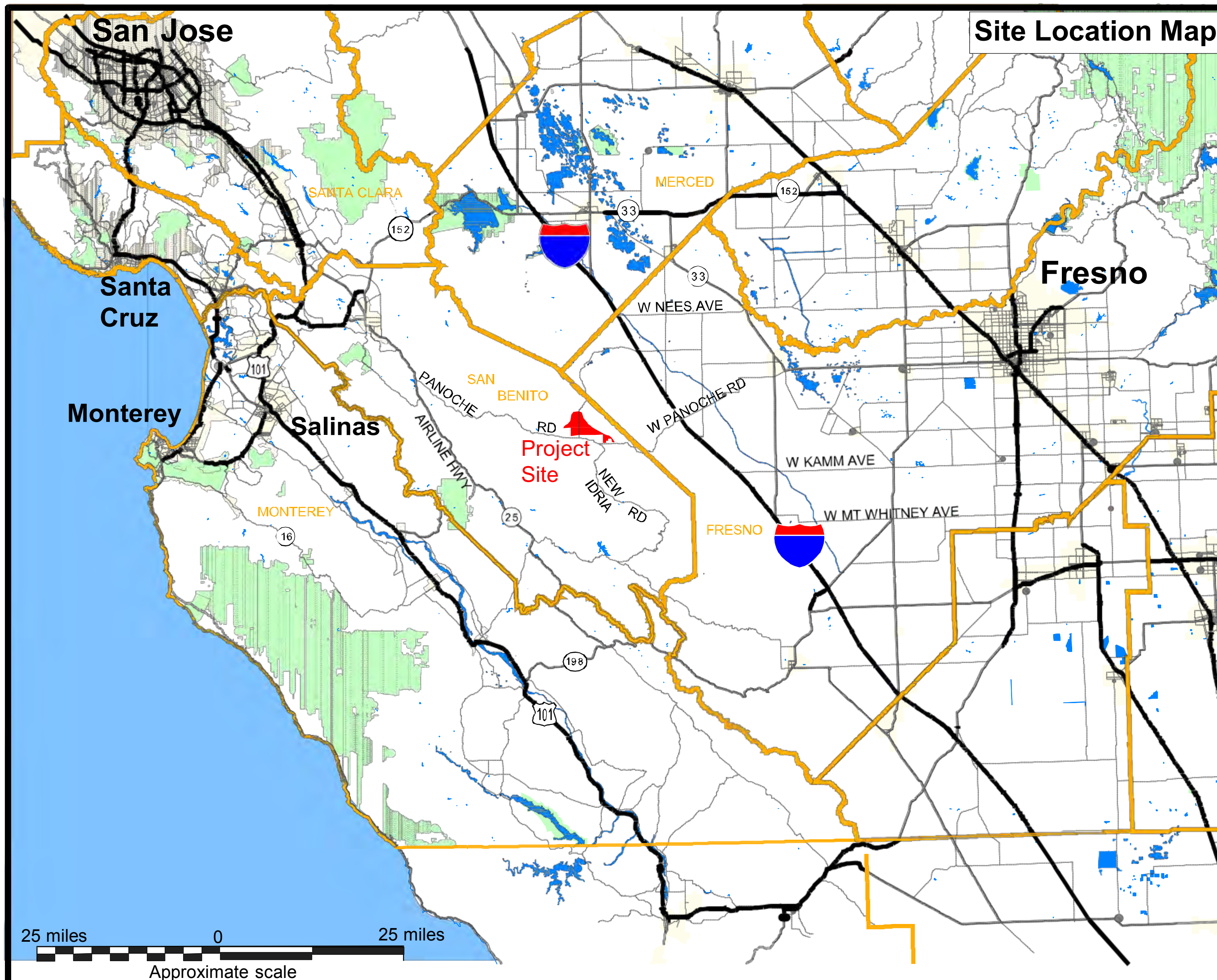
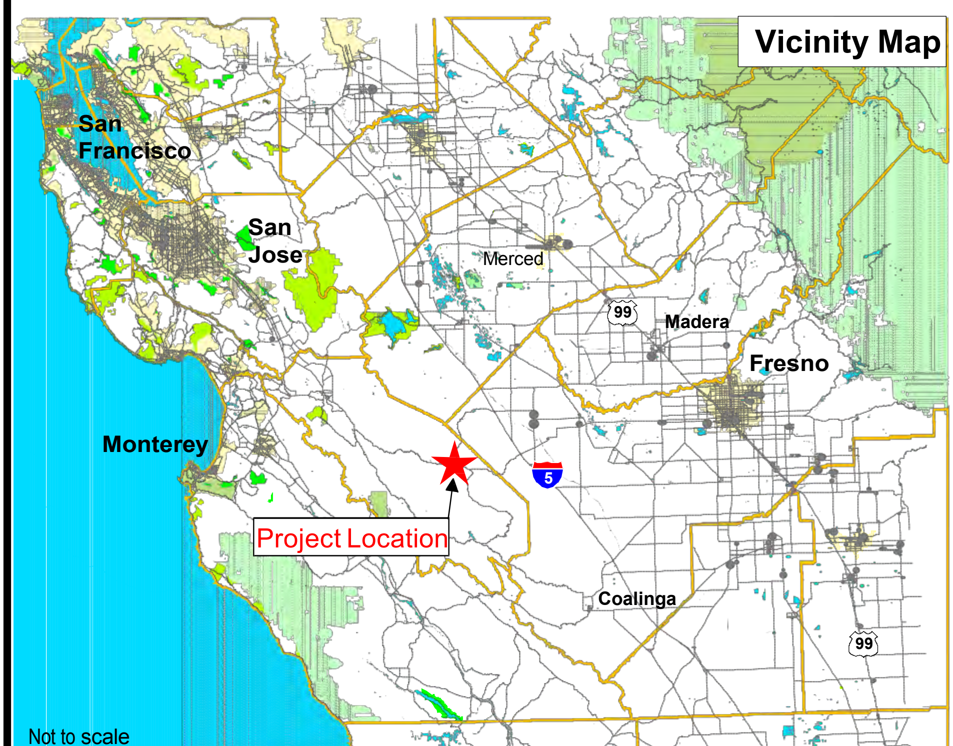
Oakhurst: P.O. Box 2697 • 39930 Sierra Way, Suite B • Oakhurst, CA 93644 • Phone: (559) 642-4880 • Fax: (559) 642-4883
Bakersfield: 8200 Stockdale Highway, M10-293 • Bakersfield, CA 93311





Live Oak Associates, Inc.

Panoche Valley Solar Farm
Vicinity Map

Date	Project #	Figure #
4/27/2010	1297-05	1

Both Impacts and associated mitigations for non-listed special status species are being evaluated by the Environmental Impact Report (EIR) that is currently in preparation by the County of San Benito and will not be discussed here.

PROJECT DESCRIPTION

Solargen proposes to construct and operate a 420 megawatt (MW) photovoltaic (PV) solar power plant in Panoche Valley, an unincorporated area of eastern San Benito County. The project would be located on 4,717 acres and would include the following (Figure 2):

Installation of 1,822,800 silicon-based PV panels on framed, the worst case would be the use of 50 Watt panels, and this will give us 8,400,000 panels. The Proposed Nexpower 135 Watt panels will number 3,111,111. Panel count will depend on the panel chosen at the time of construction.

- single-pole steel support structures,
- electrical inverters and transformers,
- an electrical substation,
- an operations and maintenance (O&M) building,
- a septic system and leach field,
- On-site access roads, transmission support towers and line(s) to interconnect with a PG&E transmission line that passes through the project site. Requirements for the switchyard will come from PG&E as they will own a portion of this at the end of the project.
- Solargen is currently in the early stages of negotiations to sell the project's electrical output to PG&E.

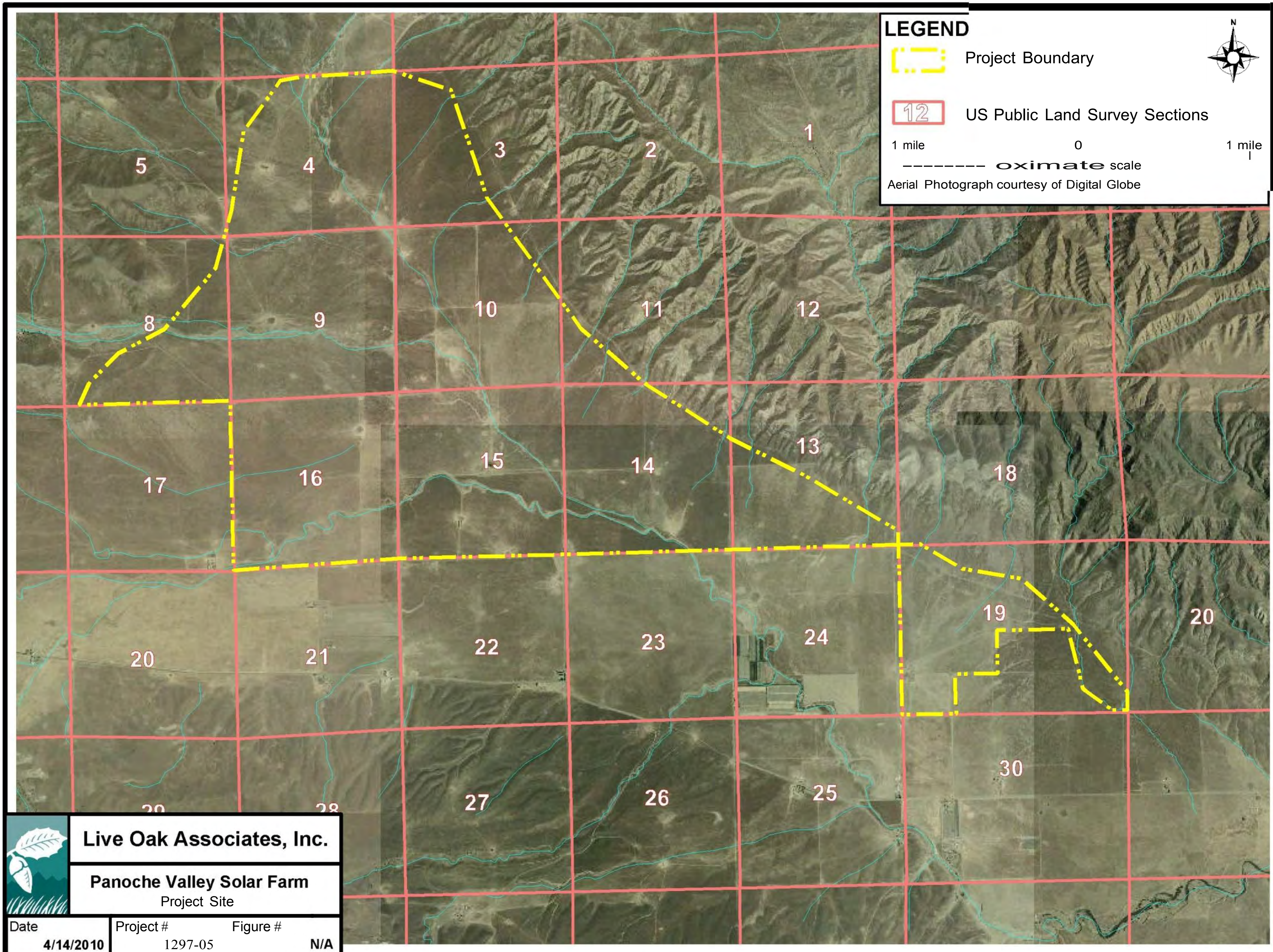
Solargen has applied to the County of San Benito (County) for a Conditional Use Permit (CUP) to allow a solar power plant to be operated on the site. Because of its responsibility for issuing this permit, the County is the lead agency under the California Environmental Quality Act (CEQA) and is responsible for the preparation of this EIR.

The proposed solar farm site comprises approximately 4,717 acres, is irregularly-shaped, and consists of all or parts of the following (Figure 2):

- Sections 3, 4, 8-11, and 13-16 of township 15 south, range 10 east; and
- Section 19 of township 15 south, range 11 east.

Lands adjacent to the proposed solar farm site are being proposed as mitigation for anticipated impacts to sensitive plant and wildlife impacts (Figure 3). These proposed mitigation lands consist of all or parts of the following:

- Sections 19, 30, and 31 of township 14 south, range 11 east;
- Section 21-27 and 32-36 of township 14 south, range 10 east;

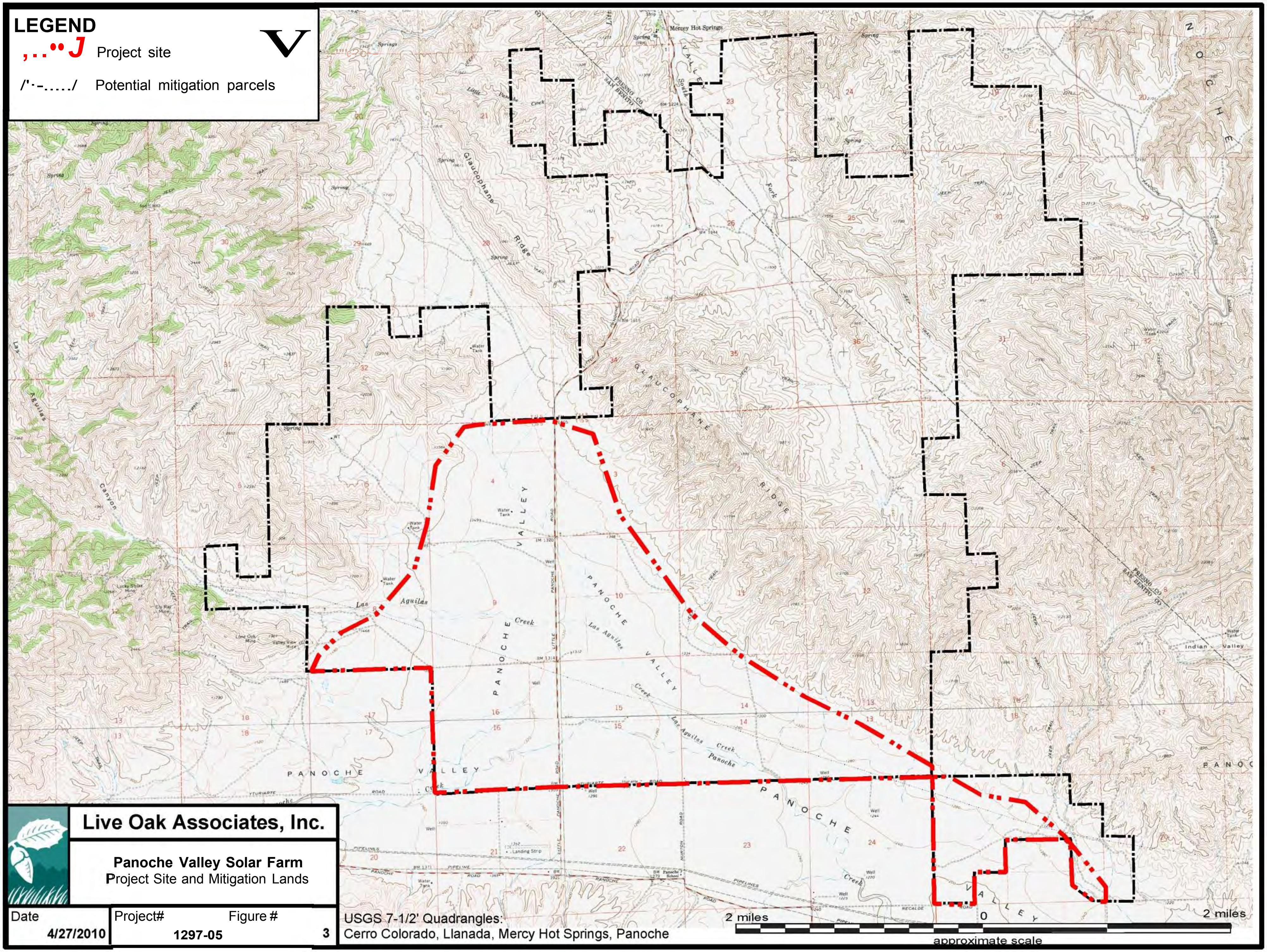


Live Oak Associates, Inc.

Panoche Valley Solar Farm

Project Site

Date	Project #	Figure #
4/14/2010	1297-05	N/A



Live Oak Associates, Inc.

Panoche Valley Solar Farm
Project Site and Mitigation Lands

Date	Project#	Figure #
4/27/2010	1297-05	3

USGS 7-1/2' Quadrangles:
Cerro Colorado, Llanada, Mercy Hot Springs, Panoche

- Sections 1-8 and 11-14 of township 15 south, range 10 east; and
- Sections 6, 7, 19, and 20 of township 15 south, range 11 east.

The proposed solar farm site and a majority of the mitigation lands are all located in the eastern region of San Benito County, California, in an area known as the Panoche Valley. The northeastern extent of the proposed mitigation lands is located in western Fresno County and includes parts of Little Panoche Valley and Glaucophane Ridge.

The majority of parcels within the solar farm site are used for cattle grazing; the remaining lands are homesteads, patches of row crops, grape production and an old dairy. The site is surrounded by rangeland and bordered to the west by the Gabilan Range and to the east by the Panoche Hills. A number of drainages and creeks are present in the area including the aforementioned Panoche and Las Aguilas Creeks. The portion of the Valley associated with the proposed project ranges in elevation from approximately 1240 feet National Geodetic Vertical Datum (NGVD) to approximately 1400 NGVD.

ANTICIPATED LEVEL OF TAKE

There is a paucity of data on how PV solar arrays will affect the continued use of the site by the various species, particularly state or federally listed species. Many of these species (BNLL, GKR, SJAS) exhibit life history strategies that would be best classified as r-selected species, with high reproductive capacity that more closely tracks changes in resource production than species with lower reproductive rates that usually exhibit longer lag time in a functional and/or numerical response. In fact, populations of these species that occur on site are known to fluctuate substantially with rainfall patterns – wetter years tend to produce higher food resources, higher reproductive rates, and increasing populations. Poorer rainfall years, particularly several in a row can lead to depressed populations.

The proposed project would be installed over an area of approximately 4,717 acres (7.4 square miles). However, the proposed design confines the solar arrays, substation, and facility buildings to a footprint of 2,201.5 acres, on-site access roads would occupy approximately 30 acres, and buried electrical collection conduit would occupy 37.4 acres. The remaining 1,680 acres (35% of the site) within the project boundary would be left undisturbed and unshaded. Undisturbed areas would include on-site drainages and riparian buffer zones.

The entire site is currently grazed with no consideration to maintaining the suitability of the site for the target species. These species persist in spite of the current grazing regime, which is driven almost exclusively on economic objectives. Observational data for these species indicate that they generally prefer short grass conditions, with very limited experimental evidence supporting a specific grazing regime.

The project has integrated a number of design features to avoid impacts when possible by avoiding wash and stream habitats - barren areas that may support BNLL or other burrowing species by setting back from the habitat features by minimum of 100 ft from the top of bank.

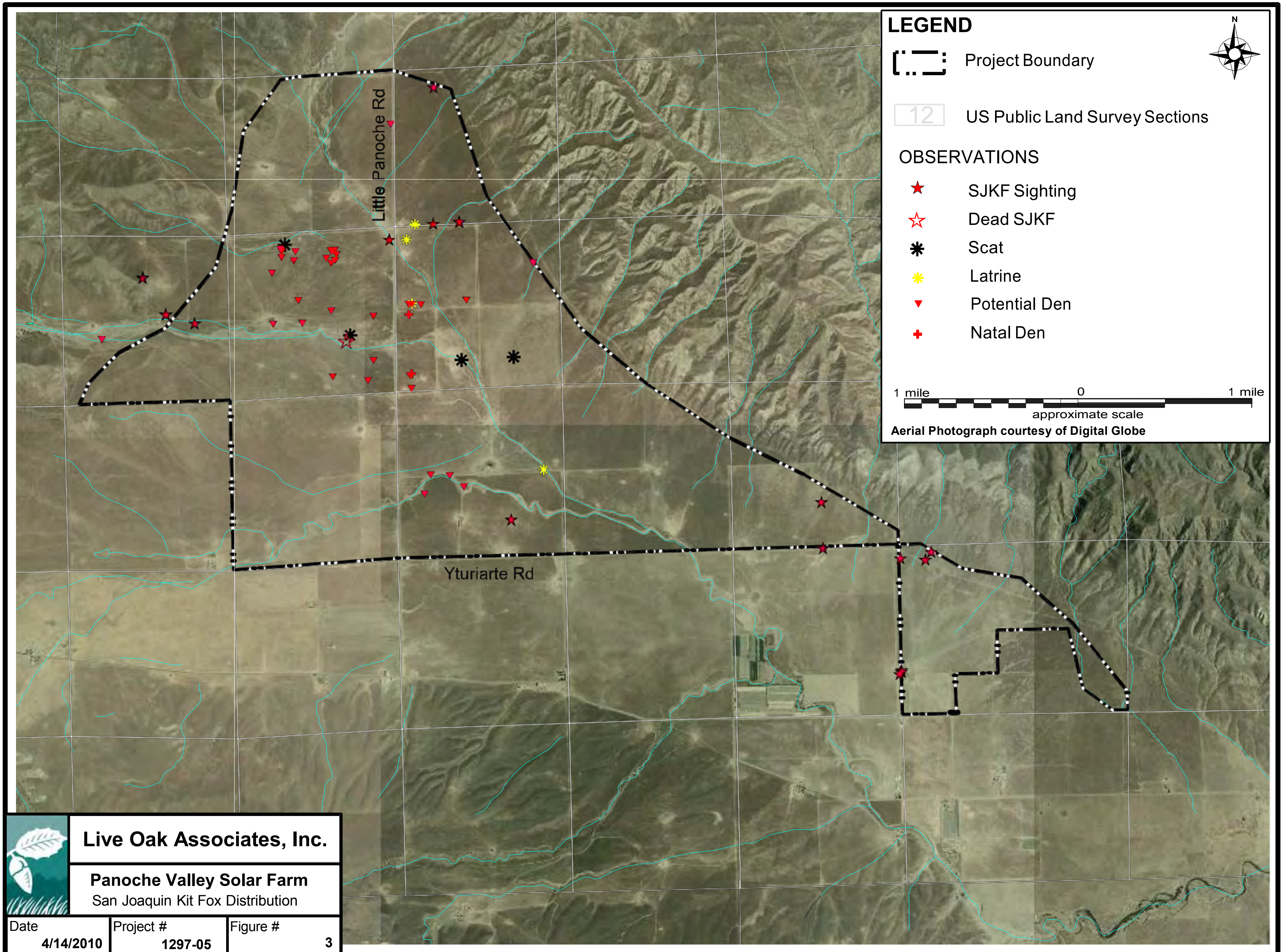
Approximately 12% (603 acres) of the site will be shaded by solar arrays while approximately 35% (1680 acres) of the site will remain undisturbed and unshaded by solar arrays. Little is known how listed species known to occur on site will react to the placement of a solar farm on the landscape. The solar arrays, roads, supporting facilities are expected to have some adverse affect on these species continued use of the site as shading may alter the micro-climate under the arrays, and undisturbed habitats (35% of the site) will be fragmented. However, construction and operation of the solar farm is intended to avoid and minimize impacts to existing resources to the maximum extent practicable and on-going management of the grasslands that will remain on-site are intended to be specifically managed to maximize food productions for such species as GKR and other small burrowing animals. Therefore, while some degradation is expected, it is unreasonable to assume that the site will completely lack suitable habitat attributes for these species to persist at some lower level. These same set of species are known to occur at modest levels within any number of oil fields of varying development density in Kern County – habitats that are also fragmented by oil wells, pipelines and roads. Admittedly, the percent of the landscaped converted to developed uses in oil fields is usually less, but the fact that the facilities fragment the landscape is undeniable, yet many of these species persist in modest to high numbers as long as suitable habitat attributes exists and food resources remain relatively modest or high.

BO for instance are known to occur in high densities in human altered landscapes. For example, the WBO in the agricultural areas of Imperial County where as much as 70% of the states population presently occurs, is estimated to approach a density 50 times higher than the desert communities would support naturally. WBO actively use agricultural roads and levees in the San Joaquin Valley and occur regularly in grassland habitats adjacent to dense development in the Bay Area Counties. Nonetheless, at buildout, WBO are expected to continue to use the site, but likely to a lesser degree.

The SJKF has been detected on site on number of occasions during biological surveys conducted for this project (Figure 4). This site supports suitable landscape attributes to provide foraging, breeding and movement habitat for the species within a regional context. The recovery plan for upland species of the San Joaquin Valley recognizes the Ciervo-Panoche Natural Area as one of the three remaining core populations for kit fox. While not its preferred habitat, this species is known to use fragmented habitats associated with on-going and developing oil fields in Western Kern County. For example, more than twenty-five years (1979 to 2004) of data were collected at the Naval Petroleum Reservoir (NPR1 and NPR2) that has been in oil production since the early 1900's with oil production increasing markedly since the mid-1990's. SJKF have continued to be detected throughout the oil fields during the last decade, including the rather varied and steep topography associated with NPR1.

A well-known population of kit foxes is associated with the urban environments of the City of Bakersfield – again, not a preferred circumstance, but evidence that the species response can accommodate human dominated landscapes.

Mammalian carnivores are intelligent and idiosyncratic. While individual kit foxes in the Panoche Valley region have had to contend with some limited traffic, farm houses, pets and other aspects of human existence in a rural environment, they have not had to accommodate



Live Oak Associates, Inc.

Panoche Valley Solar Farm
San Joaquin Kit Fox Distribution

Date	Project #	Figure #
4/14/2010	1297-05	3

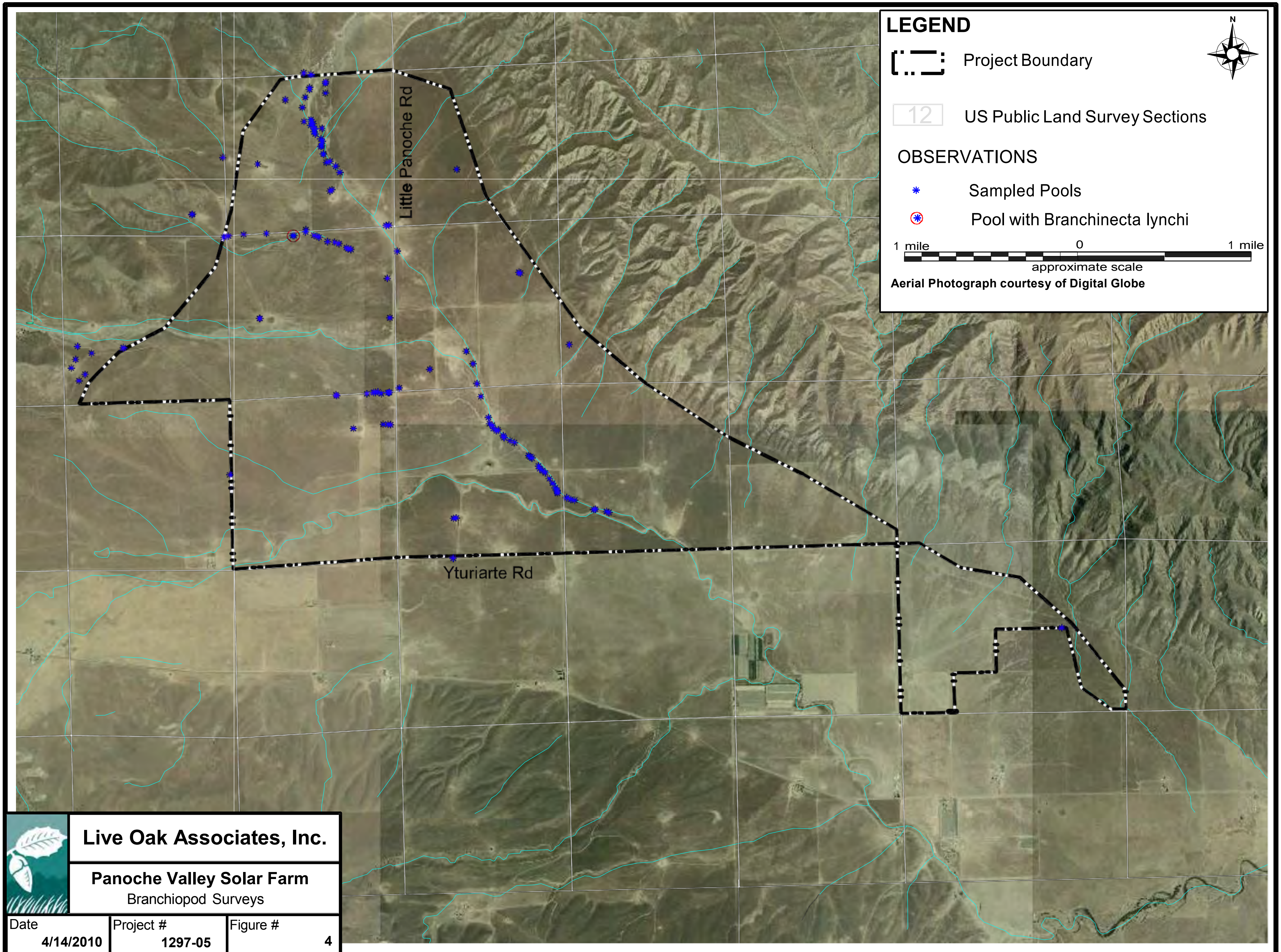
large landscape scale changes, such as a solar farm. Given that the site will be managed largely through grazing to maximize the occurrence of small mammals – important prey for kit fox, we would expect that kit foxes will take advantage of the availability and distribution of any remaining GKR burrow clusters. The site will be managed to also promote egress and ingress of wildlife species, particularly kit foxes. As foxes are known to den in landscape medians at shopping malls in Bakersfield, we would expect that foxes would continue to use the site also for breeding. As noted for GKR, we do expect the overall value for kit foxes to be less than it was prior to the construction and operation of the solar farm.

A total of 126 pools were sampled for listed brachiopods and CTS. California tiger salamander (CTS) larvae were only detected in one pool just off the western boundary while the listed vernal pool fairy shrimp was detected also in only one pool (Figures 5 and 6). In general these pools are rather devoid of aquatic life and in fact during a one-month period of time the CTS larvae had shown no marked growth – indicating poor forage production. Larval surveys are on-going and will be completed in May 2010. The first wet season surveys for brachiopod have been completed with follow up dry season surveys planned to be completed during the summer of 2010.

The pool that supports CTS just to the west of the project will remain intact, but solar arrays will be placed in areas to the east of this pond that could support upland habitat for this species. If 2010 larval surveys confirm this as the only breeding locale on site, than solar arrays in the upland habitats to the east of this pond would affect roughly half of the upland habitat associated with this pond. Unlike many development projects that certainly convert the upland habitat east of the pond to developed uses rendering it useless for estivating salamanders, solar farm should retain some residual value, particular if it is managed for small mammals, the burrows of which are critical for CTS.

The San Joaquin antelope squirrel (presently three sighting) appears quite limited and restricted on site. On-going surveys for these three species will provide additional information as to this species rarity on site.

The level of take of habitat cannot be presently estimated BNLL. The level of take for vernal pool fairy shrimp (VPFS) and the San Joaquin antelope squirrel (SJAS) is expected to be rather limited to a small portion of the site. Three species are more common on site and the modifications of the landscape by the solar farm is expected to have a more pronounced affect on these species: WBO, GKR and SJKF. The CTS is also limited in its extent on site, but the amount of habitat affected by the project could range upward of 175 acres (assuming the majority of the population estivates within 2200 ft of the pond). Therefore, for the purpose of this analysis, given the level of proposed landscaped changes, we suggest that the site will degraded by about 60% for these four species. In other words, a 40% residual value will remain for the CTS, WBO, GKR and the SJKF.


LEGEND
Project Boundary
12
US Public Land Survey Sections
OBSERVATIONS
Sampled Pools
Pool with Branchinecta lynchi
1 mile
0
1 mile
approximate scale
Aerial Photograph courtesy of Digital Globe
N
Little Panoche Rd
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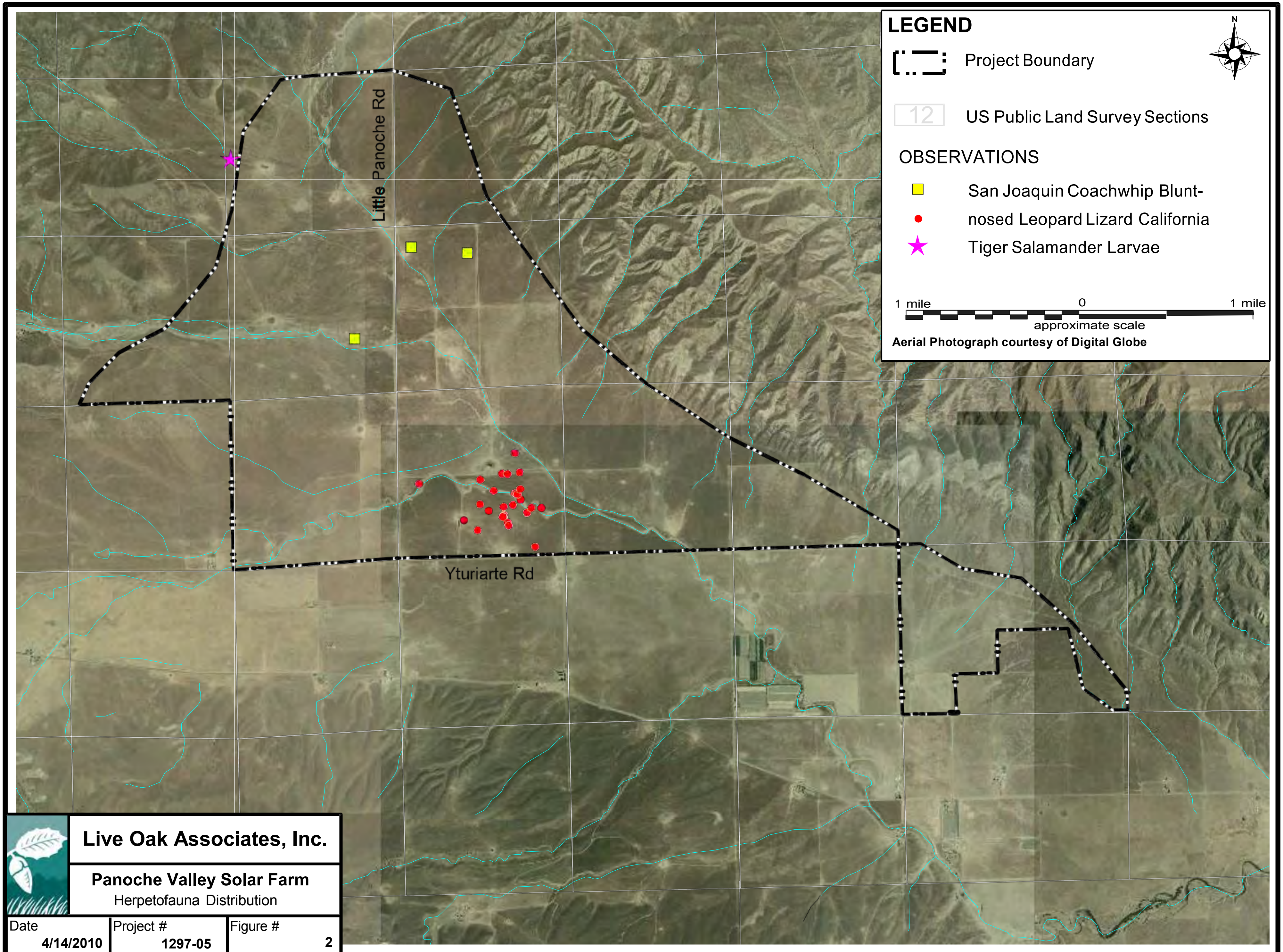
Live Oak Associates, Inc.
Panoche Valley Solar Farm
Branchiopod Surveys
Date
4/14/2010
Project #
1297-05
Figure #
4



Live Oak Associates, Inc.

Panoche Valley Solar Farm

Herpetofauna Distribution

Date	Project #	Figure #
4/14/2010	1297-05	2

Species for Which Take of Individuals Will Not Occur

The project will not result in take of BNLL or WBO.

Blunt-nosed Leopard Lizard
Solargen has developed a three-step process which the Panoche Valley Solar Farm (PVSF) will implement to ensure that the construction and operation of the project fully complies with the Fish and Game Code obligation to avoid take of the fully protected blunt-nosed leopard lizard (BNLL).

Step One – Avoidance Through Project Design: The occurrence of blunt-nosed leopard lizards (BNLL) in wide, sandy bottomed washes in low relief terrain has been well documented; as a result, all such washes observed during all surveys (protocol and quantitative sampling efforts) are considered to represent potential blunt-nosed leopard lizard habitat and should not be disturbed to the maximum extent practicable. Therefore, Solargen has provided in their design of the photovoltaic facility on the Panoche Valley Solar Farm (PVSF) a buffer of no less than 100 feet from all streams and washes crossing the project site. The buffer will be measured from the top-of-bank for each side of the features. Thus, no disturbance will occur within these habitats, or within 100' from the edge of these habitats, except for a few unavoidable road crossings (which will be designed to minimize their impact as described below). As a result, the most likely locations for BNLL occurrence on the project site will be avoided.

Step Two – Avoidance in Construction Areas Through Additional Protocol Surveys: For road crossings through washes that are unavoidable, protocol BNLL surveys (extent of which will be pre-approved by CDFG) will be completed for the limited areas where bridges will be constructed If BNLL are detected during these surveys, then they will be avoided with a 50 ft. buffer and exclusion fencing erected to keep them out of the work area where the bridge is being constructed. Even in the advent of negative survey results, as a matter of precaution, a 30-ft buffer from small mammal burrows in washes will be recognized during construction of bridges over washes. The standard recommendation prohibits vehicles traversing washes except in defined work zones.

For construction of the solar panel arrays, protocol BNLL surveys during the adult season (April 15 to July 15) will precede ground disturbance regardless of type of habitat. This recognizes that construction can occur any time after the completion of these surveys, but prior to the next adult season (see pre-construction and construction monitoring below). Avoidance recommendations and buffers as shown below will be adhered to (Table 1). If BNLL are detected in non-wash habitats during the protocol surveys conducted prior to each phase (or during any sort of survey for that matter), than the project will redesign their solar arrays to accommodate this detection by placing a 5 acre buffer (approximately a 265 ft radius) over the observation in such as to capture areas of high burrow density. Five acres is roughly equivalent to the average female home range as reported by Warrick et al. (1998). In other words, the buffer will not be a simple circle with a 265 ft radius, but a polygon that captures the best available habitat for this detection; with a caveat that no component of the project will occur within 50 ft of this sighting

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1 Compensation for loss of habitat for BNLL associated with this project will be permitted by the U.S. Fish and Wildlife Service (USFWS) via the Section 7 process and will not be discussed in this document.

Step Three – Avoidance in Construction Areas Through Pre-Construction Surveys and Construction Monitoring: All construction activities must be preceded, by not more than 30 days, by a pre-construction survey for BNLL. If a BNLL is observed within a construction area, that location will conform to the 5-acre buffer as described above. This buffer will immediately be marked by construction fencing or flagging, and will be avoided until it is determined that the BNLL has moved out of the construction zone.

Table 1. Avoidance and Minimization Measures for the BNLL on the PVSF project.

Avoidance and Minimization Measures	Description
Avoidance of washes and streams	Washes and streams should be avoided by the project including a 50-ft buffer as measured from the top-of-bank on both sides of these features.
Avoidance Zones for bridge construction – protocol surveys	Protocol surveys will be conducted during the April 15 to July 15 adult BNLL season prior to any disturbance associated with constructing the limited number of bridges necessary for the project. Therefore, in these few cases where complete avoidance of washes and streams are not feasible the project will establish 30-ft buffers from small mammal burrows (whether BNLL are detected at them or not) in wash bottoms and 50-ft buffers from any observed BNLL location in these features. These buffer zones will be demarcated by construction fencing to ensure that construction crews do not enter the avoidance zone. Monitors will be present during construction activities.
Avoidance for non-wash habitats – protocol surveys	Protocol surveys will be conducted during the adult season period of April 15 to July 15 prior to any surface disturbance. Project elements will avoid all observations of BNLL based on a 5-acre buffer that will be encompass the sighting and include the best available habitat within this 5-acres; the closest edge of the buffer to the sighting will be 50ft.
Avoidance through pre-construction surveys and construction monitoring	All construction activity including all vehicular traffic should be contained within the defined construction zone. The construction zone will be demarcated with exclusion fencing to ensure that a BNLL does not errantly wander into the construction zone. An on-site monitor will be present during all construction activity in this area. In addition, pre-construction surveys will be conducted no more than 30 days prior

	to any surface disturbance and on-site monitor will be present during all construction activities to ensure that the project does not harm or injure individual BNLL. If a BNLL is detected during construction by the on-site monitor, than the 5-acre buffer as described above will be established around this location and the project will avoid constructing any project elements within this buffer. The project will also implement all BMPs as discussed below.

In addition the avoidance measures discussed above, Solargen will also conduct a series of protocol surveys, quantitative sampling, preconstruction surveys and construction monitoring to further ensure that the project is built and operated in such a way as to remain in compliance with the Fish and Game Code.

Phase I – Section 16 (2010 Surveys)

The construction of Phase I of the project is now expected to occur on Section 16 (640 acres). Phase I will consist of approximately 200 acres of photovoltaic solar panels, and associated infrastructure. Full protocol-level adult BNLL surveys will be conducted on all of Section 16 between 15 April and 15 July 2010 (12 full surveys will be completed for adults whether BNLL are observed or not). Protocol-level juvenile BNLL surveys (5 full surveys) will be conducted on all of Section 16 between 1 August and 15 September 15 2010 if adult surveys are negative for BNLL presence. All surveys conducted will precisely follow the conditions detailed in CDFG's May 2004 *Approved Survey Methodology for the Blunt-nosed Leopard Lizard*. Appropriate buffers, and the pre-construction surveys and construction monitoring measures described below, will be employed to ensure that no take of BNLL occurs. The quantitative sampling efforts described below and beginning the spring of 2010 will also inform the precise design of Phase I.

Quantitative Sampling (2010)

Based on the site-specific information generated from the 2009 protocol surveys, Live Oak Associates, Inc. developed a quantitative sampling methodology to be employed on the entire 4,717-acre project site in 2010. One purpose of this approach is to inform project design by identifying areas of likely BNLL presence (which areas the project would avoid and preserve) and absence (which areas would be the focus of project construction); as described below, this information would later be supplemented by focused surveys and construction monitoring on a phase-by-phase basis to ensure take avoidance. The sampling methodology will also produce robust BNLL information for the entire project site for purposes of analyzing biological resource impacts in the EIR. This sampling methodology consists of the following:

- Quantitative sampling proposed (i.e., occupancy modeling framework – change over time metrics) over the entire project site for BNLL and other targeted species (e.g., BUOW, SJAS, GKR, SJKF, etc.). 90-random and 45-targeted sampling points distributed across the 4,717-acre project site. Sampling points will be no closer than 280m to ensure independence of the sampling unit and each sampling point will be buffered by a 2 ha (5-

acre) area that will be intensely surveyed consistent with established agency protocol for adult BNLL between 15 April and 15 July 2010. Each sampling unit will be visited 5 times during this 3-month window which allows estimates of important parameters of detection probability, occupancy, colonization and extinction over a multi-season (multi-year) basis. Sampling effort can either be increased spatially or temporally. It is common within an occupancy framework to maximize effort temporally for the expressed purpose of developing detection histories. We have chosen 5 surveys conducted during the adult survey window based on Germano (2009), which states the average time to detect BNLL is 2.27 days (n=48 10-day efforts). The average time to detect the species decreases to 1.18 days when the species is abundant and increases to 3.60 days when the species is sparse.

Full Coverage Surveys for future Phases

For all future phases of project construction, initial project design will be informed by the 2010 sampling methodology and subsequent years of sampling. This will be supplemented phase-by-phase by full protocol-level surveys (12 surveys) for BNLL adults, to be performed between the 15 April and 15 July survey period preceding construction of that phase. As noted above, if no BNLL are detected during the adult survey window, then full coverage surveys will be conducted during the juvenile period (five full coverage surveys conducted between 1 August and 15 September). However, if BNLL are detected during the adult season, then no surveys will be conducted during the juvenile season. Appropriate buffers will be employed to ensure that no take of BNLL occurs.

Pre-construction and Construction Monitoring

As described above, each phase of project construction will be preceded by both (1) the sampling methodology survey, and (2) focused protocol-level surveys for adult BNLL during the optimal survey period of 15 April to 15 July. In addition, Solargen will employ extensive pre-construction and construction monitoring in each construction phase to further ensure that take does not occur. A qualified biologist will (1) conduct one full-coverage pre-construction survey within 30 days prior to the onset of construction, (2) conduct an additional pre-construction survey immediately prior to the onset of construction, and (3) conduct ongoing monitoring of construction activities in any areas that could potentially be occupied by BNLL.

Operation

The project will be operating in such a way as to not harm or injure a BNLL during the life of the project. Standard procedures will be employed as are done for other projects in BNLL range (e.g., oil fields) and will include (but not be limited to), staff training, pre-established speed limits, etc.

The project while designed to not take individuals may result in the loss of some undermined amount of habitat for this species. Those studies discussed above will provide a more precise estimate as to the amount of habitat likely affected by this project.

The current project design is expected to avoid wash and creek habitats in such a manner as these areas are expected to continue to operate at some level for the species. It will not be possible to evaluate the overall affect of the project on the loss of BNLL habitat until such time as the 2010 surveys are complete.

WBO

The WBO is widely distributed in the state with approximately 70% of its population for the state occurring in Riverside and Imperial County. The southern and central San Joaquin Valley is estimated to support approximately 15% of it population. This site may support wintering and breeding habitat for a number of pairs of owls (surveys in 2010 are expected to provide a better measure of their distribution and abundance on the site). While this site may be important for this species, the loss or degradation of the entire project site for this species is not expected to result in jeopardy, given the measures employed to ensure no take of WBO, particularly breeding birds, and given the relative abundance and distribution of this species in the region, off of the project site.

Species for Which Sufficient Data Exist to Estimate Take of Individuals and/or Habitat

As previously discussed, based on current information the project will result in limited loss of habitat for three species: VPFS, CTS and SJAS. As noted above, while only one breeding pond has been identified for CTS, up to 175 acres of upland habitat could be affected (but not eliminated) by this project. For the purpose of this summary, these species will not be considered further. The comprehensive mitigation plan discussed in detail in the BA and 2081 Application will provide suitable details for the relevant species. These documents will address all federal and state listed species to ensure that appropriate avoidance, minimization and compensation measures and employed for each of these species. In addition, the adequacy of the mitigation plan to compensate for loss of habitat for BNLL is not presently known as these surveys are just now getting underway.

Specific Data Analysis Associated with Distance Sampling for GKR and San Joaquin Kit Fox

The methodologies described below and in Appendix A provide good estimates as to the level of take and the adequacy of the mitigation lands to compensate for this impact. For the purpose of this analysis we conducted line transect surveys using distance sampling (Buckland *et al*. 2001) in 63.6 sq km Panoche Valley study area in late February and March 2010. These sampling surveys occurred on both the 4717 acres Project Site and the 11,000acres Mitigation site. North-south transects were walked that were placed at approximately 350 m intervals in the study area (Figure 3). For the analysis, the study area was considered in its entirety and into areas of interest for this effort: the Mitigation Lands (44.5 sq km), the Project Area (19.1 sq km) and, for two transects that spanned both Lands, a combined site Mitigation/Project Area (63.6 sq km).

The locations of target resources and, in some cases, estimated densities were recorded. The methods for burrow cluster data collection were modeled after Townsend 2006 and Townsend & Zahler 2006 for density estimates of burrow cluster and potential San Joaquin kit fox den.

The targets include the following:

Primary Targets

1. Potential kangaroo rat burrows complexes (based on time and shape, other sign)
2. Giant kangaroo rat and giant kangaroo rat burrow complexes

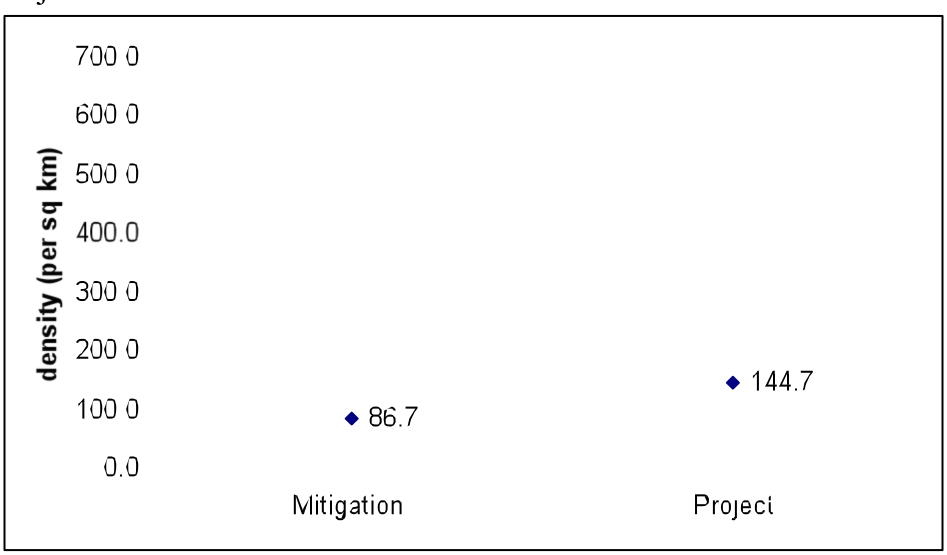
3. San Joaquin Kit Fox and potential San Joaquin kit fox dens (4.5 inches in diameter or greater, other sign)
4. Blunt nosed leopard lizards and habitat
1. San Joaquin antelope squirrel and habitat
2. Badger and badger den (distinct half moon shape – much wider than tall, other sign)
3. burrowing owl and burrowing owl burrows (burrow with white wash or pellets, burrowing owl feathers)

Secondary Targets
3. Carnivore Scat
4. Raptors – eagles, hawks, falcons, owls
5. Loggerhead Shrikes
6. Mountain Plovers
7. Local carnivores: coyotes, bobcat, cougar, red fox

See Appendix A. for details related to the Methodology and Results. Only relevant information well be summarized in this section.

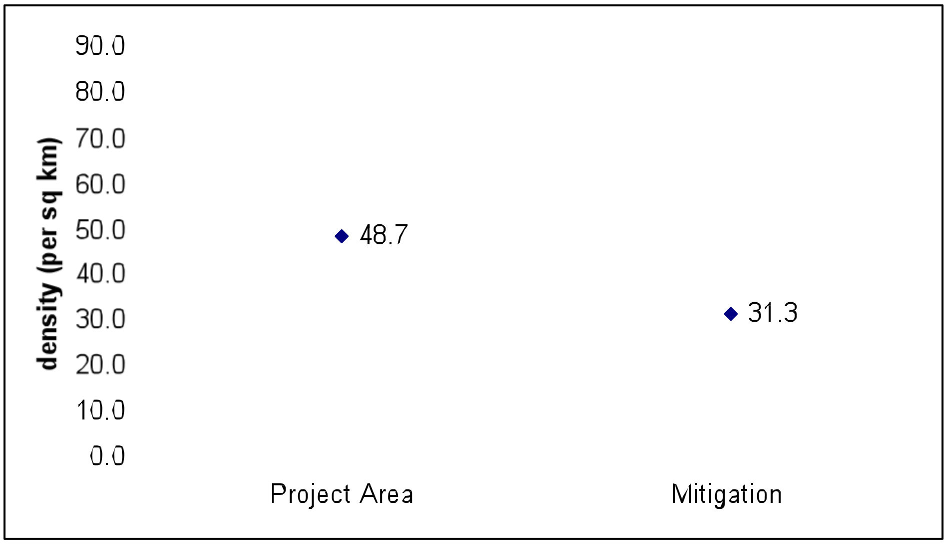
The density of burrow clusters for GKR were higher on the project site than mitigation site, however, the Project Site had much wider confidence intervals due largely to a smaller sample size. Additional data are currently being analyzed and early indications suggest that while there are fewer burrow clusters per km^2 on the mitigation site for GKR, the size of the burrow clusters are much larger on the mitigation lands likely yielding larger populations of GKR for the mitigation site when compared with the Project Site. Those data analysis will be available by the end of April.

Figure 7: Giant kangaroo rat density estimates (with upper and lower CI) for the Mitigation and Project Area



The density estimates for San Joaquin kit fox dens, badger dens, other carnivore dens and burrowing owl burrows was higher on the Project Site than on the mitigation lands (Figure 8).

Figure 8: Density estimates (potential San Joaquin kit fox dens, badger dens, other carnivore dens, and burrowing owl burrows) with upper and lower CI for the Mitigation and the Project Area.



MITIGATION LAND

Biological Goals and Objectives

The biological goals are broad, guiding principles for the conservation program for this project and provide a rationale for the minimization and mitigation strategies. Biological objectives provide direction in management in order to achieve biological goals. These biological goals and objectives are specifically tailored to address the impacts and duration of the permitted activities. The goals and objectives guide the development of an adequate and effective conservation program.

Goal 1

Maintain viable, self-sustaining populations of the Covered Species within the Project Site and associated mitigation lands

> Objective: Implement avoidance and minimization measures to minimize impacts of Covered Activities on the Covered Species within the PVSF.

Objective: Identify important movement areas (corridors) for key species and prioritize those lands for acquisition for conservation purposes.
Objective: Establish, enhance and manage permanent conservation areas to benefit the Covered Species.
Objective: Implement a monitoring program that provides sufficient information to determine relative fluctuations in Covered Species numbers in the PVSF and associated conservation lands and provides a feedback loop for adaptive management.

Goal 2

Establish at PVSF and on surrounding lands a Covered Species preserve system that complements and provides important linkages to other conservation lands, lands supporting covered species and conservation efforts in the region

Objective: Contribute monitoring data about the presence and relative abundance of Covered Species on the PVSF and associated conservation lands for use in regional conservation planning.

Goal 3

Minimize and avoid loss of individual Covered Species and their habitats during construction and operation of PVSF

Objective: Avoid and minimize impacts to Covered Species through the implementation of preconstruction surveys, best management practices, and an employee education program

Goal 4

Fully mitigate impacts to CESA-listed Covered Species by improving the existing conservation value of mitigation lands for Covered Species

Objective: Eliminate unauthorized off-road vehicle and pedestrian trespassing on mitigation lands through fencing and security patrols

Objective: Conduct appropriate site-specific habitat restoration and enhancement activities

Goal 5

Establish a conservation program for the PVSF and mitigation lands that are consistent with published recovery plans

Objective: Establish conserved lands in perpetuity in order to benefit Covered Species.

Goal 6

Have no take of the blunt-nosed leopard lizard so long as the species remains a "fully protected" species under California law and no take of burrowing owl under the MBTA and Fish and Game Code Section 3503.5.

Objective: Strictly enforce BNLL-specific pre-construction survey protocols and resulting recommendations, and implement BNLL-specific best management practices, to ensure take of BNLL does not occur.

Objective: Enforce all relevant conservation measures to ensure no take of individual or nesting burrowing owl occurs.

Goal 7

Do not exceed annual take limits of Covered Species

Objective: Use annual reporting to inform USFWS/CDFG about take of Covered Species

Objective: Maintain database to track annual take.

Goal 8

Implement an effective adaptive management program

Objective: Use the on-going monitoring for the project site and mitigation lands to adjust management and avoidance and minimization strategies in order to promote Covered Species' viability.

Objective: Collect data systematically on Covered Species on an annual basis and manage data for accessibility.

Objective: Maintain a central database that uses geographical information system for spatial analysis and presentation of Covered Species locations.

Objective: Use unbiased sampling techniques to collect scientifically credible information about Covered Species abundance and distribution.

Objective: Implement a study to measure preferred habitat characteristics for GKR and use this information for future habitat enhancement.

Objective: Utilize methods to verify if monitoring is sufficient to detect species based on sign alone for the GKR.

Compensation Measures

As noted above, the goal of the avoidance and minimization measures is to reduce the potential for take (see Appendix B). Even if the project successfully avoided all take, conversion of land suitable to support the species, may compromise and reduce the amount of suitable habitat available to the regional populations of the covered species. It has been suggested above solar farms do not render a site completely unsuitable and that a residual value of 40% remains for species such as CTS (upland habitat), WBO, GKR, and SJKF. Therefore, Solargen had developed a program for compensating for these impacts to the habitats of covered species.

The compensation program is based on the level of lost value for the covered species on the project site. The primary goal of the compensation program is to ensure that the lands proposed by Solargen to compensate contain the suitable characteristics of, and can be enhanced and restored to support the habitat features required by the species whose habitats were affected.

Solargen has identified approximately 11,000 acres of land to compensate for impacts to covered species. These lands are mostly to the north of the site (Figure 3).

The following principle will be applied to the conservation program:

- Compensation lands will be carefully tailored to reflect the relative importance of the specific lands disturbed by the PVSF. The quantitative sampling (results derived from both the distance sampling and occupancy model sampling) will be used to establish the conservation lands of both the PVSF site and the mitigation lands to ensure that the compensation lands provides habitat values and opportunities that allow the project to fully mitigate.

The following are the key elements of the conservation strategy for fully mitigating impacts to habitat for the covered species.

- Solargen will manage the identified Conservation Lands for habitat purposes only.
- Solargen will enhance the existing habitat conditions on the Conservation Lands, in order to meet the "fully mitigate" standard of CESA, through a variety of means depending on site-specific needs. For example, Conservation Lands may be suitably fenced (e.g., wildlife friendly) along public roads in order to prevent trespassing and damaging use by off-road vehicles. In other locations, Solargen may remove non-native species and/or may plant native species. These measures will be detailed in the final mitigation plan.
- Solargen has identified 11,000 acres for mitigation adjoining the project site. As the project is planned in 5 phases Solargen will place a conservation easement on 2,200 acres for each phase. Thus, prior to the construction of Phase I, Solargen will establish a Conservation Easement on 2,200 acres with an appropriate non-wasting endowment. The size of the endowment will be commensurate with the level of monitoring required for the conservation lands and estimated adaptive management activities.
- Conservation Lands will be managed for endangered species from start of the project (i.e., mitigation precedes impact).
- One year prior to the development of a new phase, Solargen will establish a Conservation Easement on 2,200 acres on the mitigation lands until such time as all 11,000 acres are protected.
- Solargen will provide a sufficient financial guarantee based on land cost, enhancement/restoration cost, management cost, etc. for all Conservation Land.

Providing enhancements will improve habitat quality for target species and therefore presumably increase carrying capacity. In addition, connectivity analysis will provide not only metrics as to the suitability of these lands in promoting regional connectivity between subpopulations, but will also provide a framework for other agencies to work toward accomplishing recovery goals beyond this project. For this plan, these lands will be managed consistent with conservation goals. The mitigation lands are a diverse and rich landscape that assist in the recovery of the covered species.

The standard for fully mitigated will be achieved by

1. discouraging and preventing permitted land use changes
2. decreasing and preventing through traffic
3. decreasing and preventing erosion caused by roads
4. preventing unauthorized access to area and providing signage informing people that they are trespassing in a protected area
5. removing trash and other debris not natural to the landscape (broken fencing, old signage, barbed wire, etc.)
6. restoring degraded areas (eroded, devegetated, disturbed) by implementing measures to prevent further erosion and revegetation with locally native plants
7. maintaining connectivity between subpopulations for target species
8. increasing the acreage of contiguous parcels of protected lands thereby decreasing edge effect

9. site specific management plans that exploit opportunities for enhancement (primarily revegetation, vegetation enhancement, grazing, removal of invasives if diminishing habitat value for target species)
10. employing species-specific enhancements

Finally, a potential long-term problem that faces covered species in this region (particularly terrestrial vertebrates) is fragmentation and the resulting effective isolation from other subpopulations. Therefore, preserving 11,000 acres of lands that support the covered species as well as other important species and promotes regional connectivity between and among populations could contribute significantly to maintaining viability for these species for the long term recovery..

Connectivity Analysis: The maintenance of habitats and connective pathways for wildlife species sensitive to human-caused landscape change is one of the most pressing issues in conservation biology. For this reason, Solargen will provide a thorough connectivity analysis to demonstrate that these compensation lands, not only provide suitable habitat attributes for the covered species, but also provides regional connectivity for the relevant species. Appendix C provides a more detailed discussion of the methodologies to be integrated into this conservation plan.

Monitoring: We will employ the multi-season occupancy sampling to generate estimates as to change for covered species on the mitigation lands. The sampling design and effort will be based on findings on the current occupancy sampling effort that is just getting underway for the project site.

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Appendix A. Distance Sampling for the Project Site and Mitigation Lands

Methods: Distance sampling along line transects was conducted to sample burrow clusters, target species and their sign, and suitable habitat. Hand-held GPS units were used to navigate along the transects and record location data. Transect easting coordinates were determined prior to fieldwork. One or two individuals walked along each transect scanning primarily within 50 m of the transect for burrows and then out to the horizon for other target resources (target species, habitat and other wildlife). When two individuals walked together, one was an observer and one was a data recorder to ensure that no animal was counted twice.

Distance sampling methods assume that line transects are located randomly with respect to the distributions of the units of observation, that all objects are detected on the line, no movement prior to detection and accurate measurements of distances to the observations.

Data were collected on burrow clusters and other data continuously along our transects for the first several days of data collection. After February 23, burrow cluster data were collected for 50 m along the transect at 500 m intervals resulting in 2-50 m sections for every 1 km of transect walked. All other target data were collected continuously along the transect.

For the analysis, kangaroo rat burrow clusters were differentiated from giant kangaroo rats by the size of burrows and size of scat. Burrow clusters with larger burrows (3 inches vs 2.5 inches) and the presence of scat of 7mm or longer rather than 5mm in length were considered giant kangaroo rat burrows. In addition, the presence of large hindfoot tracks was also diagnostic, but this was less common due to the fact that it was early spring and the kangaroo rats were less active, and the ground was often compacted due to periodic rainfall.

The software program DISTANCE (v. 5.0; Thomas *et al*., 2005) was used to analyze the data collected from the line transect survey in order to estimate densities of kangaroo rat and giant kangaroo rat burrow clusters. In addition, depending on detection rates, estimates of densities for other target species will be made. Data preparation and analysis followed published guidelines by Buckland *et al*., 2001.

Final model selection was based on the lowest AIC (Akaike's Information Criterion) value (Burnham & Anderson, 1998). Goodness of fit (χ^2) was used to assess the quality of distance data and the general shape of the detection function. The data were right truncated the width of the maximum sighting distance (w) at least 5% in order to improve model fit.

Results: The burrow cluster data were compiled into two groups: the first group represents the smaller burrows including kangaroo rats, giant kangaroo rats and probable San Joaquin antelope squirrel and the second group, the larger burrows including probable San Joaquin kit fox dens, badger dens, other carnivore dens, and burrowing owl burrows. We analyzed these separately.

Kangaroo rat group: The kangaroo rat burrow cluster data, which included kangaroo rat burrows, probable giant kangaroo rat burrows, and, to a lesser extent, probable San Joaquin antelope squirrel burrows as our targets, were collected in two ways: prior to February 23, we collected burrow cluster data continuously along our transects and after that date, we collected this data in discreet 50 m segments spaced every 450 m. Each of these segments was considered as a separate transect for data analysis.

Our effort resulted in 58.42 km walked in 259 transects. The transects in the Mitigation/Project area spanned both the mitigation and project lands so these were combined this into one category representing a smaller effort (6.4 km in 13 transects).

Table 1: Size of study areas, level of walking effort, number of transects for Distance analysis and number of observations used in this analysis for the kangaroo rat burrow cluster analysis

Study Area	***Area (sq km)***	***Effort (m)***	***No. transects***	***obs***
Entire	63.6	58421	259	456
Project	19.1	19279	60	75
Mitigation	44.5	32709	186	372
Mit/Proj	63.6	6436	13	9

We analyzed the entire study area for all targets combined and then post-stratified by stratum (Mitigation Area, Project Area, Mitigation/Project Area). We tested several models (13) using keys (uniform, half normal, and hazard rate) and adjustments (cosine, simple polynomial and hermite polynomial), different right truncation values, and stratified and non-stratified in DISTANCE, generally relying on the delta AIC values for model selection (lowest delta AIC value). We pooled the probability of detection function [g(0)] for stratified samples to calculate density estimates. For theses analyses, the best model (lowest delta AIC) was the hazard rate (key) plus cosine (adjustment term) with 10% truncation of largest values. In order to estimate resource densities for each stratum, we analyzed each stratum separately post stratifying by burrow cluster type using a pooled g(o) from the respective stratum. We tested 13 models for the Project Area stratum. The best model (the lowest delta AIC) was hazard rate (key) with the cosine adjustment and 5% right truncation of the highest values; the addition of a simple polynomial adjustment did not improve model fitting and the values were the same as the selected model. We tested 11 models for the Mitigation Area. The best model (the lowest delta AIC) was negative exponential (key) with the cosine adjustment with 5% right truncation of the greatest values.

The density estimates for the all targets together (Table 2, Figure 1) show that density in the Mitigation Area is greater than in the Project Area; when these density estimates are broken out by resource type, kangaroo rat densities are higher in the Mitigation Area but the GKR densities are lower (Table 2, Figure 2). When the CI is included, there is a large overlap between the two estimates (see Figure 2). The giant kangaroo rat density estimate may be somewhat misleading for the Mitigation Area due to the fact that although we measured the aerial extent of the burrow cluster and the number of burrows, we did not include in this analysis. Several giant kangaroo rat burrow clusters were very large (> 1 ac) in size and contained many burrows and likely several precincts, therefore artificially lowering the overall "density" measured when just considering this as one unit. We hope to rectify in a later more detailed analysis.

Table 2: Density estimates for all "kangaroo rat" burrow clusters for the entire study area and stratified by each study area, and for burrow cluster type (GKR = giant kangaroo rat, kangaroo rat, and probable San Joaquin antelope squirrel) for each study area (pooled detection function from each stratum).

Study Area	***Target***	***Density (per sq km)***	***%CV***	***df***	***95% CI (lower)***	***95% CI (upper)***
Entire	All (Krat, gkr, prob SJAS)	1168.6	17.22	154.99	833.8	1638.0
Project Area	All (Krat, gkr, prob SJAS)	272.8	49.27	59.93	107.4	693.3
Mitigation	All (Krat, gkr, prob SJAS)	797.7	14.87	220.29	596.0	1067.6
Mit/Project	All (Krat, gkr, prob SJAS)	98.1	86.11	12.06	19.4	496.5
Mitigation	GKR	86.7	41.65	191	39.4	190.7
Mitigation	kangaroo rat	990.7	15.46	234	731.9	1340.9
Mitigation	probable sjas	14.4	27.69	198.89	8.5	24.7
Project	GKR	144.7	79.50	76.79	35.9	583.3
Project	kangaroo rat	129.7	56.21	99.94	45.9	366.7

Figure 1: Density estimates for all target species (D±SE) in the Mitigation and Project Area

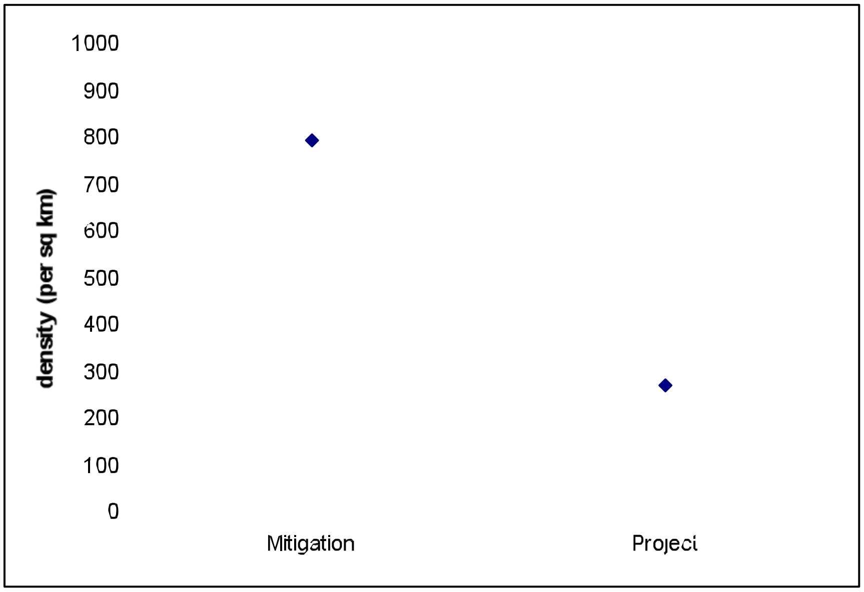
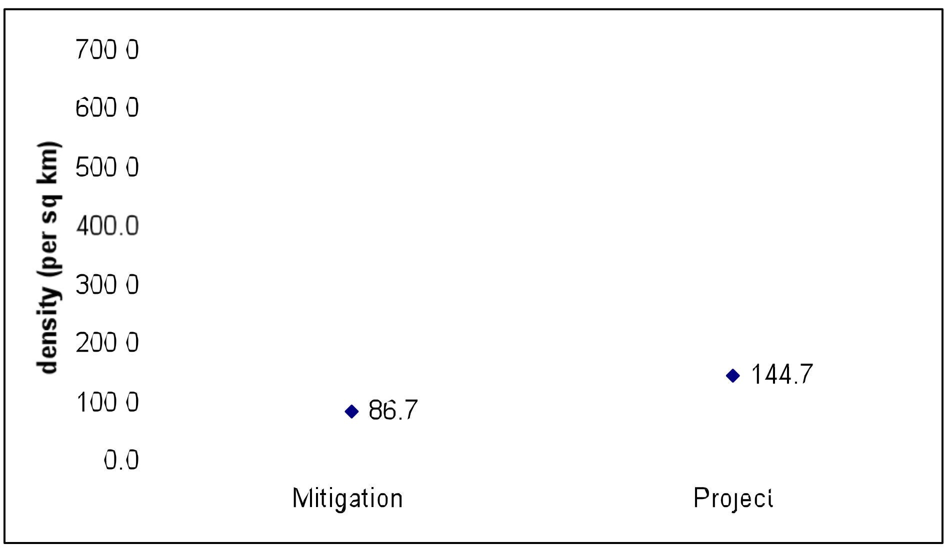


Figure 2: Giant kangaroo rat density estimates (with upper and lower CI) for the Mitigation and Project Areas.



Larger burrows: potential San Joaquin kit fox dens, badger dens, and burrowing owl burrows

We collected carnivore den, potential San Joaquin kit fox den, badger den and burrowing owl burrow location data continuously along our transects. Our total effort resulted in 162.3 km in 60 transects of effort for this analysis. We included the Mitigation/Project Area in two cases where transects were equally distributed in both the Mitigation and Project Area.

Table 3: Size of study areas, level of walking effort, number of transects, and number of observations used for this Distance analysis for potential San Joaquin kit fox den, badger dens, other carnivore dens, and burrowing owl burrows

Study Area	***Area (sq km)***	***Effort (m)***	***No. trans***	***obs***
Entire	63.6	162294	60	163
Project	19.1	40169	17	53
Mitigation	44.5	110737	43	94
Mit/Proj	63.6	11388	2	16

We analyzed the entire study area for all the data combined and then post-stratified by stratum (Mitigation Area, Project Area, Mitigation/Project Area). We tested several models (14) using keys (uniform, half normal, and hazard rate) and adjustments (cosine, simple polynomial and hermite polynomial) with different right truncation values, and stratified and non-stratified in DISTANCE, generally relying on the delta AIC values for model selection (lowest delta AIC value). We pooled the probability of detection function [g(0)] from the entire effort to calculate density estimates for stratified samples. For theses analyses, the best model (lowest delta AIC) was the uniform (key) plus cosine (adjustment term) with 10% right truncation of largest values.

We detected burrowing owl burrows (n = 12), badger dens (n = 12), potential San Joaquin kit fox dens (n = 130), generic carnivore dens (n = 10), coyote dens (n = 8) and a red fox den (red fox observed). San Joaquin kit fox presumably would use most of these structures for shelter and denning with the exception of the larger coyote dens.

The density estimate for the Project Area is greater than the Mitigation Area with overlapping confidence intervals (CI) (Table 4, Fig. 3); standard error bars show some separation of the estimates but the error bars overlap (Fig. 4). I am not at all sure why the density estimate for the Entire study area is so much higher than the other three estimates. The few number of transects walked for the Mitigation/Project Area (n = 2) contributed to the very large CI for this estimate; it is only included here to show why the Entire study area estimate is greater than the other estimates.

Table 4: Density estimates for target resources (potential San Joaquin kit fox den, badger dens, other carnivore dens, and burrowing owl burrows) for the entire study area stratified by each study area. (*D* = density)

Study Area	Target	*D* (per sq km)	%CV	df	95% CI (lower)	95% CI (upper)
Entire	Carnivore dens and burrowing owls burrows	131.9	19.89	4.29	77.5	224.7
Project Area	Carnivore dens and burrowing owls burrows	48.7	26.48	22.01	28.4	83.6
Mitigation	Carnivore dens and burrowing owls burrows	31.3	21.50	65.33	20.5	47.9
Mit/Project	Carnivore dens and burrowing owls burrows	51.9	36.48	1.18	2.2	1234.1

Figure 3: Density estimates (potential San Joaquin kit fox dens, badger dens, other carnivore dens, and burrowing owl burrows) with upper and lower CI (see Table 3 above) for each study area.

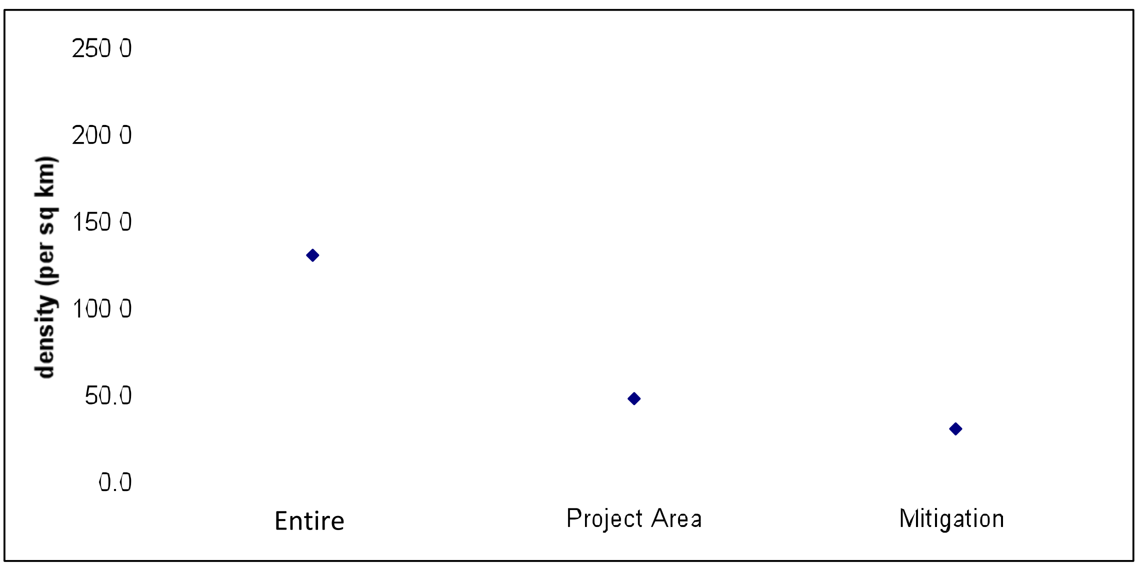


Figure 4: Density estimates (potential San Joaquin kit fox dens, badger dens, other carnivore dens, and burrowing owl burrows) with upper and lower CI (see Table 3 above) for the Mitigation and the Project Area.

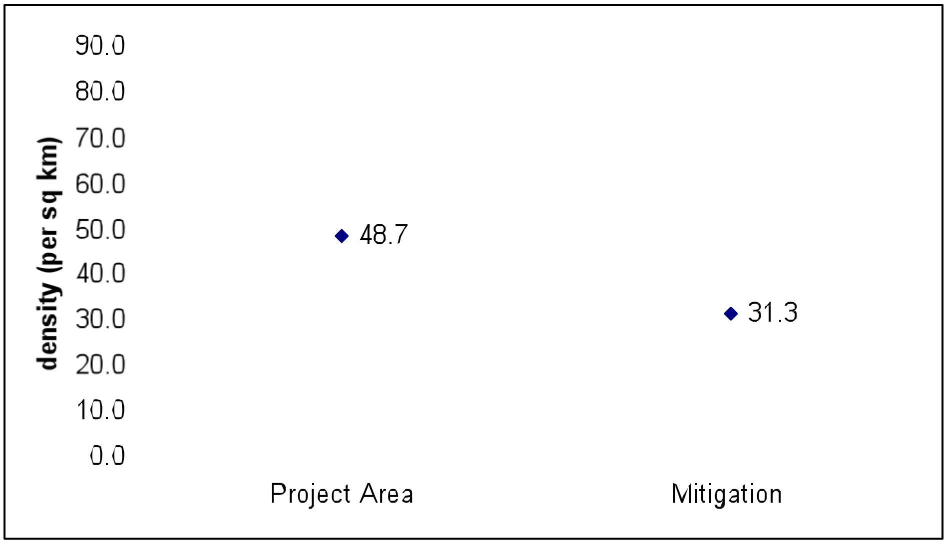
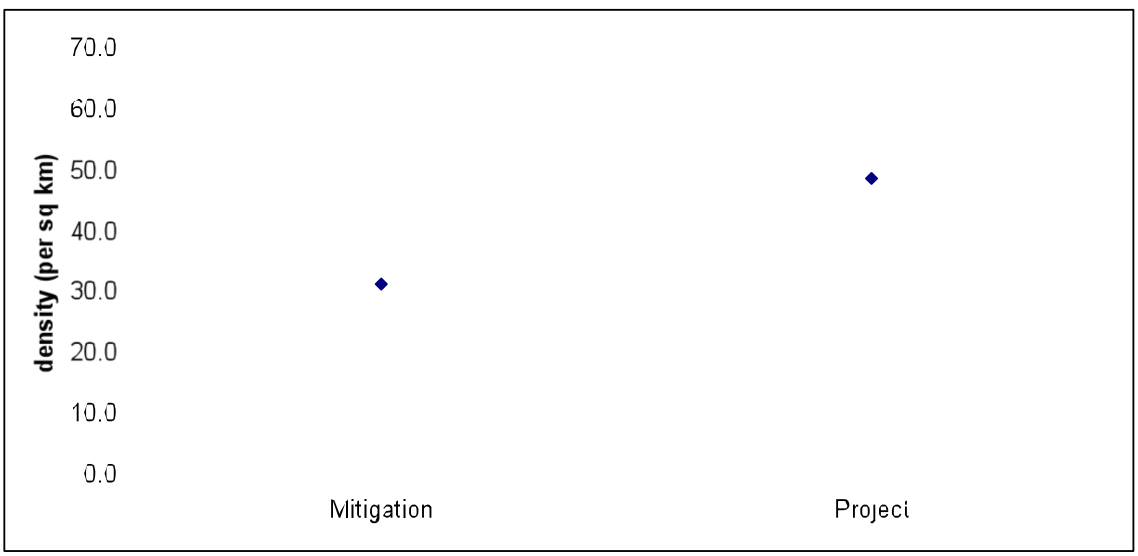


Figure 5: Density estimates (D±SE) for potential San Joaquin kit fox dens, other carnivore dens, badger dens and burrowing owl burrows for the Mitigation and Project Areas



APPENDIX B: Best Management Practices

All employees and contractors will be made aware of the BMPs, and those BMPs that are pertinent to employee work conduct will be implemented. They are listed below.

a) Prior to surface disturbance or other covered activity, a qualified wildlife biologist shall conduct a Covered Species education program (tailgate briefing) for all project personnel. Topics to be discussed during the briefing shall include: occurrence and distribution of Covered Species in the project area, take avoidance measures being implemented during the project, reporting requirements if incidental take occurs, and applicable definitions and prohibitions under the California Endangered Species Act.

b) All activities that will result in permanent or temporary ground disturbances shall be preceded by a preconstruction survey conducted by a qualified biologist. The biologist(s) shall identify and clearly mark the location of areas where Covered Species was/were identified, dens or burrows and habitats of Covered Species that are to be avoided Appropriate buffers will be established with highly visible markers. When burrows or dens are to be destroyed, a qualified biologist will determine when excavation procedures should be employed to protect individual covered species and when it is not necessary.

c) For some projects, a qualified biologist may determine that [a] biological monitor(s) shall be present while ground disturbing activities are occurring based on the sensitivity of the habitat in which a project occurs. In addition to conducting preconstruction surveys for the project, the biological monitors shall aid crews in satisfying take avoidance criteria and implementing project mitigation measures, will document all pertinent information concerning project effects on Covered Species, and shall assist in minimizing the adverse effects of project activities on Covered Species. Biological monitors shall accompany vehicles and crews throughout the project area if the qualifying biologist considers it necessary in order to avoid sensitive resources.

d) Biological monitors are empowered to order cessation of activities if take avoidance and/or mitigation measures are violated and will notify Solargen's environmental representative.

e) Unless otherwise allowed under preconstruction procedures (see discussion of b above), all known and potential San Joaquin kit fox dens, known or detected giant kangaroo rat burrows, known or detected San Joaquin antelope squirrel burrows, burrows inhabited by blunt-nosed leopard lizards, blunt-nosed leopard lizard habitat, burrowing owls burrows, shall be protected by implementing the following procedures:

The following table lists avoidance criteria for listed wildlife resources and conditions are as follows:

AVOIDANCE CRITERIA	
Type of Sensitive Area	Radius of Buffer Zone in Feet
Occupied kit fox den	100
Known kit fox den	100
Known kit fox natal den	150

Occupied kit fox natal den	200
Potential kit fox den	50
Giant kangaroo rat burrows (active and inactive)	50
San Joaquin antelope squirrel burrows	50
Occupied blunt-nosed leopard lizard burrows	50
Rodent burrow in wash (blunt-nosed leopard lizard habitat)	30
Burrowing owl burrows (breeding season)	250
Burrowing owl burrow (non-breeding season)	150

f) Unless biological monitors allow alterations to routes, all project vehicles shall be confined to existing roads or prominently staked and/or flagged access routes that are surveyed prior to use. All observed Covered Species and their habitat features such as dens, burrows or specific habitats shall be flagged as necessary to alert project personnel to their presence. All project-related flagging shall be collected and removed after completion of the project.

g) Where feasible, Solargen shall make every reasonable effort to avoid the collapse of dens and burrows where practicable by relocating project elements or by using other means as determined to be appropriate. When these features cannot be avoided, a qualified biologist will oversee the excavation and/or collapse of burrows or dens.

h) Biological monitors shall keep an accurate tally of the number of sensitive resources (as listed above) that are damaged, destroyed, or otherwise affected by project activities. Additionally, monitors shall estimate the number of small mammal burrows damaged, destroyed, or otherwise affected. Total number of dens and burrows affected by the project shall be reported in the post-activity compliance report and entered into a central database developed expressly for that purpose.

i) Potential kit fox dens that cannot be avoided may be excavated and back-filled pursuant to USFWS guidelines (June 1999) without prior notification, provided that excavation is approved and supervised by a biological monitor or other qualified biologist. Destruction of all kit fox dens shall be reported in the post-activity compliance report.

j) Solargen shall appoint an company representative who will be the contact source for any employee or contractor who inadvertently kills or injures a Covered Species or who finds a dead, injured, or entrapped individual or who finds a dead, injured or entrapped covered animal species. The representative will be identified during the pre-performance educational briefing.

k) Any contractor, employee(s), or other personnel who inadvertently kills or injures a covered animal species shall immediately report the incident to their representative. The representative shall contact the Solargen's environmental representative and, if feasible, a qualified biologist. Solargen will contact CDFG immediately in the case of a dead, injured, or entrapped listed species. The covered Species CDFG contact for immediate assistance is State Dispatch at (916) 445-0045. State Dispatch will contact the local warden or biologist. The qualified biologist will also document all circumstances of death, injury or entrapment of

Covered Species. The biologist will 1) take all reasonable steps to enable the individual animal to escape should it be entrapped, 2) contact CDFG or other appropriate authorities to identify an approved rehabilitation center and appropriate capture and transport techniques should the covered animal be injured, and 3) document circumstances of death in writing and if possible photographing dead animal *in situ* prior to moving.

l) USFWS and CDFG shall be notified in writing within three (3) working days in the event of an accidental death or injury of a San Joaquin kit fox, giant kangaroo rat, blunt-nosed leopard lizard, or San Joaquin antelope squirrel or of the finding of any dead or injured kit fox, giant kangaroo rat, blunt-nosed leopard lizard, San Joaquin antelope squirrel for other Covered Species. Notification shall include the date, time, and location of the incident or of the finding of a dead or injured animal, and any other pertinent information. The USFWS contact for this information is the Endangered Species, Program Field Office, 2800 Cottage Way, Room W-2605, Sacramento, CA 95825, (916) 414-6600. The CDFG contact information is 1416 9th Street, Sacramento, CA 95814, and (916) 654-4262. Any dead or injured kit fox, giant kangaroo rat, blunt-nosed leopard lizard, or San Joaquin antelope squirrel shall be turned over to the California Department of Fish and Game's Environmental Services Division, Fresno Regional Headquarters at (209) 445-6152 at the agency's request. The dead covered animal can be transported to California State University at Bakersfield or the Endangered Species Recovery Team in Bakersfield for storage and research if CDFG approves.

m) To prevent inadvertent entrapment of Covered Species, all open holes, steep-walled holes, or trenches more than 2 feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks (wooden planks should be more no less than 10 inches in width and should reach to bottom of trench). Before such holes or trenches are filled, they should be thoroughly inspected for trapped animals.

n) All spills of hazardous materials shall be cleaned up immediately in accordance with the Solargen Spill Prevention Control Plan.

o) Pets are prohibited at the PVSF.

p) Firearms are prohibited at the PVSF.

q) All food-related trash, such as wrappers, cans, bottles, bags, and food scraps shall be disposed of daily in containers with secure covers and regularly removed from project sites.

r) Use of rodenticides and herbicides in project areas is prohibited with the exception of those applied near buildings/critical facilities. Only agency approved compounds will be applied (if necessary) by licensed applicators in accordance with label directions and other restrictions mandated by U.S. Environmental Protection Agency, County Agricultural Commissioner, regional label prescriptions on use, California Department of Food and Agriculture, and other State and Federal legislation.

s) All project-related vehicles shall observe a speed limit of 25 mph or less on all except as posted on State and County highway/roads or paved facility roads.

t) Motorized vehicles are prohibited within occupied Covered Species habitat. If not avoidable, that area will be considered temporarily disturbed and size will be limited in width to 25 feet (12.5 feet on either side of the centerline).

u) Appropriate measures shall be undertaken to prevent unauthorized vehicle entry to off-road survey routes in sensitive habitat areas. Signing will be the preferred method to discourage use.

v) Project vehicles shall be confined to existing primary or secondary roads or to specifically delineated project sites (i.e., areas that have been surveyed and described in existing documentation). Otherwise, off-road vehicle travel is not permitted.

w) Upon completion of any project, all areas that are significantly disturbed and not necessary for future operations, shall be stabilized to resist erosion, and revegetated and re-contoured if necessary, to promote restoration of the area to pre-project conditions.

Employee Education Program

The Employee Education Program familiarizes Solargen employees and contractors with BMPs and other measures regarding Covered Species. This program is designed to ensure all personnel who work at the PVSF are aware of and can identify the Covered Species and the measures implemented to protect these species. In addition, contact names and numbers are given to which personnel can report incidents regarding Covered Species.

An employee environmental program (awareness) will be administered to all new employees and to all other employees every 2 years. Upon completion of the program, the employees are given a badge that is required for admittance onto the PVSF. Badges will include the employee's picture and will be color-coded and dated in order to show that the employee is current with required training.

Prior to beginning work at the PVSF, all new employees, contractors, and other personnel that work at the PVSF and associated right-of-ways will complete an employee education program that includes a section on Covered Species awareness. Personnel must take the Employee Education Program administered test. Training included in the Employee Education Program pertains to Covered Species' identification, Covered Species' basic natural history, components of avoidance and minimization program, familiarity with preconstruction surveys and what they are and how they are administered, BMPs, and how to report incidents involving Covered Species.

The employee or contractor for PVSF will be shown examples (i.e., pictures) of Covered Species and their burrows, dens, nests or other sign. Basic natural history facts for each of the Covered Species will be included in information given to employees. All BMPs will be provided in easy to carry pamphlets for reference while working at the PVSF and lands within the 2-mile buffer.

A review of the BMPs will be conducted for each employee and a test will be administered to verify that employees have a familiarity with the provisions in the BMPs.

Appendix C. Connectivity Analysis

The fate of wide-ranging species depends critically on planning efforts that simultaneously consider the habitat requirements and ecological processes that motivate animal movement over long distances. However, planners require more specific information on the features of wildlife habitat that promote or impede the linkage and maintenance of population core areas on large landscapes, including vegetation, topography, and anthropogenic barriers.
The space use needs of large mammals are rarely considered at spatial scales relevant to the species. Often these efforts are based on legal and not bioregional boundaries and, as such, cannot easily accommodate the conservation of wildlife habitats that extend beyond the legal boundaries of sites or planning efforts. In addition, simplistic attempts to identify "movement corridors," usually focus on delineating "corridors," which can best be defined as "routes that facilitate movement of organisms between habitat fragments" (Hilty et al. 2006:5). Corridor delineation efforts, however, typically invoke simplistic judgment-based exercises describing static habitat patterns, and do not explicitly integrate the ecological *processes* of animal movement (e.g., dispersal). Moreover, corridor studies tend to occur at relatively small spatial scales and emphasize one (or few) possible pathways between patches of habitat presumed to be suitable. For example, some rely on the non-statistical least cost path (LCP) or least cost corridor (LCC) method to identify "wildlife corridors," as it is widely available as a free extension to ArcGIS and relatively simple to run. The challenge is that due to the unrealistic assumptions (e.g., animals have perfect knowledge of their landscape) and overly simplistic results of a single "optimal" corridor, conservation efforts for rare or sensitive species are more likely compromised than benefited.

Some have tried to circumvent the inherent problems with LCP by a tortuous process of rerunning the model with different end points to define multiple pathways. However, all that this accomplishes is to compound the intrinsic flaws of the LCP model, and unfortunately for the untrained eye, provides a "reasonable" facsimile of how species move between and among suitable habitat patches. Sadly, this approach merely legitimizes a non-statistical and highly flawed modeling methodology and its resultant "solution." This is why landscape ecologists have argued that complex connectivity measures that not only take into account the movement abilities of the species, but also the distances to all possible population sources, perform better at defining the connectedness of a landscape (Moilanen and Nieminen 2002, Lindenmayer and Fischer 2006). While it is desirable to strive for parsimony (e.g., Ockham's Razor) in deriving spatial models, it is a fallacy to believe that overly simplistic models are parsimonious – it is a bit counter-intuitive, but complex models that do a better job of approximating reality are in fact more parsimonious than simple models that are based on seriously flawed assumptions (e.g., LCP). For example, it is a tautology (i.e., circular) to run a LCP analysis several times trying to identify multiple pathways as the artificial placement of end points "pre-determines" the pathway. Thus it is a fallacy to believe the multiple LCP runs accomplish the type of analyses that Moilanen and Nieminen (2002) were advocating.

Indeed, when recommended mitigation areas are improperly identified there can be great risk to both animals and resource investments. In this context, landscape-level approaches and predictive, probabilistic models that are rigorously derived and ecologically meaningful are needed.

San Joaquin Kit Fox: The movements of wide-ranging animals, such as the kit fox, are most influenced by the dominant attributes of the habitat mosaic to be navigated, namely vegetation. At the moment, we propose to rely on currently available spatial data on vegetation communities in California which have been derived at a 30-100-m resolution using satellite imagery acquired during the previous decade (e.g., CALVEG, Landfire). We will use USGS digital elevation models (DEMs; 10m) to derive multiple terrain features, including topographic position and landscape ruggedness. Each of these data layers will be subjected to a formal process of expert and literature review in order to vet, classify, and weight each layer (i.e., "variable") entering into the habitat and connectivity models described below. Typically, 6 to 8 variables are selected and integrated into these analyses. All data layers and models will be derived using cutting-edge remote sensing and geographic information system applications where appropriate.

As we did for the cougar model in Southern California, the vegetation cover map will not simply be a ranking of various cover classes but the ensuing vegetation map will incorporate patch metrics. In other words, the subsequent value of a pixel will be integrated into the neighborhood by which it is surrounded. This considers the fact that the adjacent land cover types influence the importance of a habitat type for a target species. For example, riparian habitat within a mosaic of oak woodland and chaparral habitats is of higher value for a cougar than riparian habitat contained entirely within an urban matrix. In other words, context is important.

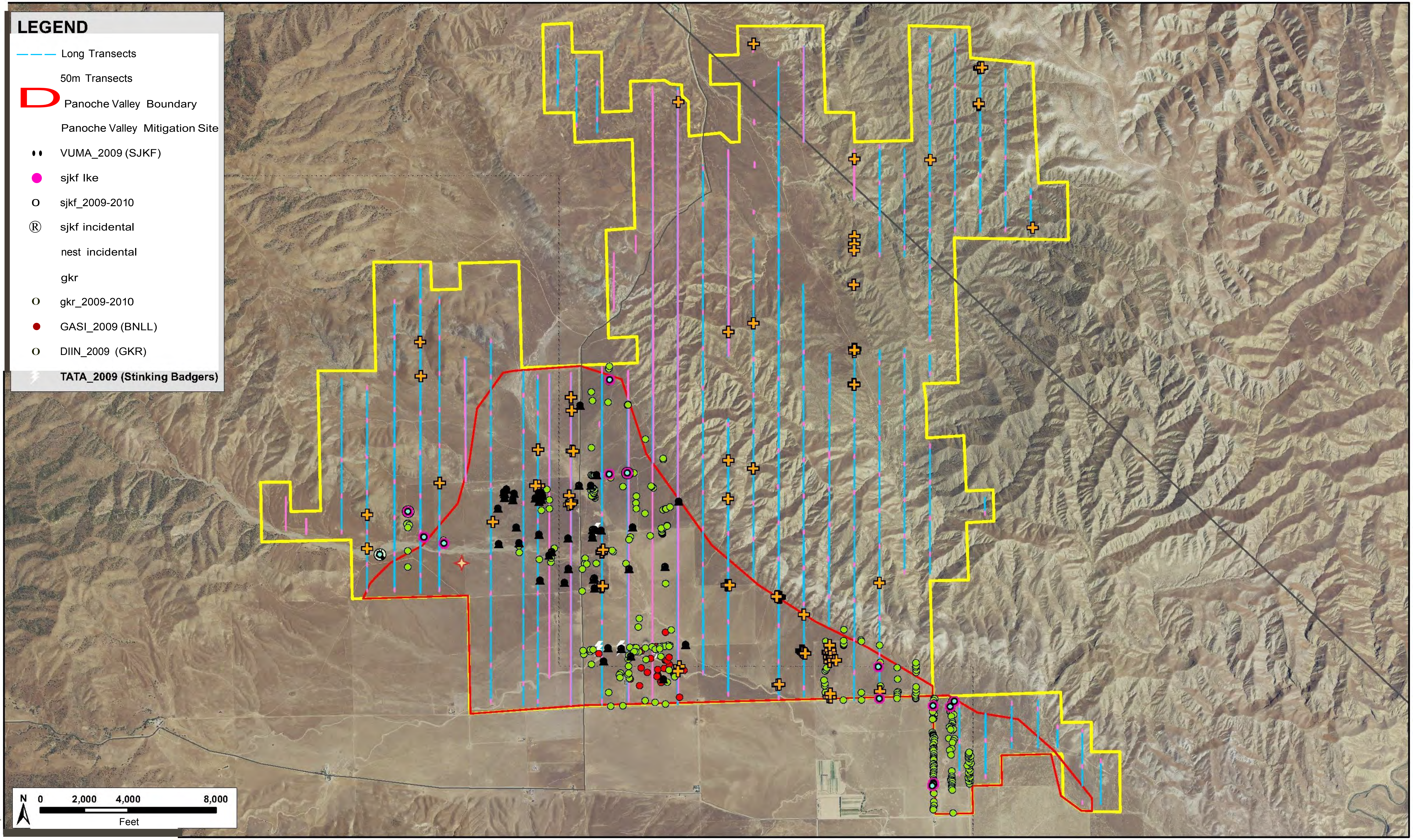
We will develop an expert-based model of habitat suitability for San Joaquin kit fox using the relevant habitat data layers and relying on the ranking of 4 or 5 experts. On a continuous scale of 0–1000, each expert will score the relative likelihood of each habitat attribute, or "class" (at the scale of the 30-m grid cell) to "support or sustain the day-to-day behaviors of an individual kit fox within an established home range." Scored values of 1000 indicate "most likely" and values of 0 indicate "not capable." We will use a quantile classification method to initially divide the distribution of cell values for the certain data layers such as topographic position, roads, developments layers into 10 suitability classes (score = 100, 200, 300, …, 1000, where 100 was lowest and 1000 was highest).

We will use a modification to the GIS-based Weighted Linear Combination (WLC) procedure described by Malczewski (2000) to average habitat class score values and to weight and combine individual habitat data layers. We will compute an average expert-defined habitat class score value and create a new layer that assigns this value to each cell in that habitat class. Separately, individual experts will be requested to assign an importance value (on a continuous scale of 0–1000) to each of the habitat layers and will compute a "swing weight" (sensu Malczewski 2000) for each layer by dividing its importance value by the sum among all importance values. Briefly, swing weights are derived by asking an expert to compare a change, or swing, from the least- to most-suitable habitat class value for a given habitat layer to a similar change in another habitat layer, and scoring the importance of all layers accordingly. Next we will create a preliminary habitat suitability layer by calculating the average importance value from among all experts, computing a new swing weight for each layer, and then multiplying this value by the average expert-defined habitat class score value at each cell. We will then add the products for each of the final layers together. Finally, we will reclassify these new values using a GIS algorithm that identifies four quartile breaks in the data distribution, where the 75th percentile represents the highest suitability areas. We will use this more parsimonious classification (1=low suitability and 4=high suitability) as our final habitat suitability layer.

To characterize potential large core habitat areas on the study area, we will use a circular moving window and focal-majority operation in the GIS to identify contiguous areas with the highest habitat suitability values that are within a suitable radius (i.e., radius will be based on average home range size for the region) of each 30-m cell on the study area. Importantly, we will consider core habitat areas to be large patches of contiguous high suitability habitat, typically nested within broader suitable areas on the landscape, and that are capable of supporting the minimum prey and cover requirements for source and destination populations of dispersing kit fox.

A key ecological principle is that on large landscapes with suitable and well-connected habitat features, greater numbers of low resistance pathways will permit greater current (or energy) flow between pairs of nodes. That is, greater connectivity among populations or core patches is predicted when more connected pathways are available. Because they have a solid mathematical foundation in random walk theory and probabilistically incorporate all possible pathways linking habitat features, circuit-theoretic models convey greater realism than more common analytical approaches, such as least-cost path analysis (see McRae et al. 2008).

We will use a similar approach for identifying regional connectivity issues for GKR



Tranect Lines with Records

Solargen Photovoltaic Facility (3128-01)

May 201

MEMORANDUM

Date: **March 13, 2015**

To: Jennifer Kaminsky

Of: Burns and McDonnell Engineering Company, Inc.

From: Randi McCormick, Principal Biologist

Subject: Early season rare plant surveys of Panoche Solar Project Footprint

Purpose

The purpose of this memorandum is to briefly document an early season rare plant survey conducted by McCormick Biological, Inc. on the Panoche Solar Project Footprint (approximately 2,506 acres) plus a buffer of at least 100 feet located in San Benito County, California (Attachment 1). In addition, eight wire pull sites, three guard structure sites, four temporary work areas, All Dielectric Self-Supporting (ADSS) pole sites and one helicopter landing zone were surveyed. These areas are located within natural lands that represent potential habitat for rare plant taxa along the proposed telecommunications routes for the Panoche Valley Solar Project (Project) within Pacific Gas &Electric (PG&E) right-of-way in San Benito and Fresno Counties. These surveys were conducted in compliance with MM BR-3.1 of the draft Supplemental Environmental Impact Report for the Revised Project.

Survey

Survey methods were consistent with the *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFW 2009) (Protocols). Each of the Project components was surveyed by qualified botanists using walking transects spaced no more than 20 meters apart. Special attention was given to areas of unusual soils and high species diversity. Reference sites that were located within approximately ten miles of the Project Footprint were surveyed for three early season rare plant species, San Joaquin wooly threads (*Monolopia congdonii*), forked fiddleneck (*Amisinckia furcata*), and Panoche peppergrass (*Lepidium jaredii* ssp. *album*), to verify survey timing. All three of these taxa were verified to be in a flowering and fruiting stage that enabled positive identification. Reference sites for all potentially occurring rare plant species were not visited; however, these three species were considered suitable proxies for verification of appropriate timing for potentially occurring early flowering plant species. Several of the target rare plant species are expected to flower later in the season. GPS points were taken to enable follow-up surveys for the plants in these genera that could not be identified during the survey

All plant taxa encountered were identified to the extent possible. Identifications were made using keys contained in The Jepson Manual: Vascular Plants of California (2nd Edition) (2012) and updates found in the Jepson eflora (http://ucjeps.berkeley.edu/IJM.html), containing revisions to taxonomic treatments. Plant identifications were made using a 10x or greater magnification field hand lens and/or were collected and identified using a dissecting microscope.

When encountered, observations of special-status plant species were documented as follows: coordinates were recorded using a handheld global positioning unit, number of plants in the population was counted (<50 individuals) or estimated (>50 individuals), percent of population flowering, vegetative, and/or in fruit was estimated. If enough individuals were present, a voucher specimen was collected following standard botanical collecting guidelines.

The survey was conducted between March 3 and March 13, 2015. Between five and seven surveyors walked parallel transects on the Project Footprint and the 100 foot buffer. Each of the PG&E telecommunications elements was inventoried by one to two surveyors. The target list of rare plants was compiled in the Panoche Valley Solar Project Final EIR, and is shown in Table 1 below:

Table 1: Target List of Rare Plant Species

Species	**Status**	**Flowering Period**	**Comments**
Amsinckia furcata Forked fiddleneck	CRPR 4.2	March-May	
Androsace elongata ssp. *acuta* California androsace	CRPR 4.2	February-April	
Antirrhinum ovatum Oval-leaved snapdragon	CRPR 4.2	May-July	
Astragalus macrodon Salinas milk vetch	CRPR 4.3	April-June	
Astragalus rattanii var. *jepsonianus* Jepson's milk vetch	CRPR 1B.2	April-June	
Atriplex cordulata var. *cordulata* Heartscale	CRPR 1B.2	June-July	
Atriplex coronata var. *coronata* Crownscale	CRPR 4.2	March-October	
Atriplex coronata var. *vallicola* Lost Hills crownscale	CRPR 1B.2	April-September	
Atriplex depressa Brittlescale	CRPR 1B.2	June-October	
Atriplex joaquiniana San Joaquin spearscale	CRPR 1B.2	April-September	
Atriplex minuscula Lesser saltscale	CRPR 1B.1	April-October	
Atriplex subtilis Deltoid bract saltbush	CRPR 1B.2	June-October	
Blepharizonia plumosa Big tarplant	CRPR 1B.1	July-November	
California macrophylla Round leaved filaree	CRPR 1B.1	March-July	

Camissonia benitensis San Benito evening primrose	FT, CRPR 1B.1	April-June	
Campanula exigua Chaparral harebell	CRPR 1B.2	May-June	
Caulanthus californicus California jewelflower	FE, SE, CRPR 1B.1	February-April	
Caulanthus lemmonii Lemmon's wild cabbage	CRPR 1B.2	March-May	
Chorizanthe ventricosa Priest Valley spineflower	CRPR 4.3	May-September	
Chlorophyron molle ssp. *hispidum* Hispid bird's beak	CRPR 1B.1	June-September	
Deinandra halliana Hall's tarplant	CRPR 1B.1	April-May	
Delphinium californicum ssp. *interius* California larkspur	CRPR 1B.2	April-June	
Delphinium gypsophilum ssp. *gypsophilum* Pinoche Creek larkspur		March-June	
Delphinium recurvatum Recurved larkspur	CRPR 1B.2	March-June	
Eriastrum hooveri Hoover's eriastrum	CRPR 4.2	March-July	
Eriogonum gossypinum Cottony buckwheat	CRPR 4.2	March-September	
Eriogonum nudum var. *indictum* Naked buckwheat	CRPR 4.2	April-December	
Eriogonum temblorense Temblor buckwheat	CRPR 1B.2	April-September	
Eriogonum vestitum Idria buckwheat	CRPR 4.3	April-August	
Fritillaria falcata Talus fritillary	CRPR 1B.2	March-May	
Fritillaria viridea San Benito fritillary	CRPR 1B.2	March-May	
Lagophylla diabolensis Diablo Range hare leaf	CRPR 1B.2	April-September	
Layia discoidea Rayless layia	CRPR 1B.1	May	
Layia heterotricha Pale yellow layia	CRPR 1B.1	March-June	
Layia munzii Munz's tidy tips	CRPR 1B.2	March-April	
Lepidium jaredii ssp. *album* Panoche pepper grass	CRPR 1B.2	February-June	
Leptosiphon ambiguus Serpentine leptosiphon	CRPR 4.2	March-June	

Madia radiata Golden madia	CRPR 1B.1	March-May	
Malacothamnus aboriginum Gray bushmallow	CRPR 1B.2	April-October	
Monolopia congdonii San Joaquin woollythreads	FE, CRPR 1B.2	February-May	
Navarretia nigelliformis ssp. *radians* Adobe navarretia	CRPR 1B.2	April-July	
Navarretia prostrata Prostrate navarretia	CRPR 1B.2	April-July	
Phacelia phacelioides Mt. Diablo phacelia	CRPR 1B.2	April-May	
Senecio aphanactis California groundsel	CRPR 2B.2	January-April	
Streptanthus insignis ssp. *lyonii* Arburua Ranch jewelflower	CRPR 1B.2	March-May	

FE = Federally Endangered SE = State Endangered

CRPR = California Plant Rank (California Native Plant Society)
1B = Plants that are rare, threatened, or endangered in California and elsewhere
4 = A watch list; plants of limited distribution
0.1: Seriously endangered in California
0.2: Fairly endangered in California
0.3: Not very endangered in California

Findings

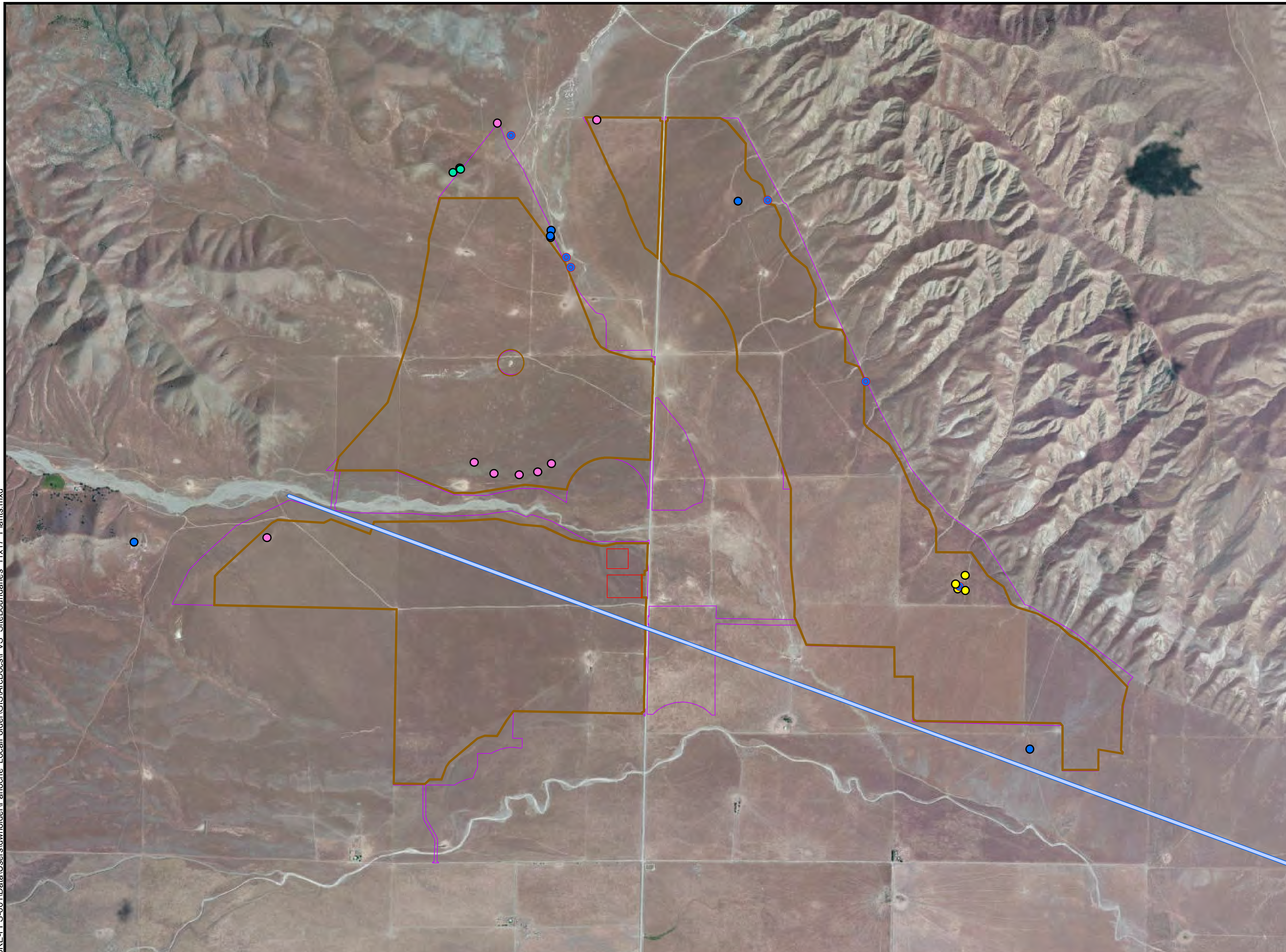
No federal or state listed rare, threatened or endangered plant species were observed within the survey area during this early season survey. Several plant species ranked by the California Native Plant Society were observed (See Table 1 and Figure 1). Relatively small populations of forked fiddleneck, serpentine leptosiphon, and California groundsel were found within the Project Footprint. In the region, forked fiddleneck is found at several locations numbering in the thousands, while relatively large populations of serpentine leptosiphon (10,000+) and California groundsel (50+) were found outside of the Project Footprint during the survey. The locations of these observations are shown on Figure 1 attached.

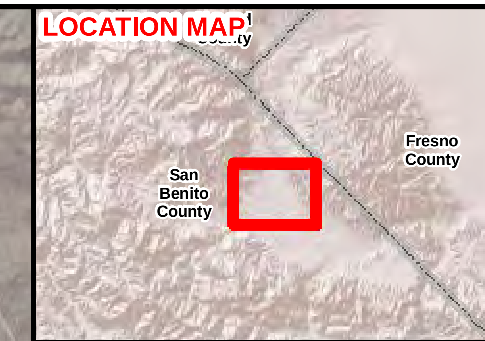
Impacts to a small portion of a population (i.e., a few individuals) of plants that are not federally or state-listed, or impacts to a population for which loss of a local population would not substantially affect the range of the species have been considered in the 2010 Final EIR and 2014 Supplement EIR, Section C.6.

Impacts to these species would be reduced through implementation of Mitigation Measures BR-G.1 through BR-G.6 which states, (1) All construction personnel participate in the Worker Environmental Education Program; (2) Best Management Practices (BMPs) for biological resources are implemented; (3) A Habitat Restoration and Revegetation Plan is developed and implemented; (4) Biological construction monitoring is implemented; (5) Conservation easements are created for permanent habitat protection as appropriate; and (6) A Habitat Mitigation and Monitoring Plan is developed and implemented for mitigation lands. MM BR-1.1 would ensure the preparation and implementation of a Weed Control Plan and MM BR-1.2 would ensure the development of a Grazing Plan for vegetation management on the site. In addition, MM AQ-1.1 would reduce impacts from fugitive dust. Finally, MM BR-3.1 would require pre-construction surveys for special-status plant species. These measures would reduce impacts to these CNPS-listed plants. A results survey report will be prepared that includes a list of all plant taxa identified during the survey and recommendations regarding follow-up surveys to fulfill the methods for comprehensive floristic surveys as described in the CDFW Protocols.

Participating Botanists

The following individuals assisted in the early season rare plant surveys for the Panoche Valley Solar Project: Marcus Jones, Ed Kentner, Russell Kokx, Eve Laeger, Randi McCormick, Gene Moise, Keir Morse, and Jordan Zylstra.





Legend

PVS Project Footprint

PVS Perimeter Fence

Substation and Switchyard

ROW

Rare Plants Locations

Amsinckia furcata

Leptosiphon ambiguus

Senecio aphanactis

Navarettia sp.

Delphinium sp.

NORTH

4,000 2,000 0

Feet

Burns & McDonnell SINCE 1898

Panoche Valley Solar, LLC

PANOCHE PROJECT BOUNDARY

RARE PLANTS

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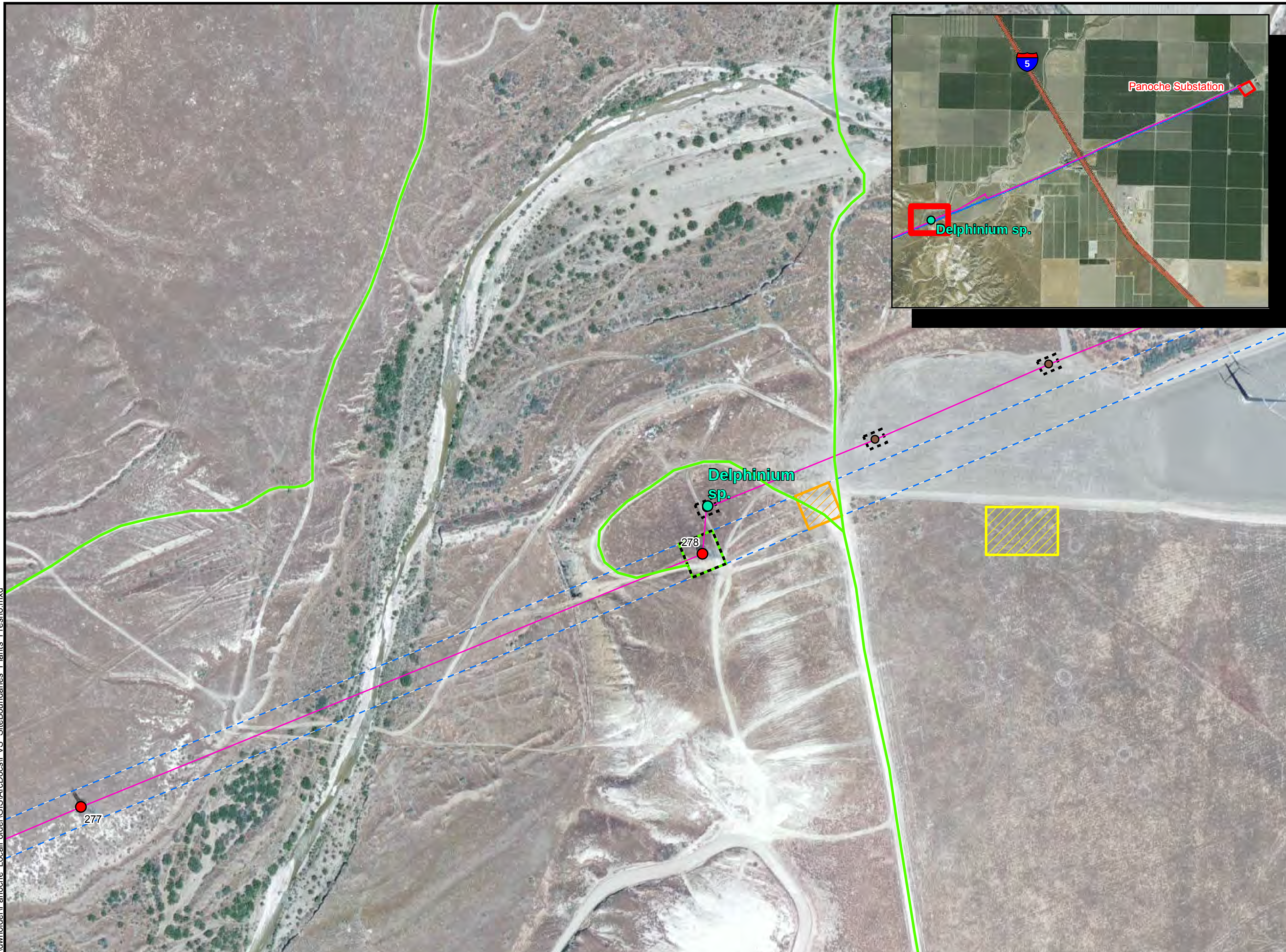
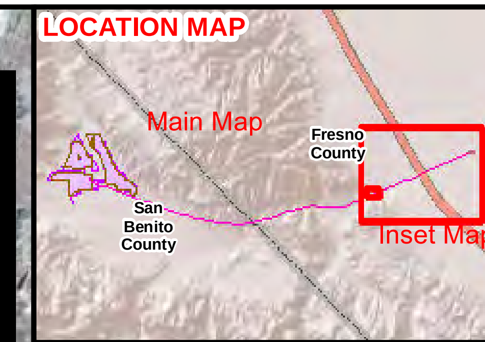
Panoche Valley Solar Project Boundary, 1:24,000, DWHolder, 1/9/2015





Legend

- PVS Project Footprint
- PVS Perimeter Fence
- Existing 12kV Poles for ADSS
- OPGW
- Access Routes
- Work Area
- Work Area - No Ground Disturbance
- Wire Stringing Site
- Helicopter Landing Zone
- ROW Boundary

Rare Plants Locations

- Delphinium sp.

NORTH

400 200 0
Feet

Burns & McDonnell
SINCE 1898

Panoche Valley Solar, LLC

PANOCHE PROJECT OPGW

RARE PLANTS

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Panoche Valley Solar Project Boundary, 1:2,400 DWHolder, 3/24/2015

BIOLOGICAL ASSESSMENT

FOR THE PANOCHE VALLEY SOLAR FACILITY

April 2014

TABLE OF CONTENTS

EXECUTIVE SUMMARY IX

1.0 INTRODUCTION 1
1.1 Purpose of this Document 1
1.2 Species Considered in this Document 5
1.3 Summary of Effects Determinations 6
1.4 Consultation History 6

2.0 PROJECT INFORMATION 10
2.1 Location of Project 10
2.2 Project History/Background 10
2.3 Project Description 11
2.3.1 Proposed Construction Schedule/Phasing Plan 22
2.3.2 Site Preparation 23
2.3.3 Construction and Installation 25
2.3.4 Operations and Maintenance 27
2.3.5 Decommissioning Plan 28
2.4 Proposed Conservation Measures/Conservation Package 29
2.4.1 General Proposed Avoidance and Minimization Measures 29
2.4.2 Species-Specific Proposed Avoidance and Minimization Measures 32
2.4.3 Operations and Maintenance Proposed Avoidance and Minimization Measures 43
2.4.4 Conservation Lands 44
2.4.5 Conservation Package 46

3.0 ACTION AREA 49
3.1 Data Collection/Survey Methods 49
3.2 Environmental Baseline of the Action Area (Project Footprint and Conservation Lands) 54
3.2.1 Biotic Habitats 55
3.2.2 Project Footprint 56
3.2.3 Project Conservation Lands 59

4.0 SPECIES ACCOUNTS 69
4.1 Giant Kangaroo Rat 69
4.2 San Joaquin Kit Fox 86
4.3 Blunt-nosed Leopard Lizard 93
4.4 California Tiger Salamander 105
4.5 California Condor 109
4.6 Vernal Pool Fairy Shrimp 111
4.7 Conservancy Fairy Shrimp 113
4.8 Longhorn Fairy Shrimp 116
4.9 Vernal Pool Tadpole Shrimp 117

5.0 EFFECTS ANALYSIS AND DETERMINATIONS 120
5.1 Giant Kangaroo Rat 123
5.2 San Joaquin Kit Fox 130
5.3 Blunt-nosed Leopard Lizard 136
5.4 California Tiger Salamander 143

5.5 California Condor 150
5.6 Vernal Pool Fairy Shrimp 151
5.7 Conservancy Fairy Shrimp 154
5.8 Longhorn Fairy Shrimp 156
5.9 Vernal Pool Tadpole Shrimp 158

6.0 CUMULATIVE EFFECTS 161

7.0 CONCLUSIONS 164

8.0 LITERATURE CITED 165

FIGURES

Figure 1 – Project Location.. 2
Figure 2 – Proposed Layout.. 3
Figure 3 – Project Footprint and Conservation Lands 4
Figure 4A – Proposed Telecommunication Upgrades 15
Figure 4B – Proposed Telecommunication Upgrade Alternative 18
Figure 4C – AT&T Telecom Support 21
Figure 5 – Proposed Drainage Crossings 24
Figure 6 – California Tiger Salamander Ponds 33
Figure 7 – Project Footprint and Valley Floor Conservation Lands Biotic Habitats 57
Figure 8 – Valadeao Ranch Conservation Lands Biotic Habitats 60
Figure 9 – Silver Creek Ranch Conservation Lands Biotic Habitats 66
Figure 10 – CNDDB Giant Kangaroo Rat Records 72
Figure 11 - Giant Kangaroo Rat Habitat Suitability 76
Figure 12 – Giant Kangaroo Rat Observations and Habitat Suitability Model 77
Figure 13 – 2013 Giant Kangaroo Rat Observations – Project Footprint 80
Figure 14 – 2013 Giant Kangaroo Rat Observations – Valley Floor Conservation Lands 82
Figure 15 – 2013 Giant Kangaroo Rat Survey Results – Silver Creek Ranch Conservation Lands.... 83
Figure 16 – 2013 Giant Kangaroo Rat Survey Results – Valadeao Ranch Conservation Lands......... 84
Figure 17 - CNDDB San Joaquin Kit Fox Records 89
Figure 18 – San Joaquin Kit Fox Camera Trap Locations 91
Figure 19 – San Joaquin Kit Fox Den Locations 92
Figure 20 – 2010 Blunt-nosed Leopard Lizard Occupancy Sampling Locations 98
Figure 21 – 2009-2010 Blunt-nosed Leopard Lizard Observations 99
Figure 22 – Blunt-nosed Leopard Lizard Observations on Silver Creek Ranch Conservation Lands100
Figure 23 – 2013 Blunt-nosed Leopard Lizard Protocol Survey Results 101
Figure 24 – Blunt-nosed Leopard Lizard Occupancy and Habitat Suitability Model on Project Footprint and Valley Floor Conservation Lands 104
Figure 25 – Known California Tiger Salamander Breeding Ponds Outside Project Footprint and Valley Floor Conservation Lands 108
Figure 26 – Ephemeral Pool Habitat Locations 114
Figure 27 – Vernal Pool Fairy Shrimp Observations 115
Figure 28 – Giant Kangaroo Rat Mitigation Lands 125
Figure 29 – Giant Kangaroo Rat Core Population Areas 126
Figure 30 – San Joaquin Kit Fox Mitigation Lands 132

Figure 31 - Ciervo-Panoche Natural Area 137
Figure 32 – Blunt-nosed Leopard Lizard Buffer Locations... 139
Figure 33 – Blunt-nosed Leopard Lizard Mitigation Lands 141
Figure 34 – Valadeao Ranch Conservation Lands California Tiger Salamander Potential Mitigation Ponds 147
Figure 35 – Silver Creek Ranch Conservation Lands California Tiger Salamander Potential Mitigation Ponds... 148

TABLES

TABLE 1 SPECIES CONSIDERED 5

TABLE 2 SUMMARY OF EFFECTS DETERMINATIONS...6

TABLE 3 MEETING HISTORY..8

TABLE 4 VARIOUS PROJECT DESIGNS 11

TABLE 5 PROJECT ACREAGE BREAKDOWN.. 11

TABLE 6 POTENTIAL ACCESS ROAD IMPACTS 23

TABLE 7 DRAINAGE CROSSING IMPACTS.. 25

TABLE 8 SURVEYS CONDUCTED FOR THE PROJECT.. 49

TABLE 9 BIOTIC HABITAT ALLIANCES IN THE ACTION AREA 56

TABLE 10 HISTORIC GKR DENSITY ESTIMATES REPORTED IN THE LITERATURE 73

TABLE 11 ESTIMATED GKR DENSITIES IN THE PROJECT FOOTPRINT 75

TABLE 12 ESTIMATED NUMBER OF GKR ON VALADEAO RANCH AND SILVER CREEK RANCH CONSERVATION LANDS* 78

TABLE 13 GKR SURVEY RESULTS WITHIN THE PROJECT AREA......................... 81

TABLE 14 GKR SURVEY RESULTS WITHIN THE VFCL.. 81

TABLE 15 GKR SURVEY RESULTS WITHIN THE SCRCL 81

TABLE 16 GKR SURVEY RESULTS WITHIN THE VRCL 85

TABLE 17 SAN JOAQUIN KIT FOX OBSERVATIONS.. 90

TABLE 18 SLOPE CLASSES AND SJKF SCAT 93

TABLE 19 BNLL HOME RANGE ESTIMATES.. 94

TABLE 20 BNLL POPULATION DENSITY ESTIMATES IN THE LITERATURE............. 96

TABLE 21 PONDS SURVEYED DURING PROTOCOL CTS LARVAL SURVEYS, MARCH, APRIL, AND MAY 2010...107

TABLE 22 INDIVIDUALS IMPACTED AND POPULATION ESTIMATES FOR SELECT T&E SPECIES ON CONSERVATION LANDS...122

TABLE 23 ESTIMATED GKR DENSITIES ON THE VALLEY FLOOR, VALADEAO RANCH AND SILVER CREEK RANCH CONSERVATION LANDS* 124

TABLE 24 ACRES OF ESTIVATION HABITAT AFFECTED BY THE PROJECT.............144

TABLE 25 CALCULATION OF INDIVIDUALS WITHIN THE ACTION AREA................145

TABLE 26 SUMMARY OF DETERMINATIONS..164

APPENDICES

Appendix A – California Tiger Salamander and Vernal Pool Fairy Shrimp Project Specific Impact Avoidance and Minimization Measure Review
Appendix B – Giant Kangaroo Rat Project Specific Impact Avoidance and Minimization Measure Review
Appendix C – Giant Kangaroo Rat Relocation Plan
Appendix D – San Joaquin Kit Fox Project Specific Travel Corridors, Habitat Connectivity, and Conservation Measure Review
Appendix E – Blunt-Nosed Leopard Lizard Proposed Project-Specific Avoidance Buffer Rationale
Appendix F – Conservation Management Plan
Appendix G – Support for Silver Creek Ranch as Mitigation Lands
Appendix H – California Tiger Salamander Mitigation Plan
Appendix I – San Joaquin Kit Fox Scat-sniffing Dog Surveys
Appendix J – San Joaquin Kit Fox Scat-sniffing Dog Surveys and Genetic Analysis
Appendix K – Dynamic Occupancy Sampling
Appendix L – San Joaquin Kit Fox Vehicle Strike Analysis

DEFINITIONS

Biological Monitor	Observers that work on-site to perform biological surveys or provide oversight of ground disturbing activities as needed and that receive instruction from and report to the Designated Biologist(s).
Conservation Lands	Three large parcels of land to offset potential impacts as part of a conservation package consisting of the permanent preservation and management of those parcels (Valley Floor Conservation Lands, Valadeao Ranch Conservation Lands, and Silver Creek Ranch Conservation Lands).
The County	San Benito County
Designated Biologist	Biologist knowledgeable and experienced in the biology and natural history of the T&E Species on the Project, whom shall be responsible for monitoring construction activities to help minimize and fully mitigate or avoid the incidental take of individual species and to minimize disturbance of T&E Species' habitat. This biologist may appoint biological monitors to perform biological surveys or provide oversight of ground disturbing activities as needed in their place.
Ldn	The average equivalent sound level over a 24 hour period, with a penalty for noise during the nighttime hours.
The Action	The development of the Panoche Valley Solar Project, including the Project Footprint and associated conservation lands in the Panoche Valley of eastern San Benito County, California.
Project Footprint	The portion of the Action that includes the solar arrays and associated roads and equipment, totaling 2,492 acres.
Project Roads	Project roads include roads designated for construction, project perimeter roads, and transportation corridors between panels.
PVS	Panoche Valley Solar; name of the project.
T&E species	Federally listed threatened or endangered species.

ACRONYMS

AC	alternating current
ACECs	areas of Critical Environmental Concern
AMBA	American badger
amsl	above mean sea level
APLIC	Avian Power Line Interaction Committee
BA	Biological Assessment
BLM	Bureau of Land Management
BMPs	best management practices
BNLL	Blunt-nosed Leopard Lizard
BUOW	Burrowing owl
CACO	California condor
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFS	Conservancy Fairy Shrimp
CL	Conservation Lands
cm	centimeters
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CTS	California Tiger Salamander
CUP	Conditional Use Permit
dBA	A-weighted decibels
DC	direct current
DEIR	Draft Environmental Impact Report
DTT	direct transfer trip

EIS	Environmental Impact Statement
ESA	Endangered Species Act
F˚	Fahrenheit
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEIR	Final Environmental Impact Report
ft	feet
ft^2	square feet
GIS	Geographic Information Systems
GKR	Giant Kangaroo Rat
GOEA	Golden eagle
HSM	habitat suitability model
km	kilometers
LHFS	Longhorn Fairy Shrimp
LOA	Live Oak Associates, Inc.
LSAA	Lake or Streambed Alteration Agreement
m	meters
m^2	square meters
mm	millimeter
mph	miles per hour
MW	megawatt
NIU	Network Interface Unit
O&M	Operations and maintenance
OPGW	optical ground wire
PG&E	Pacific Electric and Gas
PLC	Power line carrier

POTT	permissive overreaching transfer trip
PV	photovoltaic
PVS	Panoche Valley Solar, LLC
ROW	Right-of-way
SCADA	Supervisory Control and Data Acquisition
SCPs	Scientific Collecting Permits
SCRCL	Silver Creek Ranch Conservation Lands
SJAS	San Joaquin antelope squirrel
SJKF	San Joaquin Kit Fox
T&E	threatened or endangered
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VFCL	Valley Floor Conservation Lands
VPFS	Vernal Pool Fairy Shrimp
VPTS	Vernal Pool Tadpole Shrimp
VRCL	Valadeao Ranch Conservation Lands
yd^3	cubic yard

EXECUTIVE SUMMARY

INTRODUCTION

Panoche Valley Solar, LLC proposes to construct and operate an approximately 399 megawatt solar photovoltaic energy generating facility in San Benito County, California. The project is referred to herein as the Panoche Valley Solar (PVS) Facility. The Project Footprint consists of approximately 2,492 acres in the Panoche Valley of eastern San Benito County. The Project includes construction and operation of the solar array complexes, an operations and maintenance building, project perimeter roads including emergency access and egress, electricity collection lines, DC-AC inverters, an electrical substation and switchyard, and Pacific Gas & Electric telecommunication upgrades. Construction of the PVS Facility is anticipated to commence late 2014 or early 2015 and proceed thereafter in phases over a period up to five years.

The Project incorporates important general and species specific conservation measures proposed by PVS to avoid and minimize impacts on biological resources. In addition, the Project will implement a conservation package consisting of permanent preservation, enhancement, and management of three large parcels of land adjacent to the project footprint to offset potential impacts to special status species. Together the three parcels total approximately 24,185 acres of high quality conservation land that will provide local mitigation, preserve core populations of special status species, and create permanent movement corridors with adjacent lands controlled by the U.S Department of Interior's Bureau of Land Management (BLM) for those species.

PURPOSE AND CONCLUSIONS OF THIS BIOLOGICAL ASSESSMENT

For purposes of constructing an emergency access/egress road, PVS has applied to the United States Army Corps of Engineers (USACE) for issuance of a federal permit authorizing fill of certain waters of the United States pursuant to Section 404 of the Clean Water Act (CWA). This Biological Assessment has been prepared by the applicant on behalf of USACE, to evaluate the potential impacts of the Project on federally-listed or proposed species and designated and proposed critical habitat under the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq. This Biological Assessment has determined that the Project may affect federally threatened and endangered species. However, the Project does not impact any federally proposed species and is not located within any listed or proposed critical habitat of any federally listed species. Therefore, the USASCE requests formal consultation of the U.S. Fish and Wildlife Service (USFWS) under Section 7(a)(2) of the Endangered Species Act. This Biological Assessment further concludes, that taken as a whole in concert with the proposed conservation and preservation and enhancement measures to be implemented on the mitigation lands, the Project, whether considered alone or cumulatively, presents a substantial conservation benefit that would help secure the continued existence and recovery of the affected federally protected species.

1.0 INTRODUCTION

1.1 Purpose of this Document

Panoche Valley Solar, LLC (PVS) proposes to construct and operate an approximately 399 megawatt (MW) solar photovoltaic (PV) energy generating facility located in San Benito County, California (**Figure 1**). The project is called the Panoche Valley Solar Facility (PVS Facility, the Project, or the Action) (**Figure 2**). The Project Footprint consists of approximately 2,492 acres in the Panoche Valley of eastern San Benito County, California. The Project also includes the permanent preservation and management of approximately 24,185 acres of high quality Conservation Lands that are contiguous with the Project Footprint (**Figure 3**).

This Biological Assessment (BA) has been prepared on behalf of the U.S. Army Corps of Engineers (USACE) to evaluate the potential impacts of the Action on federally-listed threatened, endangered, and proposed species pursuant to the Endangered Species Act (ESA). Section 7(a)(2) of the ESA of 1973 (16 U.S.C. 1531 *et seq*.) states that "Each Federal agency shall, in consultation with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an "agency action") is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section. In fulfilling the requirements of this paragraph, each agency shall use the best scientific and commercial data available." PVS is seeking authorization from the USACE to fill certain waters of the United States, pursuant to Section 404 of the Clean Water Act. Since those actions may adversely affect federally listed species, the USACE is initiating formal consultation with the U.S. Fish and Wildlife Service (USFWS) pursuant to Section 7(a)(2).

Legend

County Line
City Limit
Project Footprint
Valley Floor Conservation Lands
Valadeao Ranch Conservation Lands
Silver Creek Ranch Conservation Lands

N

0 2 4
Miles

BR
2/20/2014

Energy Renewal PARTNERS, LLC

Panoche Valley Solar Project

Project Location

Figure

1

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BR
11/26/2013

- Project Footprint
- Valley Floor Conservation Lands
- Proposed Panel Block (Phase I Shaded)
- Existing Transmission Line
- Temp. Water Supply Pond (location approx.)
- Laydown Yard Slope > 3%
- Project Substation
- Laydown Yard
- Project Road (O&M/Emergency Use)
- Project Road (Emergency Use)

N

0 625 1,250 2,500
Feet

Panoche Valley Solar Project

Layout

Figure
2

Legend

Project Footprint

Valley Floor Conservation Lands

Valadeao Ranch Conservation Lands

Silver Creek Ranch Conservation Lands

N

0 3,500 7,000 Feet

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BR 10/15/2013

Panoche Valley Solar Project

Project Footprint and Conservation Lands

Figure 3

1.2 Species Considered in this Document

Species considered in this BA include all federally listed proposed, threatened, and endangered species and critical habitat considered to be potentially occurring in San Benito County by the USFWS that may potentially be impacted by the Action. Of the species considered, there were eight federally endangered and three threatened species. No federally proposed species or critical habitat was found to be potentially impacted by the Action. **Table 1** describes federally listed threatened or endangered species (T&E species) with the potential to occur in San Benito County, and if those species are carried forward for further analysis in this BA.

TABLE 1 SPECIES CONSIDERED

SPECIES	FEDERAL STATUS	STATUS IN ACTION AREA	ANALYZED FURTHER[1]
San Joaquin Woolythreads (*Monolopia congdonii*)	Endangered	**Absent.** No listed designated critical habitat. No suitable habitat.	No
Vernal Pool Fairy Shrimp (VPFS; *Brachinecta lynchi*)	Threatened	**Present.** Species known to occur on the Project Footprint. No listed designated critical habitat.	Yes
Conservancy Fairy Shrimp (CFS; *B. conservatio*)	Endangered	**Absent.** Not observed despite comprehensive surveys. No listed designated critical habitat.	Yes
Longhorn Fairy Shrimp (LHFS; *B. longiantenna*)	Endangered	**Absent**. Not observed despite comprehensive surveys. No listed designated critical habitat.	Yes
Vernal Pool Tadpole Shrimp (VPTS; *Lepidurus packardi*)	Endangered	**Absent.** Not observed despite comprehensive surveys. No listed designated critical habitat.	Yes
California Red-legged Frog (*Rana draytonii*)	Threatened	**Absent.** No listed designated critical habitat. No suitable habitat.	No
California Tiger Salamander (CTS; *Ambystoma californiense*)	Threatened	**Present.** Species known to breed in ponds adjacent to the Project Footprint. No listed designated critical habitat.	Yes
Blunt-nosed Leopard Lizard (BNLL; *Gambelia silus*)	Endangered	**Present**. Species known to occur on the Project Footprint. No listed designated critical habitat.	Yes
California Condor (*Gymnogyps californianus)*	Endangered	**Present.** No suitable nesting habitat. Potential foraging habitat; species known to pass over the Project Footprint. No listed designated critical habitat.	Yes
Giant Kangaroo Rat (GKR; *Dipodomys ingens*)	Endangered	**Present**. Species known to occur on the Project Footprint. No listed designated critical habitat.	Yes

SPECIES	FEDERAL STATUS	STATUS IN ACTION AREA	ANALYZED FURTHER[1]
San Joaquin Kit Fox (SJKF; *Vulpes macrotis mutica*)	Endangered	**Present.** Species known to occur on the Project Footprint. No listed designated critical habitat.	Yes
1. Species were not carried forward for further analysis in this document if no suitable habitat occurred in the Action Area or associated conservation lands or no populations were known to occur in the case of rare plants.			

1.3 Summary of Effects Determinations

Table 2 summarizes the effects determinations for the nine species discussed in this document.

TABLE 2 SUMMARY OF EFFECTS DETERMINATIONS

Species	"May Effect, Not Likely to Adversely Affect"	"May Effect, and is Likely to Adversely Affect"
Giant Kangaroo Rat		X
San Joaquin Kit Fox		X
Blunt-nosed Leopard Lizard		X
California Tiger Salamander		X
California Condor	X	
Vernal Pool Fairy Shrimp	X	
Conservancy Fairy Shrimp	X	
Longhorn Fairy Shrimp	X	
Vernal Pool Tadpole Shrimp	X	

1.4 Consultation History

The Action evolved during San Benito County's (the County) environmental review process under the California Environmental Quality Act (CEQA). The initial Applicant (Solargen) for the Action applied to San Benito County for a Conditional Use Permit (CUP) for a 1,000 MW, 10,000-acre solar PV project on October 16, 2009. In response to concerns about the size and potential impacts of the Action, Solargen worked in collaboration with the County to reduce the Project size by almost 60 percent from 1,000 MW on 10,000 acres, to 420 MW on approximately 4,885 acres. This reduced project size was reflected on Solargen's revised final CUP application. San Benito County then prepared a Draft Environmental Impact Report (DEIR), pursuant to CEQA, which analyzed the environmental impacts of a 420 MW Project. The DEIR was made available for public comment on June 28, 2010.

Comments received from the public raised concerns regarding the 420 MW Project's potential impacts. These comments were taken into account while revising the DEIR into the Final Environmental Impact Report (FEIR). In response to these comments, the Project Footprint was again reduced in size from 420 MW and 4,885 acres to a footprint of approximately 399 MW and 2,813 acres. The approximately 399 MW Project was then reconfigured to avoid the most biologically sensitive lands and the Conservation Lands were expanded from 10,331 acres to 23,292 acres. The FEIR was published on September 30,

2010. Based on additional biological surveys completed in 2013, PVS further reduced and reconfigured the Project Footprint to 2,492 acres while increasing the Conservation Lands to 24,185 acres.

PVS participated in numerous informal consultation meetings with the USFWS and other agencies prior to submitting the original BA for the Action to the USFWS in October 2010. The USFWS responded with a number of comments and requests for additional information concerning the BA, both in meetings and discussions with PVS and in written comments submitted in February 2011. PVS then prepared and submitted an Addendum to the BA in September 2011, which the USACE transmitted to the USFWS in early October 2011. In a letter to the USACE dated March 8, 2012, the USFWS confirmed that formal Section 7 consultation began in February 2012, but noted that it was premature and infeasible to develop a specific timeline for completing the consultation, in light of the USACE's ongoing Environmental Impact Statement (EIS) process.

During meetings between the USFWS and PVS held in July 2012, the USFWS identified additional biological information required to analyze biological impacts in the forthcoming EIS and Biological Opinion. Rather than creating an additional Addendum presenting these new findings, PVS has elected to present the USFWS with this updated comprehensive BA, which consolidates information gathered over 25,000 hours of field surveys performed from the summer of 2009 through the fall of 2013.

Informal meetings to discuss the Action's potential impacts to biological resources and on-site and off-site conservation measures have been held periodically since the beginning of the planning process in 2009. The meetings were conducted with the USACE, USFWS, California Department of Fish and Wildlife (CDFW) (previously California Department of Fish and Game (CDFG)), Bureau of Land Management (BLM), Renewable Energy Action Team (REAT; consisting of personnel from California Energy Commission and CDFW), and San Benito County officials and are outlined in **Table 3**.

TABLE 3 MEETING HISTORY

DATE	ATTENDEES
April, 2009	Live Oak Associates, Inc. (LOA), Solargen, USFWS, CDFG
June 24, 2009	LOA, Solargen, USFWS, CDFG
January 6, 2010	LOA, Solargen, USFWS, CDFG
February 3, 2010	LOA, Solargen, USFWS, CDFG, USACE, San Benito County
March 3, 2010	LOA, Solargen, USFWS, CDFG, San Benito County
March 10, 2010	LOA, Solargen, USFWS, CDFG
April 7, 2010	LOA, Solargen, USFWS, CDFG
April 28, 2010	LOA, Solargen, USFWS, CDFG
May 19, 2010	LOA, Solargen, REAT, USFWS, BLM
June 2, 2010	LOA, Solargen, USFWS, CDFG, San Benito County
June 21, 2010	LOA, Solargen, USFWS, CDFG
July 7, 2010	LOA, Solargen, USFWS, CDFG
August 4, 2010	LOA, Solargen, USFWS, CDFG
August 10, 2010	LOA, Solargen, USFWS, CDFG, BLM, The Nature Conservancy
September 16, 2010	Solargen, USFWS, CDFG, California Governor's office, Department of Interior
November 3, 2010	LOA, Solargen, CDFG, USFWS
November 16, 2010	Solargen, USFWS, CDFG, California Governor's office, Department of Interior
July 26, 2012	LOA, PVS, USFWS
August 6, 2012	LOA, PVS, USFWS
November 28, 2012	LOA, PVS, McCormick Biological, Power Engineers, USFWS, CDFG, USACE
January 7, 2013	CDFW, PVS, Energy Renewal Partners, LLC
January 10, 2013	USACE, PVS, Energy Renewal Partners, LLC
April 17, 2013	USACE, PVS, Energy Renewal Partners, McCormick Biological, EMPSI
April 17, 2013	CDFW, PVS, Energy Renewal Partners, LLC, McCormick Biological
April 18, 2013	USFWS, PVS, Energy Renewal Partners, LLC
August 26, 2013	CDFW, PVS, Energy Renewal Partners, LLC
August 27, 2013	USFWS, PVS, Energy Renewal Partners, LLC
October 29, 2013	CDFW, PVS, Energy Renewal Partners, LLC, McCormick Biological
November 19, 2013	USFWS, USACE, PVS, Energy Renewal Partners, LLC, EMPSI, McCormick Biological, Brian Cypher, PhD
March 11, 2014	USACE, PVS, Energy Renewal Partners, LLC
March 12, 2014	USFWS, PVS, Energy Renewal Partners, CDFW, McCormick Biological, Brian Cypher, PhD

DATE	ATTENDEES
March 21, 2014	USFWS, CDFW, PVS, Energy Renewal Partners, McCormick Biological, Brian Cypher, PhD

In addition, the USFWS and CDFW provided comments to San Benito County on its DEIR, which the County considered in preparing and then adopting the FEIR.

2.0 PROJECT INFORMATION

2.1 Location of Project

The Project is located near the intersection of Panoche Road and Little Panoche Road, in eastern San Benito County and western Fresno County (**Figure 1**). The Project Footprint is located approximately two miles north of the intersection of Panoche Road and Little Panoche Road. This location is approximately two miles southwest of the Fresno County Line and the Panoche Hills, and approximately 15 miles west of Interstate 5 and the San Joaquin Valley. The Project Footprint would be located within Township 15S, Range 10E, Sections 3-4, 8-11, and 13-16 of the United States Geologic Survey's Cerro Colorado, Llanada, Mercy Hot Springs, and Panoche 7.5-minute topographic quadrangle maps. In addition to the Project Footprint, the Conservation Lands associated with the Project are located in both San Benito and Fresno counties within Township 15S, Range 10E, Sections 3-4, 8-10, 13-16, and 25; Township 15S, Range 11E, Section 19; Township 14S, Range 10E, Sections 21-27, and 32-36; Township 14S, Range 11E, Sections 19, and 29-32; Township 15S, Range 10E, Sections 1-8, and 10-14; Section 15S, Township 11E, Sections 6-7, 19-20, and 26-36; and Township 16S, Range 11E, Sections 1-6, and 8-12 (**Figure 1**). The solar facility and all associated land would be located on property under control of PVS.

2.2 Project History/Background

The Action evolved during San Benito County's 13-month environmental review process under the CEQA and additional biological studies (**Table 4**). PVS applied to the County for a Conditional Use Permit for a 1,000 MW PV solar energy project incorporating approximately 10,000 acres of the Panoche Valley in October 2009. In response to concerns about the size of the Action and potential environmental impacts, PVS worked in collaboration with the County to reduce the project size by almost 60 percent from 1,000 MW on 10,000 acres, to 420 MW on approximately 4,700 acres. The County then prepared a DEIR pursuant to CEQA which analyzed the environmental impacts of a 420 MW Project. The DEIR was made available for public comment on June 28, 2010.

Comments received from the public, the USFWS, and the CDFW raised concerns regarding the 420 MW project's impacts to protected wildlife species, including blunt-nosed leopard lizard (BNLL), giant kangaroo rat (GKR), San Joaquin kit fox (SJKF), and California tiger salamander (CTS). In response to these comments and internal discussions after reviewing the results of biological studies conducted in the spring and summer of 2010, the Action was again reduced in size from 420 MW to 399 MW and was redesigned to avoid the most biologically sensitive areas. These comments were taken into account while revising the DEIR into the FEIR. (The FEIR is available at http://www.cosb.us/Solargen/feir.htm.)

Additional biological surveys were conducted in 2013 to further document the distribution of GKR, BNLL, and SJKF dens. The results of these surveys were used to further refine the Action and Project Footprint. PVS incorporated additional GKR avoidance areas, BNLL avoidance buffers, and a SJKF travel/dispersal corridor. Due to advances in solar panel efficiency and project design, the Action will still have a total output of approximately 399 MW, but will require only 2,492 acres of Project Footprint area.

TABLE 4 VARIOUS PROJECT DESIGNS

DATE PROPOSED	OCTOBER 2009		JUNE 2010		SEPTEMBER 2010		OCTOBER 2013 (CURRENT PROJECT)
Proposed MW Output	1,000 MW	DEIR	420 MW	FEIR	399 MW		399 MW
Acres Impacted	10,900 acres		4,885 acres		2,813 acres		2,492 acres
Acres of Mitigation	4,316 acres		10,331 acres		23,292 acres		24,185 acres

2.3 Project Description

The Action would be located on grazed rangeland and would generally include development of a solar facility (**Figure 2; Table 5**). The approximate 399 MW footprint comprises 2,492 acres (3.9 square miles) in the Panoche Valley located in eastern San Benito County, California. Interstitial spaces between panels will be used for maintenance transportation corridors during operations.

TABLE 5 PROJECT ACREAGE BREAKDOWN

PROJECT FOOTPRINT COMPONENTS	ACRES IMPACTED
Solar array and associated infrastructure and transportation corridors	2,352 acres (directly impacted)
Project perimeter roads	33 acres (directly impacted)
Substation	12 acres (directly impacted)
Laydown area	95 acres (directly impacted)
Total Impacted Acreage	2,492 acres

An additional 2,523 acres interspersed throughout and adjacent to the Project Footprint would be left undisturbed and designated as the Valley Floor Conservation Lands (VFCL). The VFCL would include wildlife movement corridors within on-site drainages and 100-year floodplains, as well as open space in the southern portion of the Project area. These undisturbed areas would remain as open space and would be managed as conservation areas to maintain and enhance habitat conditions for listed species (**Figure 3**).

In addition to the designation of the VFCL, the Action will include two large ranches for conservation/mitigation purposes. These ranches, the Valadeao Ranch Conservation Lands (VRCL; 10,772 acres) and the Silver Creek Ranch Conservation Lands (SCRCL; 10,890 acres), are contiguous with the Project Footprint and each other (**Figure 3**). The combined total acreage to be placed in permanent preservation and management is approximately 24,185 acres.

Management actions that protect, maintain, and enhance the Conservation Lands and corridors between habitat areas on and between the VFCL, SCRCL, and VRCL will create a Conservation Lands system that complements and provides important linkages to other protected lands (e.g., adjacent BLM lands), lands supporting Requested Take Species, and regional conservation efforts. The following will be implemented to protect and enhance Conservation Lands to benefit Requested Take Species:

1. The perimeter of the Conservation Lands shall be fenced to exclude unauthorized access. If new fencing is installed, fencing will be designed with at least three-strand barbed wire, with a fourth (bottom) strand of smooth wire at least eight inches above the ground, and shall be consistent with local BLM guidelines. This fencing design will reduce potential injury to wildlife while clarifying Conservation Land boundaries to the public. Signs shall be placed on boundary

fencing adjacent to public roads or property accessible by the public at 150-500 feet intervals, indicating that entry without access permission is prohibited, and the lands are protected.

2. Litter and illegally dumped wastes shall be removed from the property within the first year of establishing the conservation easement, and at least on an annual basis thereafter. The initial cleanup areas will include at least the sites identified during the initial baseline survey.

3. Any areas where human disturbance already exists that are not needed for long term maintenance, landowner/leasee access, grazing activities, etc. will be restored in such a way as to blend the area into the surrounding habitat. A revegetation specialist with experience restoring western San Joaquin Valley plant communities will assess individual sites to determine restoration methods and appropriate planting procedures and species. If restoration is determined to be warranted, methods will follow the Habitat Restoration and Revegetation Plan.

4. Actions that facilitate regional connectivity for the Requested Take Species through enhancement of corridors and connected portions of the Conservation Lands will be implemented. Implementation shall include: a) habitat enhancement and restoration of former agricultural lands within the Conservation Lands, and b) minimization of new roads and facilities near "pinch points" in the connected Conservation Lands and adjacent protected properties.

5. Provide, on average over the long term, a sufficient population level of Requested Take Species to fully mitigate for the numbers taken from construction of the PVS Facility. When needed, enhance habitat to increase population levels as described below, which are at minimum, the number taken from the construction of the Project.

Specific requirements for maintaining the Conservation Lands will be developed and included in the Conservation Management Plan, Grazing Plan, the Habitat Restoration and Revegetation Plan, the Noxious Weed and Invasive Plant Control Plan, and the Habitat Mitigation and Monitoring Plan for the Proposed Action.

<u>Panel Blocks:</u>

The Action will utilize approximately 2,352 acres to install PV panels over multiple phases of construction. All panels would be oriented to maximize solar resource efficiency. Panel faces would be non-reflective and black or blue in color.

The PV solar panels would be mounted on steel support structures that will stand up to fifteen feet in height. The steel support structures would be constructed of corrosion-resistant galvanized steel.

The solar panels will be arranged throughout the Project Footprint in modular blocks connecting to an inverter system. The purpose of the inverter system is to convert the direct current (DC) energy produced by the panel to alternating current (AC) energy that is required for electric transmission. Rows of panels will be spaced approximately 10 to 35 feet apart (panel edge to panel edge), 35 feet being a worst-case scenario to prevent shading of adjacent rows. The project footprint will include a 15 to 20 foot wide perimeter road that will be used for maintenance and emergency response. In addition, interstitial space between panels will be used for transportation access during maintenance activities. **Figure 2** depicts the preliminary Project Layout.

Electricity Collection Lines and DC-AC Inverters:

Electrical energy in the form of DC generated by the PV panels is collected in combiner boxes and routed to the inverter. A combiner box is a small electrical enclosure, approximately one cubic foot in size, which is mounted on the PV racking system and allows the PV string voltages to be placed in parallel, increasing the DC current. Electricity from panel combiner boxes would be gathered via an underground or rack-mounted DC collection system from the arrays and routed to the centralized inverter system. The inverter systems are typically enclosed and mounted on concrete piers, with the entire structure being approximately 8 feet wide by 40 feet long by 10 feet high. There would be one of these structures per each power block.

The direct current would be converted to AC by the inverters, stepped up by the transformers, and transmitted to the new substation via 34.5 kV (AC) medium-voltage collection lines. The medium voltage collection lines would begin at the inverter system transformers and would terminate in the collection breaker of the substation. The medium voltage lines will be routed to the substation using either standard wood pole overhead lines or trenches with buried cables. These wood poles would be approximately 25 feet in height and spaced about 250 feet apart. The most recent Avian Power Line Interaction Committee (APLIC) guidelines for avian protection, as well as a Bird and Bat Conservation Strategy will be implemented on overhead structures and lines. Additional information on the APLIC guidelines and Bird and Bat Conservation Strategy is provided in Section 5.5 of this report.

The Project will employ trenching for burial of a number of electrical runs, typical of utility scale power plants. The electrical lines in these trenches would carry either DC or AC and various voltage ranges, with each line type in separate trenches or spaced laterally or vertically as appropriate.

Example trench types include:

- Module harness leads between rows to reach combiners
- Collecting combiners to feed PCS
- Weather stations to PCS
- Feed power to tracker motors
- Collecting PCS pads to feed the substation

Between rows of modules, small trenches may bring the module cable harnesses to the nearest combiner, if sized for more strings of modules than are in a single row. The combiner outputs are collected in trenches leading back to the Power Conversion Station (PCS) pad and feeding the inverters. These combiner trenches may be shared with other lines from the PCS feeding tracker motors on the racking system if trackers are used in the project.

From the PCS pads, trenches are used again to collect their outputs and convey the power to the substation. From the numerous PCS pads, the trenches would typically connect groups of 20-30MW of PCS pads and may run longer distances to reach the substation. Depending on the terrain features between the PCS pads and substation, some limited sections of overhead lines may be used instead of trenching to avoid disturbing the ground.

Electric Substation and Switchyard

An electrical substation will convert power from 34.5 kV to 230 kV. The substation will be located directly adjacent to the existing Pacific Electric and Gas (PG&E) transmission line (**Figure 2**). An on-site access road will be constructed to serve the substation, as well as an approximate one-acre fenced-in parking area. The substation output will be connected to a 230-kV switching station which will be owned and operated by PG&E; the switching station provides protective relays and breakers to manage interface with the 230-kV grid system. The substation and switchyard equipment will cover approximately 9 acres of the 12-acre area. The equipment and facilities in the substation and switchyard will range in height from approximately 3 to 35 feet (with the exception of the potential microwave tower discussed below). The substation and switchyard sites will be graded and compacted to an approximately level grade. Several concrete pads will be constructed as foundations for electrical equipment, and the remaining area will be covered with gravel. Equipment used within the substation and switchyard will include electrical transformers, switchgear, and related substation facilities designed and constructed to transform medium-voltage power from the Project's delivery system to PG&E's existing 230-kV transmission line. Presently, the electrical substation is located on the south side of the transmission line; however, the substation may need to be moved to the north of the transmission lines if required by PG&E after their final evaluation of system design requirements.

PG&E Telecommunication Upgrades

The California Independent System Operator (CAISO), the electricity grid operator in California, in combination with the interconnecting utility, PG&E, are responsible for ensuring grid reliability. These two entities are tasked with determining the transmission system impacts of the proposed Project and any measures needed to ensure system conformance with utility reliability criteria. A study was conducted by CAISO dated September 18, 2013 in coordination with PG&E per CAISO Tariff Appendix DD Generator Interconnection and Deliverability Allocation Procedures. The study identified various systems upgrades necessary to support interconnection of the Project to the electrical grid, including primary and secondary telecommunication services to allow for data transmission between the Project and the electrical grid. These upgrades are considered Connected Actions to the Project.

In addition, telephone and data internet service is needed to support communications to and from the Project site during construction and O&M phases of the Project. Telephone and data internet service will be provided by AT&T. The telephone and data internet service is also a Connected Action.

PG&E Primary Telecommunication Service

It is anticipated that PG&E would install optical ground wire (OPGW) on its existing 230-kV transmission line to establish the primary telecommunication service between the substation at the Project site and the Panoche substation located 17 miles to the east of the Project. This is a routine method of providing telecommunication services between electrical substations and generating facilities or other substations and, as illustrated in PG&E's current San Joaquin Valley O&M Habitat Conservation Plan (HCP; see Section E6, page 2-21), is considered maintenance to existing electrical infrastructure (Jones & Stokes. 2006). **Figure 4A** depicts the primary telecommunications route described herein. The purpose of the OPGW is twofold: for system protection and for control of the transmission line. OPGW is designed to replace traditional shield wire, which protects the line by providing a path to ground by handling electrical faults like shield wire with the added benefit of containing optical fibers, which can be used for telecommunications purposes.

Given that the existing 230-kV transmission line currently has shield wire installed; PG&E would replace the shield wire with OPGW by using the existing shield wire to pull OPGW through the line. It is

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Legend

- Project Footprint
- BLM Land
- State Land
- Distribution Line
- Existing 230 kV Transmission Line

N

0 2,000 4,000 8,000
Feet

Panoche Valley Solar Project

Telecommunication Upgrades

Figure 4A

anticipated that PG&E would require approximately eight splice sites and sixteen pull sites along the existing 17-mile transmission line corridor to complete installation of the OPGW. These splice and pull sites would require an approximate 100 feet by 100 feet work area centered at each tower site. At the remaining tower sites used only as attachment sites, the work area would be approximately 25 feet by 25 feet. Moreover, some minor upgrades to the seventy-five existing structures along the 17-mile 230-kV transmission line route may be required to accommodate installation of the OPGW. No additional work area would be needed by PG&E to perform these minor upgrades to the existing structures. Existing roads would be used to provide access, and existing maintenance pads at each structure site would likely provide sufficient work area to stage equipment needed to pull the OPGW and perform the attachments needed at each site.

Construction would be completed using a combination of helicopter and ground crews, unless it is determined to be infeasible during PG&E's engineering review. Helicopters would be used to transport qualified electrical workers to the towers, deliver materials, and assist in pulling the OPGW from tower to tower. If the use of helicopters is feasible, the need for crews to enter the attachment tower sites would be eliminated. Ground crews would install eight splice boxes and set up sixteen pull sites. Typical construction vehicles for these activities would include pickup trucks, a bucket truck or man-lift, and a crane. Overhead crossings of public roadways would require the use of temporary guard structures. The temporary guard structures are designed to prevent tools or materials from falling into the roadway. A typical guard structure would include four 60- to 80-feet-tall wooden poles in a large pot; two pots would be placed on each side of the roadway with netting affixed to the top of each pole. It is anticipated that the pots would be placed in or adjacent to the disturbed road shoulder. No grading, vegetation removal, or ground disturbance is anticipated associated with installation of the guard structures.

To the east of the Project site, the PG&E Right-of-Way (ROW) traverses BLM administered land in the Panoche Hills. The BLM property crossing is approximately eight miles in length and located to the south of the Panoche Hills South Wilderness Study Area. No new impacts to sensitive habitat or resources are anticipated as part of the OPGW installation within the ROW crossing BLM land because the OPGW would be installed on existing structures using existing access roads. This work would be considered maintenance of the existing 230-kV transmission line by the BLM. PG&E would coordinate with BLM as needed to confirm that the scope of work necessary to install the OPGW on the existing 230-kV transmission line along this 8-mile segment is included in the existing ROW agreement(s) between PG&E and BLM.

In accordance with the description of work activities above, impacts to sensitive species and habitat will be minimal as no new permanent structures will be necessary. The work along all 17 miles would be of short duration and should be complete in approximately 6-8 weeks. Existing roads, maintenance pads, and the existing transmission line will be used to install the OPGW, and PG&E will implement the same methods in the execution of the work that they employ when performing maintenance activities on their electrical system. While many of the same sensitive species discussed in Section 4 of the Biological Assessment may be observed along access roads and at transmission tower sites; we expect PG&E will employ robust avoidance and minimization measures for these sensitive species and their habitat. PG&E will utilize existing federal permits for covered practices and/or will obtain, if necessary, the applicable federal ESA permit(s) to complete the described work. Specifically, measures to avoid impacts to sensitive species and their habitat include:

- Crews will be educated about sensitive species in the area, and a qualified biologist will perform surveys of work areas prior to the start of work.

- Work will occur during daytime hours, minimizing potential impacts to giant kangaroo rat and other nocturnal species.

- Vehicles and equipment will remain on existing roads and will maintain low speeds in areas where sensitive species are known to occur. Reducing speeds will avoid and minimize impacts to special-status reptiles and mammals in the area.

Details on these avoidance and minimization measures are discussed in Section 2.4. These measures, in conjunction with the inherent nature of the work being conducted, will minimize potential impacts to sensitive species and habitat.

PG&E Secondary Telecommunication Service Preferred Alternative

To meet PG&E's standards, two physically redundant communication paths for connectivity will be required. In addition to the OPGW installation on the existing 230 kV transmission line structures described above, PG&E will establish a secondary system. The preferred alternative for a secondary system would be the installation of a microwave system to achieve the required system protection. The final determination of the secondary system will be made after PG&E has completed additional engineering studies. As illustrated in **Figure 4B**, an initial study showed that a microwave system could be established between the Project and Panoche substation by installing three microwave towers. If PG&E selects the microwave option alternative, it is anticipated that the three microwave towers would be installed at the existing Panoche Substation, at the Project substation, and at least one microwave repeater on the ridgeline of the Panoche Hills to provide line-of-sight communications between the two substations.

The microwave towers constructed at the Panoche and Project substation would be approximately 100-feet tall and would be located within the fence line of the two substations. The tower site providing line-of-sight between these two locations will consist of a fenced 100 feet by 100 feet area containing a communication building, a communication tower, and a back-up power source, typically a generator with a diesel or propane fuel tank. The tower would be a free-standing, four-legged lattice steel structure occupying an approximate 30 feet by 30 feet area with a height of approximately 300 feet to achieve line of sight between the Project site and the Panoche substation microwave towers. Communication buildings are typically 36 feet by 12 feet and would be delivered to the site prefabricated by truck and installed on a concrete slab using a crane. Distribution power would be brought to the site from the existing distribution poles along existing access roads. At least one additional distribution pole may be needed and construction would employ the same methodology as described previously. The inset on **Figure 4B** shows the route for the connection of the tower site to the existing nearby distribution line power.

A preliminary review demonstrates that the microwave tower could be constructed on private land outside of BLM-administered land along an existing access road to the south of PG&E's existing 230-kV transmission line shown on **Figure 4B**. While it appears existing roads could be utilized to access the proposed tower site, minor road improvements may be necessary to allow trucks to transport equipment and materials to the work site.

In addition, minor grading of the tower site and excavation to install the tower foundation will be necessary. As part of the Federal Communications Commission (FCC) approval process, PG&E would survey the location of this area for biological and cultural resources prior to siting the tower; thus, the exact placement of the tower site can avoid adverse impacts to sensitive habitat or resources. Last, the height of the microwave tower may require Federal Aviation Administration (FAA) filings and approval, including a requirement to install FAA-lights on the microwave tower.

As discussed above, impacts to sensitive species and habitat will first be avoided through siting of the microwave site along with use of existing roads to access the microwave site. As shown on **Figure 4B**,

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2/17/2014

Legend

- Project Footprint
- BLM Land
- State Land
- Proposed Microwave Repeater Site
- Microwave Line of Sight
- Existing 230 kV Transmission Line
- Existing Distribution Line

N

0 2,000 4,000 8,000
Feet

Panoche Valley Solar Project

Telecommunication Upgrade Alternative

Figure 4B

the microwave site could be located in Fresno County and, therefore, it may be within the coverage area of the approved San Joaquin HCP. However, while it is not clear that the HCP would specifically cover construction of this site, it is expected that all minimization and mitigation measures for covered species in the HCP will be adhered to by PG&E during the siting and construction of the microwave site. PG&E will utilize existing federal permits for covered practices and/or will obtain, if necessary, the applicable federal ESA permit(s) to complete the described work. Specifically, measures to avoid and minimize impacts to sensitive species and their habitat include:

- Crews will be educated about sensitive species in the area, and a qualified biologist will perform surveys of work areas prior to the start of work.

- Work will occur during daytime hours, minimizing potential impacts to giant kangaroo rat and other nocturnal species.

- Vehicles and equipment will remain on existing roads and will maintain low speeds in areas where sensitive species are known to occur. Reducing speeds will avoid and minimize impacts to special-status reptiles and mammals in the area.

Additional details on these avoidance and minimization measures are discussed in **Section 2.4**. These measures, in conjunction with the relative small footprint of the impact and inherent nature of the work being conducted, will avoid and minimize potential impacts to sensitive species and habitat.

Communications to Moss Landing and Coburn

PG&E will have telecommunications between the Moss Landing, Coburn, and Panoche substations and the Project. In addition to the installation of OPGW from the Panoche substation, PG&E will utilize power line carrier (PLC) and leased line systems to connect the remaining two substations at Moss Landing and Coburn; the implementation of these systems will involve minor modifications to the existing switchyards at Moss Landing and Coburn substations. Essentially, PLC is a system that uses the power conductors between substations to transmit low speed serial data for relay protection communications through existing electrical lines. The Moss Landing switchyard connection will use a PLC system to provide permissive overreaching transfer trip (POTT) and connections to Coburn switchyard will be a PLC and a leased line circuit to provide POTT and DTT (direct transfer trip) capabilities. The leased line service is anticipated to be provided by AT&T and would be a point-to-point high-speed serial data connection between Coburn and the Project substations for protection relay communications. If not already established, additional poles and cables may need to be placed in the public ROW from the nearest AT&T point of service to the substation fence line. All other work at the Moss Landing and Coburn substations will take place within the existing substation fence line, and no new ground disturbance is anticipated.

Environmental Review of PG&E Telecommunications Upgrades

Maintenance activities along PG&E's transmission and distribution lines, if not already authorized by existing agreements, would likely qualify as categorical exclusions under CEQA and NEPA. Microwave tower activities would require permits and the appropriate level of review from FCC and the FAA. As stated above, PG&E will utilize existing federal permits for covered practices and/or will obtain, if necessary, the applicable federal ESA permit(s) to complete the described work. Compliance with Section 106 of the National Historic Preservation Act would be conducted as part of the FCC approval processes when final engineering is completed and exact ground disturbance locations are identified.

<u>On-Site Telephone and Data Service</u>

Telephone and internet services to the Project site would be provided by AT&T utilizing existing AT&T services located 2,000 feet south of the Project site along Little Panoche Road. AT&T's preferred method of installation would be to install new copper cables underground in the public road shoulder from the existing connection point to the Project site. The route of the AT&T cable package installation is shown in **Figure 4C**. Installation would include construction of a two-feet-wide by three-feet-deep trench to allow direct burial of the cable in compliance with state and local standards. The cables would then connect to a Network Interface Unit (NIU) measuring approximately 36 inches tall by 12 inches wide and 12 inches deep. The NIU would be placed at the end of the cable trench line near the Project site. In the alternative, the cable could be attached to existing wood distribution poles along the road from the existing AT&T connection point to the Project site. It is anticipated that PG&E would install cables on the existing distribution line by attaching the cables to wooden cross-arms on each distribution pole using a bucket truck that would park next to the pole and allow the qualified installer to add required attachments. For attachment at each pole, an approximate 10 feet by 10 feet work area would be needed. Since existing facilities will be utilized to bring the AT&T services to the Project site, no impacts to sensitive habitat and resources are anticipated to occur in association with this work on private easements and public ROW lands.

<u>Operations and Maintenance Building:</u>

The Operations and Maintenance (O&M) building will be located inside the substation fence and will be built to local codes and standards. The approximately 5,000 square foot facility would consist of a standard steel building on slab at a maximum height of twenty feet. The facility would provide office space, a meeting room, equipment to support operations and maintenance, parts storage, as well as security and site monitoring equipment.

<u>Security Fencing:</u>

The fence around the Project Footprint will have a 12.7 to 15.2 centimeter (cm) (5 to 6 inch) gap along the bottom of the chain linked fence, that would allow wildlife to travel through the site and link up with the existing travel corridors (Cypher, B.L, C.L. Van Horn Job, 2009). A fencing option to the chain linked fence would be an inverted "deer" fence that would have larger rectangular openings on the bottom to allow the specific T&E species to pass through. These fencing designs have been previously approved or suggested by the CDFW and USFWS for other solar projects. Fences surrounding the O&M building would utilize the same fencing plan, unless it is determined to be unnecessary to provide additional protection of protected species. A comprehensive environmental fencing plan will be developed and submitted by the agencies prior to construction. Gated eight-foot high chain link fences, with possible animal exclusion modifications if needed, would be constructed around the substation per the PG&E standard. Temporary wildlife exclusion fencing would be placed around construction staging areas, as needed for wildlife protection.

<u>Species Exclusion Fencing:</u>

The primary function of the temporary species exclusion fencing is to prevent special status, small vertebrate species (e.g. GKR, BNLL, CTS) from entering the construction sites where they can be killed, injured, or isolated or to provide directional control within the Project Footprint. In general, wildlife exclusion fencing is to be installed before any ground disturbance, equipment laydown, site preparation, or construction activities as deemed necessary by the Designated Biologist. The exclusion fencing will be equipped with one-way exits every 250 to 500 feet to avoid entrapment of species inside the fence. Care should be taken in exclusion fencing design should cattle or sheep be expected to be adjacent to the

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2/14/2014

Legend

- Project Footprint
- Existing 230 kV Transmission Line
- Existing Distribution Line
- Underground Route
- Overhead Route

N

0 75 150 300
Feet

Panoche Valley Solar Project

AT&T Telecom Support

Figure 4C

fencing. The exclusion fencing will be removed after the completion of construction in the area. The exclusion fencing will be detailed in the Project's Comprehensive Fencing Plan.

Temporary Water Supply Ponds:

Temporary water supply ponds will be constructed within the Project Footprint. The water from these ponds will be used to water graded/excavated areas and active unpaved roadways, unpaved staging areas, and unpaved parking areas. The frequency will be based on the type of operations, soil, and wind exposure. The watering will assist in the reduction of fugitive dust accumulation, the amount of wind erosion and dust generated by exposed topsoil, the possible exposure to Valley Fever from dust generated by construction and traffic, and the impacts to vegetation from fugitive dust. Three temporary ponds are planned within the Project Footprint **(Figure 2)** and have the combined capacity of approximately 1,626,000 gallons and will take up approximately 1.5 acres of the Project Footprint. The ponds will be surrounded by species exclusion fencing to restrict access by special status species. Based on pumping rates expected from water wells at the site, the ponds would be filled during the night and over the course of the day to capacity and will be nearly drained from water utilization each day. This will eliminate any significant amount of standing water that would assist in the creation of special status species habitat (e.g. branchiopods species). In addition, up to five new water wells will be drilled, if existing water wells cannot be utilized to fill the temporary construction ponds.

2.3.1 Proposed Construction Schedule/Phasing Plan

Permanent disturbance would result from the construction of Project Footprint perimeter roads and emergency access/egress points, maintenance transportation corridors, the substation and O&M facility, parking areas, solar array footers, and equipment pads. Temporary disturbance to the Project Footprint would result in initial site preparation from trenching for electrical conduit, grading of areas with slopes greater than three percent, construction staging and laydown areas, and temporary access roads (**Figure 2**). The temporary trenching and temporary access roads associated with the construct of the solar facility will take place in areas of the Project Footprint that are designated as permanent impact areas. The areas of potential grading that have slopes greater than three percent have a combined acreage of approximately 767 acres, and the construction staging and laydown areas have a combined total acreage of 95 acres. If the grading of areas with slopes greater than three percent is not required for the construction of the facility, it will be avoided.

The Action would be constructed in phases over multiple years. Construction is anticipated to begin in late 2014 to early 2015. The first phase will be installed in the portion of the site that is west of Little Panoche Road and the northern most region of Project Footprint east of Little Panoche Road. To provide the necessary mitigation offsets, the VFCL and the SCRCL will be acquired by PVS before the start of construction. The second phase will complete the installation on the Project Footprint (**Figure 2)**, which will bring the total project installed capacity of approximately 399 MW. PVS will acquire the VRCL to support the second phase of construction.

Portions of the Project Footprint that would be temporarily disturbed during construction would be restored in accordance with a revegetation plan. Revegetation will be conducted on areas temporarily disturbed during construction to restore vegetative cover to similar to pre-construction condition once site work in those areas of temporary disturbance is completed. Temporarily disturbed areas will be reclaimed by appropriate contouring, where needed, and replanting with a seed mix as provided in a revegetation plan. All seed mixtures will be certified "weed free." Noxious weeds will be controlled through implementation of the Noxious Weed and Invasive Plant Control Plan.

2.3.2 Site Preparation

Site preparation would mainly include construction of access roads, intermittent stream crossings, and implementation of storm water best management practices (BMPs). Project grading requirements are anticipated to result in cut-and-fill activities with no cubic yards of export. Aggregate will be imported for the permanent roads and the substation.

Preparation of land areas for array installation will involve trimming of grassland vegetation (as needed), agricultural disking, harrowing and/or rolling of PV array areas, selected compacting, and grading. For the majority of the Project Footprint, the ground under the PV arrays will not require grading, except for areas that are greater than three percent slope. Preparing the ground beneath PV arrays will begin by trimming existing vegetation as close to the ground as possible by mowing or grazing. An agricultural tool, such as a disk, harrow, or cultipacker will then be used to loosen and smooth the top one to three inches of soil. Finally, a smooth steel drum roller, or similar equipment, will be used to bring the top four to six inches of soil to the appropriate compaction value. Beneath the compacted surface of the soil, the soil will remain at the existing level of compaction.

The Project O&M building will be accessed from Little Panoche Road and included in the substation area. Project roads will be limited to 20-foot (maximum) wide perimeter road with pullouts up to every 2,000 to 5,000 feet, as required by the Hollister Fire Department. Pullouts will be approximately 20 feet wide by 300 feet long. Portions of the perimeter roads that cross on-site federally jurisdictional washes will only be used for emergency access. Disturbance from perimeter roads and pullouts is limited to 44.4 acres. Interstitial space shall be used as transportation corridors between the rows of panels as needed for maintenance. Portions of the transportation corridors will be maintained dirt paths to ensure needed access. An additional transportation corridor, a maintained fenced off dirt path, will be placed south of Aquilas Creek, but north of the perimeter fence line. This transportation corridor will be utilized by VRCL management personnel (e.g. ranchers, scientist, and other necessary conservation land manage personnel) to access the western portion of the VRCL from Little Panoche Road.

Table 6 presents the potential road impacts associated with the Action.

TABLE 6 POTENTIAL ACCESS ROAD IMPACTS

Access Road Type	Length (feet)	Width (feet)	Area (acres)
Perimeter access roads with pullouts	91,122	20-40	44.4

Emergency egress and access roads for the Project will cross Panoche Creek in two locations and Las Aquilas Creek in one location (**Figure 5**). Of these three crossings, only two of these locations cross jurisdictional waters of the U.S. per the preliminary jurisdictional letter from the USACE San Francisco District dated October 18, 2010. The PVS Facility has proposed that the two jurisdictional creek crossings (**Figure 5**) be single-span bridges. The proposed span lengths and area impacted by each of the crossing are described in **Table 7**. These crossings, as well as the crossings of washes, creeks, and drainages that are potentially waters of the state and regulated by CDFW will also be permitted through the submittal of a Lake or Streambed Alteration Agreement (LSAA) Notification.

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10/16/2013

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- Known CTS Breeding Pond
- CTS Pond Buffer
- 100-year Floodplain

N

0 1,000 2,000 4,000
Feet

Panoche Valley Solar Project

California Tiger Salamander Ponds

Figure
6

TABLE 7 DRAINAGE CROSSING IMPACTS

	Las Aquilas Crossing 1	Panoche Creek Crossing 2
Width between tops of banks (linear feet)	56 feet (ft)	53ft
Width of Ordinary High Water Mark (linear feet)	48.1 ft	20 ft
Area of Impact[1] within Ordinary High Water Mark (square feet)	96 ft^2	4 ft^2
Volume of material that will be disturbed[1] within Ordinary High Water Mark (cubic yards[yd^3])	11 yd^3	20 yd^3
Area of Impact[1] outside of Ordinary High Water Mark (square feet [ft^2])	192 ft^2	320 ft^2
Volume of material that will be disturbed[1] outside Ordinary High Water Mark (cubic yards)	20 yd^3	20 yd^3

[1] Volume of disturbed material includes fill and excavation of soil or other material.

2.3.3 Construction and Installation

Power Block Installation:

Panel components, such as the PV panels and racks, will be transported to the laydown areas. All items will be transported to the Project by truck and then be distributed throughout the Project Footprint using various forms of rolling stock. During construction and installation, all traffic would enter the Project Footprint at specified access points along Little Panoche Road.

A racking system will arrive on-site to be assembled and grounded at the site. PV panels will arrive at the site and be placed in a staging area inside shipping containers. Panels will be put in place and secured to the rack per vendor specifications. The rack will be populated with panels, wired in series, and connected to a DC combiner box, which will deliver DC power to the inverters. Equipment used for system installation will include 4x4 forklifts, ATV vehicles, truck-mounted pile drivers, cranes, and pick-up trucks.

Approximately 95 acres are planned for laydown and staging purposes. Each laydown area will be located at a convenient spot for construction traffic to access from existing roads. The staging areas will only require a power source for temporary lighting. There will be no hazardous substances stored on-site outside of approved containment measures.

Nighttime Construction:

Nighttime activities at the Project will be limited in nature. Nighttime activities will include limited non-ground disturbing construction such as commissioning and maintenance activities to be performed when PV arrays are not energized; interior use of the operations and maintenance facility; unanticipated emergencies (defined as an imminent threat to life or a significant property interest), including non-routine maintenance that requires immediate attention; special status species impact avoidance and minimization activities and research (e.g. GKR trapping and SJKF radio telemetry); and security patrols. No panel installation or ground disturbing activities (including but not limited to grading, pile driving, trenching) will take place at night. From 7pm to 7am generators within 350 ft of project boundary will not run at 100 percent load or will be less than 40dBA Ldn at the property line. No work will be completed during a rain event unless it is required, such as an imminent threat to life, necessary T&E species work, or a significant property and/or construction interest. A Designated Biologist or Biological Monitor will be present during all construction activities.

Other construction work and standard operations and maintenance activities will be limited to daytime hours (5:00 am to 9:00 pm).

Construction Personnel:

The workforce at the Project will vary based on activity at the site during the course of construction. Nighttime activities will be limited to crews of 20-100. Daytime crews will range from 100-500 individuals.

Transportation:

PVS intends to construct the project in phases over multiple years using up to three 8-hour shifts per day and to offer shuttle service to transport employees to and from the primary workforce areas of Hollister, San Benito County, and Fresno County that are located between 10 and 60 miles from the Project. Shuttle service will be used to limit the number of individual vehicles driving to the Project on a daily basis.

It is anticipated that approximately 15-100 large trucks per day will access the Project to deliver material and equipment. A few trucks containing oversized loads also will access the Project Footprint, but will be infrequent when compared to daily truck traffic.

Auto trips include all passenger vehicle trips that will be generated by the Project. These trips will mainly represent employee trips to and from the Project throughout their work shifts, for employees not using shuttles. As stated previously, the workforce for the Project will vary based on activity at the site during the course of construction. Crews of 20-100 for nighttime activities and 100-500 individuals for daytime crews are anticipated. The daily traffic generated by project construction workers was estimated based on work shift information and the assumption that employees will utilize the provided shuttle service. The Project will generate the greatest amount of auto traffic from 5:00 to 6:00 AM during the arrival of employees for the day work shift and from 2:30 to 4:00 PM during the departure and arrivals of employees from shift change. Based upon existing traffic count data, the identified peak project traffic will not coincide with the peak existing traffic along surrounding roadways.

The expected truck traffic generated by the Project will mainly be composed of trucks delivering solar panels, materials, and equipment to the site. It is anticipated that approximately 15-100 large trucks will access the Project Footprint on a daily basis to deliver materials and equipment. It is assumed that the trucks will arrive to the site evenly distributed between and hours of 6:00 AM and 6:00 PM.

The Project will operate seven days a week during daylight hours and will require 10 full time employees initially and up to 50 full-time employees at build-out. They will be expected to travel to and from the site in personal vehicles. A major focus of the operations of the Project will be monitoring system operational status, performance, and diagnostics from the main control room. Operations activities will include meter reading and production reporting. Security personnel will be on-site every hour, every day, working in approximately 8-hour shifts.

2.3.4 Operations and Maintenance

The Action will be in operation for at least 35 years, with the possibility of a subsequent re-powering for additional years of operation. The Action will operate seven days per week during daylight hours. Operational activities will consist of monitoring system operational status, tracking system controls and mechanical equipment, performance, and diagnostics. Operations activities will include meter reading and production reporting by the Supervisory Control and Data Acquisition (SCADA) system, along with updating O&M manuals and activities.

The operations staff will be approximately 10 persons for the first year and up to 50 persons once construction has been completed for the entire project.

Security:

The Project Footprint will be fenced to prevent access by the public in order to ensure public safety and protect equipment from theft and vandalism. Gates will be installed at all Project Footprint access roads. The Project Footprint will provide 24-hour security at the site, security staff will routinely traverse the site, utilizing Project roads, in lightweight vehicles or all-terrain vehicles. The Project Footprint will be equipped with day/night closed-circuit security cameras and will use human-activated motion lighting.

Maintenance:

Once installation is complete and the site is fully operational, all traffic will enter the Project Footprint at access points along Little Panoche Road. Inverters will be periodically checked for general component maintenance. The PV field will be inspected periodically for the degrading of wires, panels, and combiner boxes, as well as for mechanical fastener tightening. The SCADA system will also identify areas that are underperforming; these will be checked as required using project roads and transportation corridors. Damaged or underperforming PV panels will be replaced as required; mechanical fasteners will be replaced as needed. Inverters that are underperforming or have stopped working will be diagnosed by the electrician and, if required, an inverter technician will be brought on-site. The maintenance staff will traverse the site as necessary, utilizing Project roads, and if possible lightweight vehicles or all-terrain vehicles.

Lighting:

During operation of the Project, motion-sensor lighting will be used throughout the Project Footprint. Constant lighting, at a low level, will be required at the O&M building. This will be a single lamp source near the entrance of the building, which will be activated by a timer. All lighting will have a power switch to conserve energy when the lighting is not required. All lighting will point downward and be shielded to preserve dark skies, and will adhere to San Benito County’s Lighting Ordinance (SBCo 19.31.003- 009) for areas in Zone 3 and under Class 2 lighting regulations.

Fire Safety:

Four water storage tanks, holding approximately 4,000 gallons per tank, will be located at on-site water well sites. These tanks will have universal adapters to enable fire trucks to refill with water at the Project in an emergency situation. Wash crossings of waters of the U.S. on the perimeter roads will only be utilized by emergency vehicles.

2.3.5 Decommissioning Plan

The Project will be in operation for at least 35 years, with the possibility of a subsequent re-powering of the Project for additional years of operation. Upon its eventual decommissioning, PVS will be responsible for the removal, recycling, or disposal of all solar arrays, inverters, transformers and other structures on the site including roads and bridges. PVS anticipates using the best available recycling measures at the time of decommissioning. The switchyard will be owned and operated by PG&E, and decommissioning will be based on the PG&E codes and standards in effect at that time.

The Project will be constructed with numerous recyclable materials, including glass, semiconductor material, steel, and wiring. When the Project reaches the end of its operational life, the component parts will be dismantled and recycled. All waste resulting from the decommissioning of the facility will be transported by a certified and licensed contractor and taken to a landfill/recycling facility in accordance with all local, State, and federal regulations. Decommissioning will include the following:

- The facility will be disconnected from the utility power grid.
- Individual PV panels will be disconnected from the on-site electrical system.
- Individual PV panels will be unbolted and removed from the support frames and carefully packaged for collection and return to a designated recycling facility for recycling and material re-use.
- With exception of the switchyard, the electrical interconnection, transmission, and distribution cables above ground will be removed and recycled off-site by an approved recycling facility.
- Underground conductor will be abandoned in place with the ends cut 3 feet below grade.
- PV panel support steel and support posts will be removed and recycled off-site by an approved metals recycler.
- Electrical and electronic devices, including inverters, transformers, panels, support structures, lighting fixtures, and their protective shelters will be recycled off-site by an approved recycler.
- Fencing will be removed and recycled off-site by an approved metals recycler.
- Bridges and gravel roads will be removed; filter fabric will be bundled and disposed of in accordance with all applicable regulations. Road and bridge areas will be backfilled and restored to their natural contour.
- Soil erosion and sedimentation control measures will be re-implemented during the decommissioning period and until the site is stabilized.
- All permits related to decommissioning will be obtained where required.

2.4 Proposed Conservation Measures/Conservation Package

The Applicant has proposed the following general and species-specific conservation measures to minimize impacts to biological resources which may occupy the Project Footprint. General and species-specific conservation measures were created through numerous consultation meetings with USFWS, CDFW, and other non-government organizations which have occurred since the inception of the Action, and through San Benito County's preparation of a FEIR for the Project pursuant to CEQA (see **Section 1.4**).

As described above, the Action has conducted over 25,000 hours of biological surveys on the Project Footprint, and based on the results and associated habitat evaluations, the Project Footprint has been significantly reduced in size and its design significantly altered so as to avoid the highest concentrations of T&E Species and the highest quality habitat for such species.

2.4.1 General Proposed Avoidance and Minimization Measures

The Applicant will implement the following BMPs in order to minimize potential impacts on T&E Species. Many of these measures are also described in the FEIR. The Project shall have biological monitors on the site throughout construction activities.

1. Before commencing on-site construction activities, the Permittee will submit to CDFW and USFWS the name, qualifications, business address, and contact information of one or more Designated Biologists. The Permittee shall ensure that each Designated Biologist is knowledgeable and experienced in the biology, and natural history of the T&E Species on the Project. The Designated Biologist(s) shall be responsible for monitoring construction activities to help minimize and fully mitigate or avoid the incidental take of individual species and to minimize disturbance of T&E Species' habitat. The Designated Biologist may appoint biological monitors to perform biological surveys or provide oversight of ground disturbing activities as needed in their place. All biological monitors that work on-site will receive instruction from and report to the Designated Biologist(s).

2. Prior to surface disturbance or other covered activity, a Designated Biologist shall conduct a T&E Species education program (tailgate briefing) for all Project personnel, which familiarizes the Applicant's employees and contractors with occurrence and distribution of T&E Species in areas impacted by the Action; take avoidance measures being implemented during the Project; BMPs; reporting requirements if incidental take occurs; and applicable definitions and prohibitions under the CESA and other measures regarding federal and state listed species. This program is designed to ensure all personnel who work at the Project are aware of and can identify the federal and state listed species and the measures implemented to protect these species. In addition, contact names and numbers are given to which personnel can report incidents regarding federal and state listed species. An employee environmental awareness program will be administered to all new employees and to all other employees every two years. Upon completion of the program, the employees are given a badge that is required for admittance onto the Project site. Badges will include the employee's picture and will be color-coded and dated in order to show that the employee is current with required training.

3. Posters showing pictures of T&E Species with information and protocols to be followed will be placed in conspicuous locations (e.g. construction trailers). Verbiage will be in English and in Spanish.

4. All activities that will result in permanent or temporary ground disturbances shall be preceded by a preconstruction survey conducted by a Designated Biologist(s) or their representative. The biologist(s) shall identify and clearly mark the location of areas where T&E species were identified, and dens or burrows and habitats of T&E Species that are to be avoided. Appropriate buffers will be established with highly visible markers. When burrows or dens are to be damaged, a Designated Biologist will determine when excavation procedures should be employed to protect individual T&E Species, and when it is not necessary. If relocation is permissible, then the appropriate relocation plans will be followed.

5. A Designated Biologist or their representative shall be present while ground-disturbing activities are occurring. In addition to conducting preconstruction surveys, the biologist(s) shall aid crews in satisfying take avoidance criteria and implementing mitigation measures; will document (weekly) all pertinent information concerning Action effects on T&E Species; and shall assist in minimizing the adverse effects of Action activities on T&E Species.

6. Designated Biologists and biological monitors are empowered to order cessation of activities if take avoidance and/or mitigation measures are violated and will notify the applicants environmental representative immediately.

7. Unless Designated Biologist(s) allow alterations to routes, all Action vehicles shall be confined to designated project roads or prominently staked and/or flagged access routes that are surveyed prior to use. All observed T&E Species and their habitat features such as dens, burrows or specific habitats shall be flagged as necessary to alert Project personnel to their presence. All Project-related flagging shall be collected and removed after completion of Project construction.

8. Designated Biologist(s) shall keep an accurate tally of the number of sensitive resources (as listed above) that are damaged or otherwise affected by Action activities. Additionally, biologist(s) shall estimate the number of small mammal burrows damaged or otherwise affected. Total number of dens and burrows affected by the Action shall be reported in the post-activity compliance report and entered into a central database developed expressly for that purpose.

9. PVS shall appoint a company representative who will be the contact source for any employee or contractor who inadvertently kills or injures a T&E Species or who finds a dead, injured, or entrapped T&E Species. The representative will be identified during the pre-performance educational briefing.

10. Any contractor, employee(s), or other personnel who inadvertently kills or injures a T&E Species shall immediately report the incident to their representative. The representative shall contact the Action’s environmental representative and Designated Biologist(s). The Action’s environmental representative or Designated Biologist will contact CDFW and/or USFWS immediately in the case of a dead, injured, or entrapped listed species. The T&E Species CDFW contact for immediate assistance is State Dispatch at (916) 445-0045. State Dispatch will contact the local warden or biologist. The biologist will also document all circumstances of death, injury or entrapment of T&E Species. The biologist will: 1) take all reasonable steps to enable the individual animal to escape should it be entrapped; 2) contact CDFW, USFWS or other appropriate authorities to identify an approved rehabilitation center and appropriate capture and transport techniques should the covered animal be injured; and 3) document circumstances of death in writing and if possible photograph the dead animal in situ prior to moving (the animal will only be moved with permission from the applicable agencies).

11. If a T&E species is injured or take occurs from a Project-related activities during construction or operations, the Designated Biologist shall be immediately notified and initial notification shall be made to CDFW by calling the Regional Office and providing information on the location, species, number of animals injured or killed, and the Permit Number. Following the initial notification, the Designated Biologist shall prepare written documentation of the information reported by telephone. Permittee shall send CDFW a written report within two calendar days. The report will include the date, time and location of the finding or incident, location of the carcass, and if possible provide a photograph, and any other pertinent information. The CDFW contact information is 1416 9th Street, Sacramento, CA, 95814, and (916) 654-4262. The USFWS contact information is Ventura Fish and Wildlife Office, 2493 Portola Road, Suite B, Ventura, CA 93003.

12. To prevent inadvertent entrapment of T&E Species, all excavated, steep-walled holes or trenches more than two feet deep, or of any depth if they contain water or other material, shall be covered with plywood or other barrier materials or provided with one or more escape ramps constructed of earth fill or wooden planks (wooden planks should be more no less than 10 inches in width and should reach to bottom of trench) at the close of each working day such that animals are unable to enter and become entrapped. Before holes or trenches are filled, a biologist (s) shall inspect them for trapped animals. If any worker discovers that T&E Species have become trapped, construction activities shall cease in the vicinity of the trapped animal and notify the Designated Biologist(s) or their representative immediately. Project workers and the biologist(s) shall allow the T&E Species to escape unimpeded if possible, or the biologist(s) determines that activities are allowed to continue. If an injured T&E Species is discovered at any time, the Designated Representative shall contact the USFWS and CDFW.

13. The Applicant shall employ limitations on pile driving activities to reduce noise levels. These measures include completing pile driving activities in as short a period as feasible; using and operating sonic or vibratory pile drivers at reduced driving force where feasible soil conditions occur instead of impact pile drivers; and if several pile drivers are to be used, the pile driving activities shall be arranged so that no two pile drivers are driving simultaneously within 160 feet of each other.

14. The Applicant is required pursuant to the County's conditions of approval to evaluate and implement feasible foundation installation systems to minimize noise and vibration that would affect ground-dwelling wildlife. Additional noise mitigation measures will be implemented during the construction phase that will reduce potential impacts to nearby wildlife and livestock from loud noises as needed.

15. All spills of hazardous materials shall be cleaned up immediately in accordance with the Applicant Spill Prevention Control Plan.

16. Pets are prohibited at the Action site with the exception of working dogs. Working dogs that assist ranchers are not considered pets. Any working dog entering the Action site will be required to provide proof of inoculations to prevent disease transmission.

17. Firearms are prohibited within the Project Footprint.

18. All food-related trash, such as wrappers, cans, bottles, bags, and food scraps shall be disposed of daily in containers with secure covers and regularly removed from the Action site.

19. Use of rodenticides and herbicides in areas impacted by the Action will be restricted to use within the prescriptions of the Noxious Weed and Invasive Plant Control Plan. Herbicides used for noxious weed control would be applied in accordance with BLM-approved procedures and other federal and state regulations. Applications will be applied by licensed applicators in accordance with label directions and other restrictions mandated by U.S. Environmental Protection Agency, County Agricultural Commissioner, regional label prescriptions on use, California Department of Food and Agriculture, and other state and federal legislation.

20. The width of motorized vehicle movement will be limited to 25 feet during construction activities when driving in occupied T&E Species habitat.

21. Appropriate measures shall be undertaken to prevent unauthorized vehicle entry to off-road survey routes in sensitive habitat areas. Signage will be the preferred method to discourage use.

22. Project vehicles shall be confined to existing roads, construction roads, the perimeter road for the Project Footprint, and transportation corridors between panels. Vehicle travel is not permitted off of designated transportation routes, except in the case of emergency. A day-time speed limit of 15 miles per hour (mph) and a night-time speed limit of 10 mph will be adhered to on the Action site, and Project personnel will not exceed 25 mph on public roads in the vicinity of the Project site.

23. Upon completion of any section, all areas that are significantly disturbed and not necessary for future operations, shall be stabilized to resist erosion, and revegetated and re-contoured if necessary, and will follow goals and methods in the Habitat Restoration and Revegetation Plan to promote restoration of the area to pre-Project conditions.

2.4.2 Species-Specific Proposed Avoidance and Minimization Measures

In addition to the general proposed conservation measures described above, the Action will implement species-specific conservation measures for CTS, GKR, SJKF, VPFS, LHFS, CFS, VPTS, and BNLL during construction activities associated with the Action as described below.

California Tiger Salamander

Four known CTS breeding ponds and one potential CTS breeding pond are located within 1.2 miles of the Project Footprint (none are located within the Project Footprint) (**Figure 6**). The objective of these measures is to provide for any CTS found on the Project site to be relocated to a suitable burrow adjacent to the existing breeding pond on the VRCL. Below, and in **Appendix A,** are the measures that will be implemented to protect CTS during construction activities.

a. *CTS Surveys.* The Designated Biologist(s) or their representative shall survey the work site before the Applicant begins any ground disturbing activities. If the Designated Biologist(s) finds any life stages of CTS (adults, eggs, or larvae) the Designated Biologist(s) shall relocate the life form to suitable habitat that is being preserved. The Designated Biologist(s) shall hold the appropriate state and federal Scientific Collecting Permits (SCPs) for amphibians to be authorized to capture and handle CTS. The Designated Biologist(s) may be assisted by approved biologists that do not have SCP; these biologists shall be identified as Designated Monitors.

Energy Renewal
PARTNERS, LLC

BR
10/16/2013

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- Known CTS Breeding Pond
- CTS Pond Buffer
- 100-year Floodplain

N

0 1,000 2,000 4,000
Feet

Panoche Valley Solar Project

California Tiger Salamander Ponds

Figure
6

b. *CTS Exclusion Fencing.* The Applicant shall place CTS exclusion fencing in focused areas as deemed necessary by the Designated Biologist for any construction activity taking place within 1.2 miles of potential or known CTS breeding sites prior to the rainy season before construction begins and around temporary construction ponds. Prior to the installation of the exclusion fencing, the activity will be preceded by a preconstruction survey conducted by a Designated Biologist or their representative. The Applicant shall maintain the CTS exclusion fencing throughout the first rainy season prior to construction activities and throughout all construction activities. The Applicant shall use wildlife fencing equipped with one-way exits every 250 to 500 feet to avoid entrapment of amphibians inside the fence. The Applicant shall bury fencing to a depth of six inches, and fencing shall be a minimum of 30 inches above grade. CTS exclusion fencing can be designed to work to exclude other species as well. Care should be taken in exclusion fencing design should cattle or sheep be expected to be adjacent to the fencing. Entranceways to construction areas shall be minimized as much as possible and shall be equipped with a gate that can be placed across the entranceway at the end of each working day, which would prevent CTS from entering the site. The Applicant shall avoid small mammal burrows to the extent possible during installation of the exclusion fencing. The exclusion fencing will be removed after the completion of construction or may be removed at the end of the rainy season if the project or section of the project within 1.2 miles of a known or potential breeding pond will be completed prior to the following rainy season.

c. *CTS Relocation Plan.* If a CTS is observed, the permitted Designated Biologist(s) will place the CTS into a suitable bucket or insulated cooler in the shade with a wetted sponge and an ice pack wrapped in a clean cloth (if required) to mimic subterranean conditions. The biologist will then immediately record the biologist's name, date, time, and CTS location using a handheld GPS and digital camera. The sex, age, condition, diagnostic markings, and the general condition and health of each CTS observed will also be recorded and photographed. The CTS will be released into a suitable burrow as close to a suitable pond as possible (most likely Pond #12 on the VRCL; **Figure 6**) and as quickly as possible with a time out of the ground not to exceed one hour. If a dead or injured CTS is located during the burrow excavations or construction activities, the USFWS and CDFW will be contacted immediately and the Applicant and Designated Biologist(s) will follow direction from these agencies for the next steps to take. Finally, the actions undertaken and the habitat description and location of where the CTS were found and where the CTS were relocated will also be recorded and photographed. All of the above information and any field notes will be submitted to the USFWS and the CDFW. In addition, this information will be recorded in a CNDDB report and the Monthly Compliance Report and submitted to the CDFW.

d. *CTS in Project Footprint.* If a CTS is found by any person in areas impacted by the Project Footprint before or during construction activities, the Applicant shall immediately stop all work that could potentially harm the CTS until the permitted Designated Biologist(s) can relocate the CTS to an active rodent burrow system in accordance with the approved relocation plan. Prior to surface disturbance or other covered activity, a qualified wildlife biologist shall conduct a listed species education program (tailgate briefing) for all project personnel who will include an explanation of how to identify CTS, and applicable reporting procedures.

e. *Open Trenches.* All open holes, sumps, and trenches within the areas impacted by the Project will be inspected at the beginning and end of each day for trapped animals during the rainy season. The Applicant shall provide earthen or wooden (at least 10 inches in width) escape ramps of no more than 3:1 slope every 250 to 500 feet. No more than 5,000 linear feet of trench will be open at one time during the construction.

f. *Rain Forecast.* The Designated Biologist(s) or their representative shall monitor the National Weather Service 72-hour forecast for areas impacted by the Project. A rain gauge shall be installed at the Project site and monitored and refreshed every morning. If rain exceeds 0.25 inches during a 24-hour period, the Applicant shall cease work (including construction-related traffic moving though areas except on public roads) within 1.2 miles of potential or known breeding ponds until no further rain is forecast. In areas within 1.2 miles of potential or known breeding ponds that have been encircled with CTS exclusion fencing (can include structures to permit one-way movement of CTS off the work site), construction may continue during rain events. If work must be completed at night, in the rain, within the exclusion fencing, it will be due to such things as an imminent threat to life, necessary T&E species work, or a significant property and/or construction interest.

g. *Night Work.* The Applicant shall restrict night work in areas within 1.2 miles of potential or known CTS breeding sites when a 70 percent or greater chance of rainfall is predicted within 48 hours of Covered Activities that have not been encircled with exclusion fencing until the chance of rain decreases or no further rain is forecasted. However, even after CTS exclusion fencing is installed, this condition still applies to construction-related traffic moving though areas within 1.2 miles of potential or known CTS breeding sites, but outside of the CTS exclusion fencing (e.g., on roads). If work must be completed at night, in the rain, within the exclusion fencing, it will be due to such things as an imminent threat to life, necessary T&E species work, or a significant property and/or construction interest.

h. *Soil Stockpiles.* The Applicant shall ensure that soil stockpiles are placed where soil will not pass into potential CTS breeding pools or into any other "Waters of the State," in accordance with Fish and Game Code 5650. The Applicant shall appropriately protect stockpiles to prevent soil erosion.

i. *Barriers to CTS Movement.* Any roadways that the Applicant needs to construct within 1.2 miles of known or potential CTS breeding sites shall be constructed without steep curbs, berms, or dikes, which could prevent CTS from exiting the roadway. If curbs are necessary for safety and/or surface runoff, the Applicant shall design and construct them to allow CTS to walk over them. If steep dikes are required, the Applicant shall design and construct them to include over-side drains or curb/dike breaks spaced at intervals of 25 feet to allow CTS passage.

j. *Fieldwork Code of Practice.* To ensure that disease is not conveyed between work sites, all Biologists shall follow the fieldwork code of practice developed by the Declining Amphibian Populations Task Force Fieldwork Code of Practice; the Designated Biologist(s) may substitute a bleach solution (0.5 to 1.0 cup of bleach to 1.0 gallon of water) for the ethanol solution. Care shall be taken so that all traces of the disinfectant are removed before entering the next aquatic habitat.

k. Breeding Ponds. One to three potential breeding ponds will be created on Conservation Lands depending upon mitigation needs. If possible, the pond(s) will be created without impacts to federal or state waters. However, if the pond(s) cannot be built without impacting federal or state waters, all necessary permits will be obtained prior to the construction. The Project will be creating new breeding habitat on the Conservation Lands, which will be preserved and managed in perpetuity. Using an adaptive management approach for the Conservation Lands and creation of additional ponds will potentially increase the population in the Panoche Valley by 60 to 180 individual CTS, depending on how many new breeding ponds are created (assumes 60 new breeding adults per pond).

<u>Giant Kangaroo Rat</u>

The GKR avoidance and minimization measures below and in **Appendix B** will be utilized during construction and general operations of the Action.

a. Surveys documenting the presence of GKR in and around the Project Area were used to delineate areas of high GKR occupancy. Several of these areas were removed from the original Project Footprint in order to minimize impacts to GKR. A total of 212 acres of GKR avoidance areas were removed from the (FEIR) Project Footprint and have been incorporated into the VFCL. These areas were selected due to the large numbers of concentrated active and inactive GKR precincts, presence of high quality habitat, and direct connectivity to protected lands.

b. The Project Footprint will include a 20-foot setback from Little Panoche Road based on the number of GKR active and inactive precincts identified along the adjacent fence line.

c. Prior to surface disturbance or other covered activity, a Designated Biologist(s) or their representative shall conduct a listed species education program (tailgate briefing) for all project personnel.

d. Prior to construction activities, a pre-construction survey for GKR will occur in the area of work. If GKR sign is observed within the area of work, GKR will be relocated off-site per the Giant Kangaroo Rat Relocation Plan (**Appendix C**). If exclusion fencing is required, it will be buried deep enough in the ground to prevent GKR from digging under and high enough to prevent them from jumping over. Exclusion fencing will be designed to exclude multiple species if multiple species are present. Special care will be taken in exclusion fence design if cattle or sheep are adjacent to the site. Construction will not commence in an area until it has been completely trapped and excavated and no more GKR are expected to use the area as determined by the Designated Biologist(s). These areas can be fenced and trapped/excavated in smaller sections within the larger Project area. At the end of trapping and excavation, no GKR should remain within the area.

e. All activities that will result in permanent or temporary ground disturbances shall be preceded by a preconstruction survey conducted by a Designated Biologist or their representative. The biologist(s) shall identify and clearly mark the location(s) of areas where GKR was/were identified, and dens, burrows and habitats of GKR.

f. Biological monitors will oversee all construction activities from the first day of work through the duration of construction activities. The Designated Biologist or their representative shall be present at all times during ground disturbing activities immediately adjacent to, or within habitat(s) that supports populations of the listed or special-status species.

g. All GKR burrows (active and inactive) shall be avoided to the extent feasible. Should avoidance not be feasible capture/relocation efforts shall insure that all excavated burrows are unoccupied.

h. Vegetation shall be cleared in the area immediately surrounding active burrows/precincts, followed by a period of one night without further disturbance to allow the GKR to vacate the burrow/precinct.

i. If GKR do not voluntarily leave occupied burrows/precincts, they shall be live trapped prior to commencing ground disturbing activities in the area. If the disturbance is temporary (<1 day) trapped individuals may be held under suitable conditions, during the period of disturbance, and then released at the same location at which they were trapped. For instances where the disturbance is longer term or permanent, individuals will be trapped and relocated to unoccupied burrow precincts, located as nearby as possible in areas that will not be disturbed per the GKR Relocation Plan (**Appendix C**).

j. Methods shall be taken to prevent re-entry to the burrow (e.g., exclusion fencing and one way doors) by GKR (and other small mammal species) until construction is complete in these areas.

k. Once construction activities are complete, access to the burrows shall be restored where possible. If construction related impacts would result in the crushing or destruction of an occupied burrow then the burrow shall be excavated (either by hand or mechanized equipment under the direct supervision of the qualified biologist, removing no more than four inches at a time). GKR burrows/precincts shall not be disturbed from January through June (recognized breeding/mating season) unless a qualified biologist, utilizing video technology, verifies that no young are present in the burrow per the GKR Relocation Plan (**Appendix C**).

l. All captured GKR which are not re-released at the same location as capture will be relocated within 15 miles of the Project Footprint (including possible relocation on unaffected regions of the Project Footprint or Conservation Lands) or other locations determined through further USFWS consultation per the GKR Relocation Plan (**Appendix C**).

m. All open holes, steep-walled holes, or trenches more than two feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks (wooden planks should be 10 inches in width and should reach to bottom of trench, placed at an angle appropriate for GKR to exit).

n. Unless biological monitors allow alterations to routes, all project vehicles shall be confined to existing roads or prominently staked and/or flagged access routes that are surveyed prior to use.

o. Exclusion fencing will be constructed to prevent GKR from entering construction areas.

p. In order to preserve, manage, and maintain the ongoing functionality of the proposed GKR corridors within the VFCL, the Proposed Action shall implement the following measures:

i. The habitat corridors need not be of uniform width, but at no point shall a corridor width be less than 100 feet on either side of the incised channel, or more than 100 feet from the ordinary high water mark where no incised channel is evident.

ii. Habitat corridors shall conform to contours of natural ecological features in the landscape in which the ecological requirements of the species are the foremost consideration.

iii. Habitat corridors shall be fenced in accordance with the Fencing Plan. Fence locations shall be a maximum of 25 feet from edges of all panel installations.

iv. Project design shall incorporate road designation that avoids roads adjacent to the corridors (i.e., there shall be no driving on the side of any panel block adjacent to a designated habitat corridor).

v. New construction of buildings, necessary bridge crossings, ornamental tree plantings, or other features not already identified that would reduce available habitat and may provide perching opportunities for predatory birds shall not be permitted within or directly adjacent to the habitat corridors.

vi. Prior to commencement of construction, habitat corridors shall be placed under a biological conservation easement to be preserved in perpetuity, subject to the following restriction: driving or road building shall be prohibited across habitat corridors except where this provision conflict with the emergency access requirements of the Hollister Fire Department.

<u>San Joaquin Kit Fox</u>

The following mitigation measures will be implemented in order to avoid and minimize adverse impacts to SJKF to the maximum extent practicable:

- Prior to surface disturbance or other covered activity, a Designated Biologist or their representative shall conduct a listed species education program (tailgate briefing) for all project personnel.

- All activities that will result in permanent or temporary ground disturbances shall be preceded by a preconstruction survey conducted by a Designated Biologist or their representative. The biologist(s) shall identify and clearly mark the location(s) of areas where SJKF was/were identified, and dens, and burrows of SJKF.

- A Designated Biologist may determine that a Biological Monitor(s) shall be present while ground disturbing activities are occurring based on the sensitivity of the habitat. Appropriate buffers will be established with highly visible markers. All known or occupied SJKF dens shall be identified by flagging and avoided by a buffer with a radius of 30.5 meters (100 feet).

- All known SJKF natal dens shall be identified by flagging and buffered by a radius of 150 feet.

- All occupied SJKF natal dens shall be identified by flagging and buffered by a radius of 200 feet.

- Potential kit fox dens that cannot be avoided may be excavated and back-filled pursuant to USFWS guidelines (January 2011) without prior notification, provided that excavation is approved and supervised by a biological monitor or other qualified biologist.

- All open holes, steep-walled holes, or trenches more than two feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks (wooden planks should be no less than 10 inches in width and should reach to bottom of trench).

- Construction materials will not be stacked in a manner that allows SJKF to establish den sites within the material. Construction items such as solar panel and equipment transported to the Project on pallets will be placed directly on the ground, and the pallets removed from the site.

- Unless biological monitors allow alterations to routes, all project vehicles shall be confined to existing roads or prominently staked and/or flagged access routes that are surveyed prior to use.

- Speed limits shall be restricted to 15 mph during daylight hours (5:00 am to 9:00 pm) and 10 mph during night-time hours on the site and 25 mph on public roads in the vicinity during both day and night-time driving.

- Signage designed to be both informative and eye-catching will be posted at the boundary of the Project site along Little Panoche Road to alert drivers both to construction traffic and to the presence of special status species on the site, and will include a posted speed limit.

An unimpeded north-south corridor will be protected with no disturbance (with the exception of the existing road, emergency access crossing, and the planned project perimeter road), during project construction and operations and maintenance. Below, and in **Appendix D,** are the measures that have been implemented to provide SJKF additional movement corridors through the project:

a. A 500 meter (1,640.4 feet) wide and approximately 2,484 meter (8,000 linear feet) long corridor associated with the existing Las Aquilas Creek /VFCL corridor have been included in the Project and will be beneficial in providing additional undisturbed connectivity. The corridor will promote movement through the site and north to the Panoche Hills and BLM landholdings. The undisturbed VFCL along Las Aquilas Creek will be widened to accommodate this SJKF enhancement.

b. The Panoche Creek Corridor and associated VFCL intersects the southern portion of the VFCL in a west to southeast direction. This corridor provides connectivity to the large block and high quality habitats (e.g., grassland flats) to the west of the project including the Gabilan Range and eventually through to the SCRCL and the BLM lands beyond. The southern portion of the VFCL also provides unimpeded west to east travel ways from the Panoche Creek wash (and adjacent flats) to the VRCL and adjacent Tumey Hills/Panoche Hills BLM landholdings including the Las Aquilas Creek drainage.

c. Moss-Panoche 230kV Transmission Line Corridor - bisecting the southwestern portion of the project footprint and associated VFCL in a northwest to southeast direction. This 22.48 meter (75 feet) corridor provides connectivity to the habitats (e.g., grassland flats, Panoche Creek wash) to the west of the project including the Gabilan Range and eventually through to SCRCL and adjacent BLM landholdings.

Additional SJKF avoidance and minimization measures will be utilized during construction, and general operations of the Action are described below and in **Appendix D**.

a. Prior to construction activities, pre-construction surveys shall occur and any potential SJKF den (burrow size of four inches or larger) shall be avoided from direct impact. A biologist(s) shall monitor the SJKF den during construction activities, and the den should be avoided by construction personnel. If a road is to be installed near a den, speed limits of 10 mph will be implemented near the den. Construction materials will be stored in a manner as to minimize the potential for SJKF to use the material for a den.

b. SJKF permeable perimeter fencing will be constructed to allow SJKF movement through the Project Footprint. A 12.7 to 15.2 centimeter (cm) (5 to 6 inch) gap along the bottom of the chain linked fence would allow SJKF to travel through the site and link up with the existing travel corridors, including the creek washes and the VFCL, as well as link up prey base areas such as the GKR precinct/colony avoidance areas. A fencing option to the chain linked fence would be an inverted “deer” fence that would have larger rectangular openings on the bottom that would allow the SJKF to pass through. These fencing designs were either previously approved or suggested by the CDFW and USFWS for other solar projects. Fences surrounding the substation and O&M building will be constructed to restrict SJKF access.

c. If avoidance of known dens is not possible, PVS will take the following sequential steps when working in such areas:

    1. Allow for three consecutive days of monitoring to determine the occupancy status of each den. Activity at the den shall be monitored by using tracking medium at the entrance to the den and/or stationary infrared beam cameras, and by spotlighting. If no activity is observed, actions described below under Step 3 may be implemented. If SJKF activity is observed, the den shall be monitored for an additional five days from the date of observance. Use of the den during this time can be discouraged by partially plugging its entrance(s) with soil in such a manner that any resident animal can escape easily. If SJKF are still present after five days, den excavation, discussed below under Step 3 may proceed when, in the judgment of the qualified/approved biologist, it is determined temporarily vacant.

    2. Once the SJKF has vacated the den, methods (e.g., one way doors) shall be taken to prevent reentry to the burrow by SJKF (and other mammal species) until construction is complete in these areas. Once construction activities are complete access to the burrows shall be restored.

    3. Once it has been confirmed that the dens have been vacated, if construction related impacts would result in the crushing or destruction of a den, the den shall be excavated. Excavation shall be done only by hand and under the direct supervision of a biologist, removing no more than four inches at a time. If at any time during excavation a SJKF is discovered inside the den, all activity will cease immediately, and monitoring described above under Step 1 (above) shall be resumed. As indicated above, natal dens shall not be disturbed at any time.

d. Potential SJKF dens that cannot be avoided will be excavated and back-filled pursuant to USFWS guidelines (USFWS 2011) without prior notification, provided that excavation is approved and supervised by a biological monitor or the Designated Biologist(s). Destruction of all SJKF dens shall be reported in the post-activity compliance report.

e. Trapping of SJKF will be completed to collar individual SJKF captured for location monitoring during construction activities by the Designated Biologist or Biological Monitors. The daily telemetry location of the SJKF will be used as an impact avoidance measure.

<u>Vernal Pool Fairy Shrimp, Conservancy Fairy Shrimp, Longhorn Fairy Shrimp, and Vernal Pool Tadpole Shrimp</u>

One vernal pool and one hydrologically connected vernal pool on the site are occupied by VPFS. Prior to construction activities, BMPs (such as use of silt fencing, hay bales, etc.) outlined in the site-specific Stormwater Pollution Prevention Plan, will be implemented to limit erosion and sediments from entering vernal pool habitat. Additionally, a 100-ft buffer will be placed around all occupied vernal pools to prevent equipment from inadvertently entering these pools. Additional Project avoidance and minimization measures for the VPFS are located in **Appendix A**.

<u>Blunt-nosed Leopard Lizard</u>

The avoidance and minimization measures, noted below and in **Appendix E,** are intended to avoid take of individual BNLL during construction and general operations of the Action. All Project personnel and contractors working on the Project will implement these measures.

a. Prior to initiation of ground disturbing activities, a Designated Biologist(s) shall conduct a BNLL education program (e.g., tailgate briefing) for all Project personnel. Topics to be discussed during the briefing shall include: occurrence and distribution of BNLL in the Project area, take avoidance measures being implemented during the Project, reporting requirements if an incident occurs, applicable definitions and prohibitions under the Fish and Game Code for fully protected species, and relevant provisions of the federal and state Endangered Species Act.

b. A full-protocol survey has been completed on the entire Project Footprint. In addition to the full-protocol survey that was completed, abbreviated surveys were completed in areas of primary habitat at various times since 2009. All activities that will result in permanent or temporary ground disturbances shall be preceded by a pre-construction survey within 30 days of construction by a Designated Biologist(s). In addition, an additional pre-construction survey immediately prior to the onset of construction will be conducted. The biologist(s) shall identify and clearly mark the location of areas where any BNLL were observed. If a BNLL is observed on the Project Footprint, CDFW and USFWS will be contacted. For information on the rational for the buffer, see **Appendix E**.

c. In potential higher BNLL impact risk areas, in the vicinity of Las Aquilas Creek (i.e., within Township 15S, Range 10E, Section 9 and 16), enhanced pre-construction surveys for adult BNLL will be conducted. These enhanced surveys will consist of focused protocol BNLL surveys in the month of May preceding the ground disturbance. The survey methodology will be generally based on the CDFW Approved Survey Methodology for the Blunt-nosed Leopard Lizard (CDFG 2004).

d. A biological monitor(s) shall be present while ground disturbing activities are occurring. In addition to conducting preconstruction surveys, the biological monitors shall aid crews in satisfying take avoidance criteria for BNLL and implementing Project avoidance and mitigation measures. Biological monitors shall accompany vehicles and crews throughout the Project area if the Designated Biologist considers it necessary in order to avoid individual BNLL. Biological monitors are empowered to order cessation of activities if an immediate threat of "take" is identified or take avoidance and/or mitigation measures are violated or a BNLL is located within the construction area and will notify the project environmental representative.

e. All construction work and equipment use (except for driving) shall occur within exclusion zones of no greater than 100 acres in extent. Multiple 100-acre exclusion zones are allowed, but shall not exceed 613 acres in total extent at any one time.

f. Unless Designated Biologist(s) allow alterations to routes, all Project vehicles shall be confined to defined access routes that will be staked and/or flagged. All observed BNLL shall be avoided by a flagged 52.4-acre buffer to alert Project personnel to their presence. All Project-related flagging shall be collected and removed after completion of the Project.

g. The creation of the 2,523 acre VFCL will provide permanent protection to the BNLL and associated high quality wash and terrace habitat. Almost all observations of BNLL on the Project have been observed on the VFCL. No BNLL observations have been made on the Project Footprint.

h. The Applicant shall appoint a representative who will be the contact source for any employee or contractor who inadvertently kills or injures a BNLL or who finds a dead, injured, or entrapped individual BNLL. The representative will be identified during the pre-performance educational briefing.

i. Any contractor, employee(s), or other personnel who inadvertently kills or injures a BNLL shall immediately report the incident to their representative. The representative shall contact the Applicant's environmental representative and the Designated Biologist(s). The Applicant will contact CDFW and USFWS immediately in the case of a dead, injured, or entrapped BNLL. The CDFW contact for immediate assistance is State Dispatch at (916) 445-0045. State Dispatch will contact the local warden or biologist. The USFWS contact for immediate assistance is (805) 644-1766. The Designated Biologist(s) will document all circumstances of death, injury or entrapment of BNLL. The biologist will: 1) take all reasonable steps to enable the individual animal to escape should it be entrapped; 2) contact CDFW, USFWS, or other appropriate authorities to identify an approved rehabilitation center and appropriate capture and transport techniques should the covered animal be injured; and 3) document circumstances of death in writing and, if possible, photographing dead animal *in situ*. Notification shall include the date, time, and location of the incident or of the finding of a dead or injured BNLL, and any other pertinent information. The USFWS contact for this information is the Endangered Species, Program Field Office, 2493 Portola Rd., Suite B, Ventura, CA 93003. The dead Covered animal can be transported to California State University at Bakersfield or the Endangered Species Recovery Team in Bakersfield for storage and research if CDFW and USFWS approve.

j. To prevent inadvertent entrapment of BNLL, all open holes, steep-walled holes, or trenches more than two feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks (wooden planks should be no less than 10 inches in width and should reach to bottom of trench). Before such holes or trenches are filled, they should be thoroughly inspected for trapped animals.

k. Motorized vehicles are prohibited within occupied BNLL habitat (defined as 52.4-acre buffer surrounding all observations).

2.4.3 Operations and Maintenance Proposed Avoidance and Minimization Measures

The avoidance and minimization measures described below will be implemented during operations and maintenance of the solar facility throughout its operation.

1. All Project vehicles shall be confined to existing roads, Project perimeter roads (excluding wash crossings, which are restricted to emergency use only), transportation corridors between panels, or prominently staked and/or flagged access routes.

2. The Action shall appoint a company representative who will be the contact source for any employee or contractor who inadvertently kills or injures a T&E Species or who finds a dead, injured, or entrapped T&E Species.

3. Any contractor, employee(s), or other personnel who inadvertently kills or injures a T&E Species shall immediately report the incident to their representative. The representative shall contact the Project's environmental representative and, if feasible, a Designated Biologist(s). The Project's environmental representative will contact CDFW and USFWS immediately in the case of a dead, injured, or entrapped listed species. The CDFW contact for immediate assistance is State Dispatch at (916) 445-0045. State Dispatch will contact the local warden or biologist. The USFWS contact for immediate assistance is (805) 644-1766. The Designated Biologist(s) will also document all circumstances of death, injury or entrapment of T&E Species. The biologist will: 1) take all reasonable steps to enable the individual animal to escape should it be entrapped; 2) contact CDFW, USFSW, or other appropriate authorities to identify an approved rehabilitation center and appropriate capture and transport techniques should the covered animal be injured; and/or 3) document circumstances of death in writing and if possible photographing dead animal in situ.

4. CDFW and USFWS shall be notified in writing within two working days in the event of an accidental death or injury of a T&E Species or of the finding of any dead or injured T&E Species. Notification shall include the date, time, and location of the incident or of the finding of a dead or injured animal, and any other pertinent information. The CDFW contact information is 1416 9th Street, Sacramento, CA, 95814, and (916) 654-4262. The USFWS contact information is: the Endangered Species, Program Field Office, 2493 Portola Rd., Suite B, Ventura, CA 93003.

5. All spills of hazardous materials shall be cleaned up immediately in accordance with the Applicant's Spill Prevention Control Plan.

6. Pets are prohibited at the Action site with the exception of working dogs. Working dogs that assist ranchers are not considered pets. Any working dog that will be entering the Action site will have to show proof of inoculations to prevent disease transmission to SJKF.

7. Firearms are prohibited at the Project Footprint.

8. All food-related trash, such as wrappers, cans, bottles, bags, and food scraps shall be disposed of daily in containers with secure covers and regularly removed from the site.

9. Use of rodenticides and herbicides in areas impacted by the Action will be restricted to use within the Noxious Weed and Invasive Plant Control Plan. Applications will be applied by licensed applicators in accordance with label directions and other restrictions mandated by U.S. Environmental Protection Agency, County Agricultural Commissioner, regional label prescriptions on use, California Department of Food and Agriculture, and other state and federal legislation/regulation.

10. Appropriate measures shall be undertaken to prevent unauthorized vehicle entry to off-road survey routes in sensitive habitat areas. Signage will be the preferred method to discourage use.

11. A day-time speed limit of 15 mph and a night-time speed limit of 10 mph will be adhered to on the Project site, and vehicles will not exceed 25 mph on public roads in the vicinity of the Project site.

2.4.4 Conservation Lands

In addition to the avoidance and minimization measures described above, the Action will also implement a conservation package consisting of the permanent preservation and management of three large parcels of land to offset potential impacts. These lands are the VFCL, VRCL, and SCRCL. These lands will be enhanced and managed for the species through implementation of the Conservation Management Plan (**Appendix F**). The lands were selected to provide local mitigation, preserve core populations and create permanent movement corridors with adjacent BLM controlled lands.

The FEIR established certain mitigation ratios for CEQA purposes, which vary by species, to compensate for impacts to species and habitats. These FEIR measures are as follows:

- Suitable BNLL habitat permanently directly impacted by the Action will be mitigated at a 3:1 acreage ratio. Suitable BNLL habitat indirectly impacted by the Action will be mitigated at a 2:1 acreage ratio.

- Suitable SJKF habitat permanently impacted by the Action will be mitigated at a 4:1 acreage ratio by conservation lands. This 4:1 ratio will be broken down into high and moderate suitability habitat. A 2:1 acreage ratio will consist of high suitability habitat, and another 2:1 acreage ratio will consist of moderate suitability habitat.

- Suitable GKR habitat permanently impacted by the Action will be mitigated at a 3:1 acreage ratio.

- CTS suitable breeding habitats and suitable upland habitat impacted within 2,100 feet of a known or potential breeding pond will be mitigated at a 3:1 acreage ratio, suitable upland habitat located between 2,100 feet and 2,640 feet (0.5 mile) of a breeding pond will be mitigated at a 2:1 acreage ratio, and suitable upland habitat located between 2,640 feet and 6,636 feet (1.2 miles) of a breeding pond will be mitigated at a 1:1 acreage ratio. Temporary impacts will be mitigated at a 0.5:1 acreage ratio. Preserved habitat shall be the same quality or better quality than the habitat disturbed.

- To the extent that the fill or disturbance of ephemeral pools occupied by special-status fairy shrimp species, which may be identified at a later date, cannot be avoided, as required by the

FEIR, each acre or fraction thereof of occupied vernal pool habitat which is filled or disturbed shall be compensated by the preservation and management of two acres of occupied VPFS habitat (2:1 preservation ratio) and the creation, management, and preservation of one acre of vernal pool habitat (1:1 creation ratio) at a location approved and pursuant to authorization received from the USFWS. The applicant may also satisfy this mitigation requirement through the purchase of credits at a USFWS-approved mitigation bank.

In order to implement the mitigation measures prescribed by the FEIR and to address the species and habitat impact and mitigation concerns expressed by USFWS and CDFW, the Action includes the permanent preservation and management of approximately 24,185 acres of conservation lands, as follows:

Valley Floor Conservation Lands (approximately 2,523 acres)

In order to avoid detrimental effects to T&E species, particularly BNLL, SJKF, and GKR and their habitats, the Applicant adjusted and reduced the Project Footprint by greater than 75 percent to avoid the most suitable habitat for these species and committed to permanently preserve the highly suitable habitat as the VFCLs. The VFCLs are contiguous with the Project Footprint and are primarily non-native annual grassland habitat, with some seasonal ponds and vernal and ephemeral pools, as well as segments of seasonally dry Panoche and Las Aquilas Creeks. A full description of the biotic habitats of the Action Area is provided in **Section 3.2**. The VFCLs include the entire 100-year floodplain within the previously larger Project area boundary on the valley floor, as well as the additional SJKF movement corridor, GKR avoidance areas, and BNLL avoidance buffers. These lands are currently grazed, which enhances the habitat for the T&E Species, and will continue to be grazed under adaptive management detailed in the Conservation Management Plan (**Appendix F**).

The VFCLs are contiguous with the Project site. These lands include several seasonal drainages and all of Panoche Creek that lies within the Project area boundary, which is usually a deep-cut dry wash for most of the year, as well as the 100-year floodplain that bisects the Project site in two places, which provides corridors or landscape linkages for all of the T&E Species across the valley floor. Both portions of these lands are comprised of non-native annual grassland habitat and slopes less than 11 percent. **Figure 3** shows the location of the Valley Floor Conservation Lands.

Valadeao Ranch Conservation Lands (approximately 10,772 acres)

Based upon initial biological surveys of the Project site and discussions with CDFW and USFWS, PVS identified and acquired rights to permanently preserve and manage the adjacent Valadeao Ranch property, which is located north, east, and west of the Project site (**Figure 3**).

The VRCL are contiguous with the Project Footprint directly to the west, east, and northeast of the site. These lands are also contiguous with the Valley Floor and SCRCL. VRCL include several seasonal drainages. The property is dominated by introduced annual grasslands (approximately 6,700 acres) and ephedra shrubland (approximately 2,700 acres), and also supports atriplex shrubland, and juniper and oak woodlands. A full description of the biotic habitats of the Action and associated Conservation Lands is provided in **Section 3.2**. Soils on this site are complex and range from sandy to sandy loam to clay loam to badlands. The VRCL contain approximately 2,945 acres with slopes between 0 and 11 percent (preferred slopes for several of the T&E species discussed in this document). Elevations on the Valadeao Ranch range from approximately 1,400 feet to 2,100 feet above mean sea level (amsl). These lands are currently grazed, which enhances the habitat for the T&E Species, and will continue to be grazed under adaptive management detailed in the Conservation Management Plan (**Appendix F**).

T&E species observed (either directly or by their sign) on the VRCL include CTS, GKR, and SJKF. Portions of the VRCL were found to be suitable for BNLL, GKR, CTS, and SJKF in differing acreage amounts. The VRCL also support one known CTS breeding pond and estivation habitat for an additional known CTS breeding pond located on private land. This breeding pond and estivation habitat for both ponds will be preserved in perpetuity and will increase the mitigation value for CTS.

<u>Silver Creek Ranch Conservation Lands (approximately 10,890 acres)</u>

During the DEIR public comment period, the Applicant consulted with the County, CDFW, USFWS, and various experts on the T&E Species regarding additional possible mitigation for unavoidable impacts to sensitive biological resources. PVS then identified and secured the rights to permanently preserve and manage additional conservation lands in the Panoche Valley known as the Silver Creek Ranch.

The SCRCL are southeast of the Project Footprint (**Figure 3**). The northwestern-most corner of the SCRCL is contiguous with a portion of the VRCL. Elevations on the SCRCL range from 900 to 2,200 feet amsl. California annual grasslands comprise the majority of ground cover on the site (approximately 8,400 acres) and are dominated by non-native species distributed sparsely over the landscape; the site also supports ephedra shrubland (approximately 2,260 acres), riparian areas, seeps, springs, and barrens. An area of tamarisk shrubland occurs along Silver Creek, and small areas of emergent wetlands and marsh occur along Panoche Creek. These lands include several seasonal drainages and upland habitat as well. A full description of the biotic habitats of the Action and associated Conservation Lands is provided in **Section 3.2**. Soils on the Silver Creek Ranch are less complex than those found on the Valadeao Ranch and are generally characterized as well drained and moderately permeable. Silver Creek Ranch contains approximately 5,765 acres with slopes between 0 and 11 percent. These lands are currently grazed, which enhances the habitat for the T&E Species, and will continue to be grazed under adaptive management detailed in the Conservation Management Plan (**Appendix F**).

The Silver Creek Ranch is specifically identified in the *Recovery Plan for Upland Species of the San Joaquin Valley* (USFWS 1998) and the *Recovery Plan 5-year Reviews* (USFWS 2010a, 2010b, 2010c), as an area with high habitat value for the T&E Species. The Recovery Plan also identifies the BLM's program of acquisition in which the Silver Creek Ranch is one of the two main ranches targeted for purchase. The Recovery Plan, in reference to GKR, also has a goal to "protect all existing natural land on the Silver Creek Ranch…" (Page 95). In reference to BNLL, the Recovery Plan aims to "Protect additional habitat for them in key portions of their range; areas of highest priority to target for protection are: …Natural lands in the Panoche Valley area of Silver Creek Ranch, San Benito County" (Page 122). By preserving the SCRCL, the Action will preserve a "highest priority" area identified in the Recovery Plan for these listed species that is currently unprotected.

T&E Species observed (either directly or by their sign) on the SCRCL include GKR, BNLL, and SJKF. While no CTS have been observed on the SCRCL, no protocol level CTS surveys have taken place to date on this property. Dr. Mark Jennings, a noted California herpetologist, did identify several ephemeral ponds on the SCRCL that would serve as suitable CTS breeding habitat.

Additional information regarding the SCRCL can be found in **Appendix G**.

2.4.5 Conservation Package

All Conservation Lands described above will be protected from future development in perpetuity. **Appendix F** presents a full Conservation Management Plan for the Action. This Conservation Management Plan will utilize adaptive management techniques to support enhancement, management, and preservation of all Conservation Lands. As a frame of reference, the USFWS Five Point Policy for

Habitat Conservation Plan (HCPs; USFWS 2000) states that adaptive management is defined as a method for examining alternative strategies for meeting measurable biological goals and objectives, and then if necessary, adjusting future conservation management actions according to what is learned. Annual monitoring of relative abundance of targeted species populations, prey species, vegetation characteristics associated with GKR colonies and small mammals, and results from the ongoing monitoring will serve to evaluate the effectiveness of ongoing management including specifics related to grazing (e.g., timing and extent).

In addition to the Conservation Management Plan, the Project will also prepare and implement the following in conjunction with the operations of the facility and the management of the conservation lands:

- Bird and Bat Conservation Strategy
- Eagle Conservation Plan
- Grazing Plan
- Worker Environmental Education Program
- Fugitive Dust Mitigation Plan
- Habitat Restoration and Revegetation Plan
- Habitat Mitigation and Monitoring Plan
- Noxious Weed Control Plan
- Comprehensive Fencing Plan
- Traffic Control Plan
- Groundwater Reporting and Monitoring Plan
- Spill Prevention, Control, and Countermeasure Plan
- Lighting Mitigation Plan

Two sets of plans and strategies will be developed as needed for the Project. One set that will cover the construction of the Project Footprint, and the other will cover the management of the Conservation Lands.

<u>Enhancement</u>

Although much of the Conservation Lands already support high quality habitat for the T&E Species, there are opportunities to enhance these lands to increase the quality of habitat, thus increasing the carrying capacity for T&E species resulting in a net conservation benefit. For example, *Tamarix* sp., a highly invasive plant species that attacks riparian systems, occurs on portions of the SCRCL. *Tamarix* sp. can actually change the hydrology of riparian systems (lowering the amount of water available to native species) and increase the amount of salt in the system. Within an adaptive management framework through the implementation of the Conservation Management Plan (**Appendix F**), an eradication program will be put in place to remove tamarisk from SCRCL. This will eliminate the further infiltration of tamarisk and will also result in the ability of native plants (such as cottonwoods and willows) to re-establish within the riparian system, thereby increasing the biotic value of this natural resource. In addition, should T&E Species monitoring indicate that feral pig habitat damage is negatively affecting directly or through habitat impacts on the Conservation Lands, the CDFW will be consulted to establish feral pig control measures on candidate Conservation Lands. Any such program will be subject to all take avoidance and minimization measures and any additional measures deemed necessary to adequately protect T&E Species (e.g., timing, general location of activities, etc.).

Some areas along creeks and natural drainages within the conservation areas are experiencing erosion due to heavy grazing, which is adding to the siltation of these features. Through an adaptive management program through the implementation of the Conservation Management Plan (**Appendix F**), grazing ungulates will be strategically kept out of these areas, and when appropriate, native vegetation will be planted to enhance these natural features, increasing the biotic value for local species. In addition, heavy grazing regimes will be altered (e.g. temporary exclusion of livestock) to allow areas that are over-grazed to regenerate through the implementation of the Conservation Management Plan (**Appendix F**). This will increase food supplies and cover for insects, reptiles, birds, and mammals, which will aid in increasing the population of GKR and, in turn, increase the SJKF population.

Due to the number of naturally occurring drainages and swales on the Conservation Lands, there are opportunities to create pools, offering potential breeding habitat for CTS. There is plentiful upland estivation habitat available for CTS throughout the Conservation Lands, and the addition of breeding ponds would increase the potential carrying capacity for the species in the region. Please see **Appendix H**, CTS Mitigation Plan for locations of a potential breeding pond sites. One pond is to be installed on the VRCL in close proximity to the known breeding pond (**Figure 6**). This would create a breeding pond complex and potentially promote genetic diversity through more breeding pond options. Although CTS were not surveyed for on the SCRCL, one option for CTS mitigation will include the installation of a breeding pond on these properties, if future surveys identify CTS on-site. If possible, the pond(s) will be created without impacts to federal or state waters. However, if the pond(s) cannot be built without impacting federal or state waters, all necessary permits will be obtained prior to the construction.

<u>Management</u>

All Conservation Lands are currently grazed with no consideration to maintaining the suitability of the sites for the T&E Species. These species persist in spite of the current grazing regime. Observational data for these species indicate that they generally prefer short grass conditions, with very limited experimental evidence supporting a specific grazing regime (i.e., timing or intensity).

Therefore, the Conservation Management Plan (**Appendix F**) and the Grazing Plan will manage future grazing on the Conservation Lands to benefit T&E Species. The Conservation Management Plan and Grazing Plan will, through conservation goals and objectives, manage the future livestock grazing in accordance with grazing standards and guidelines maintained by the BLM or agency approved habitat management (under a mutual understanding between CDFW and USFWS), as long as they benefit the T&E Species found on the Conservation Lands. The conservation goals and objectives found in the Conservation Management Plan (**Appendix F**) provide direction in habitat management in order to meet conservation goals. BLM grazing standards include erosion control; maintenance of vigorous, diverse native and other desirable plants; stream channel stabilization; and maintenance of state water quality standards. Grazing will be based on an adaptive management strategy that benefits T&E Species and that has been defined as an integrated method for addressing uncertainty in natural resource management (Federal Register 2000; Holling 1978; Walters 1986; Gundersen 1999).

Moderate to heavy stocking rates have been found to benefit all of the T&E Species during appropriate rainfall years (Barry 2011; Germano et al. 2011). The current grazing regime on the SCRCL is moderate to high stocking rates. These stocking rates currently are maintaining habitat required for T&E Species on the SCRCL, as shown by the number and density T&E Species on the property. This grazing regime on SCRCL should continue with some adaptive habitat management as long as it is beneficial for the T&E Species.

3.0 ACTION AREA

For the purpose of this BA, the Action Area will be defined as lands impacted by the Project Footprint (meaning the area within the fenceline of the solar project), as well as all Conservation Lands to be preserved by the Action (**Figure 3**).

3.1 Data Collection/Survey Methods

PVS has completed over 25,000 survey hours for multiple T&E Species, rare plants, wetlands delineation, and hydrological studies of Panoche Creek and Las Aquilas Creek. Surveys have occurred on the Project Footprint, the VFCL, VRCL, and SCRCL. **Table 8** presents a summary of all surveys completed for the Action.

TABLE 8 SURVEYS CONDUCTED FOR THE PROJECT

SURVEY NAME	SURVEY DESCRIPTION	DATES	LANDS SURVEYED	SPECIAL STATUS ANIMAL SPECIES DETECTED
RECONNAISSANCE SURVEYS				
Reconnaissance survey of original 10,000-acre Project site and additional 900-acre Project site with some restricted access at the time of the survey	Reconnaissance survey (walking/driving surveys for potential habitat for special status species)	April 1-3, 2009	Project Footprint and VFCL	Burrowing owl (BUOW), loggerhead shrike, tri-colored blackbird, GKR, SJKF
Reconnaissance surveys	Reconnaissance surveys (walking surveys for special status species)	April-July 2010	VRCL	GKR, SJKF, American badger (AMBA), golden eagle (GOEA)
Non-protocol reconnaissance Brachiopod surveys	A one-day effort to survey for Brachiopods in seven pools	April 14, 2010	Seven off-site ponds on VRCL and private property	VPFS and CTS
Reconnaissance surveys on the Silver Creek Ranch	Reconnaissance surveys (walking surveys for special status species, suitable habitat for these species, and spotlight surveys for SJKF)	August 30 - September 3, 2010	SCRCL	BNLL, loggerhead shrike, Mastiff bat, GKR, SJKF, San Joaquin antelope squirrel (SJAS), AMBA

Survey Name	Survey Description	Dates	Lands Surveyed	Special Status Animal Species Detected
BNLL SURVEYS				
Blunt-nosed Leopard Lizard (BNLL) Abridged Protocol Survey (2009)*	Protocol-level BNLL surveys on 2,560+ acres: 3.5 full-coverage Adult BNLL on Section 15; 8 full-coverage Adult BNLL on Section 10; 5 full-coverage juvenile BNLL surveys on Sections 10 and 15; BNLL surveys on part of Section 9.	Summer 2009 (April 15 – July 31 and August 15 – September 15)	Project Footprint and VFCL	BNLL, San Joaquin coachwhip, GOEA, BUOW, loggerhead shrike, SJAS, GKR, SJKF, AMBA
Blunt-nosed Leopard Lizard Protocol Survey (2010)	Protocol-level BNLL surveys on 640 acres: Full adult and juvenile BNLL surveys on Section 16.	Summer 2010 (April 15 – July 31 and August 15 – September 15)	Project Footprint and VFCL	BNLL, San Joaquin coachwhip, GOEA, loggerhead shrike, GKR, SJKF, AMBA
Blunt-nosed Leopard Lizard Focused Survey (2012)	Focused BNLL surveys on the 10,889-acre Silver Creek Ranch, following time of day and weather protocols, targeting drainages.	Summer 2012 (September 10-17, 2012)	SCRCL	BNLL, GKR, SJAS, SJKF, AMBA, GOEA, BUOW, western pond turtle
Blunt-nosed Leopard Lizard Protocol Survey (2013)	Protocol-level BNLL surveys on the entire Project Footprint and portions of the Valley Floor CL	Spring and Summer 2013	Project Footprint, portions of VFCL	BNLL, GOEA, BUOW, GKR
VERNAL POOL SURVEYS				
Wet Season Protocol-level vernal pool branchiopod surveys	Protocol-level vernal pool branchiopod surveys	Began in December 21, 2009, and continued in 2010 on January 4, 5, 18, and 19; February 1, 2, 16, and 17; March 2, 3, 16, 17, and 30; April 13, 14, 27, and 28; May 11 and 25; and June 7.	Project Footprint, VFCL, and VRCL	VPFS, CTS, and SJAS

SURVEY NAME	SURVEY DESCRIPTION	DATES	LANDS SURVEYED	SPECIAL STATUS ANIMAL SPECIES DETECTED
Dry Season Protocol-level vernal pool branchiopod surveys	Protocol-level vernal pool branchiopod surveys	September 27-30, 2010	Project Footprint, VFCL, and VRCL	VPFS
CTS SURVEYS				
Evaluation of historical breeding ponds identified in 1992 in the CNDDB	Evaluation of suitability of ponds in Section 4 to support CTS, resulting in confirmation of suitable breeding habitat	April 10, 2009	VFCL	
Protocol CTS Larval Sampling I	Protocol CTS Larval Surveys	March 23-26, 2010	Project Footprint, VFCL, and VRCL	CTS
Protocol CTS Larval Sampling II	Protocol CTS Larval Surveys	April 13, 14, and 21, 2010	Project Footprint, VFCL, and VRCL	CTS
Protocol CTS Larval Sampling III	Protocol CTS Larval Surveys	May 21, 2010	Project Footprint, VFCL, and VRCL	CTS
Hydrology and CTS Reconnaissance Survey	Identify locations to construct new CTS ponds	June 28, 2012	VRCL and SCRCL	GKR, SJKF
RARE PLANT SURVEYS				
Rare Plant I (Late Summer/Early Fall)	Protocol-level rare plant surveys on all or portions of Sections 3-5, 7-11, 13-17 of Township 15 South, Range10 East and Sections 18 and 19 of Township 15 South, Range 11 East; 6,200 acres of the original 10,000-acre Project site	August17-19, 24-26; September 14-18, 21-25; and September 30-October 2, 2009	Project Footprint and VFCL	BNLL, GKR, SJKF, AMBA

SURVEY NAME	SURVEY DESCRIPTION	DATES	LANDS SURVEYED	SPECIAL STATUS ANIMAL SPECIES DETECTED
Rare Plant II (Early Spring)	Protocol-level rare plant surveys on all or portions of Sections 3-5, 8-11, 13-16, of Township 15 South, Range 10 East, and Section 19 of Township 15 South, Range 11 East	March 8-April 9, 2010	Project Footprint and VFCL	GKR, SJKF, AMBA
Rare Plant III (Late Spring)	Protocol-level rare plant surveys on all or portions of Sections 3-5, 8-11, 13-16, of Township 15 South, Range 10 East, and Section 19 of Township 15 South, Range 11 East	May 4-June 4, 2010	Project Footprint and VFCL	GKR, SJKF, AMBA
Follow-up Rare Plant Survey	To determine the species of 28 *Blepharizonia* populations that were found to be occurring in pre-flowering phenology during the May-June 2010 transect surveys	July 26-27, 2010		
WETLANDS DELINEATION				
Wetland Delineation (POWER Engineers)	Full wetland delineation of the Project site and Valley Floor CL	October 19-23, 2009	Project Footprint and VFCL	
SJKF SURVEYS				
Scat-sniffing dog	Scat-sniffing dog: describe transects	July 30-August 16, 2010	Project Footprint, VFCL, and VRCL	SJKF
SJKF Scat-dog genetic testing with Smithsonian	Genetic testing of 69 scat samples found during Scat-sniffing dog survey. Yielded 22 individuals on Project site and Conservation Lands.	September 9-15, 2010	Project Footprint, VFCL, and VRCL	SJKF

Survey Name	Survey Description	Dates	Lands Surveyed	Special Status Animal Species Detected
Camera Trapping for San Joaquin Kit Fox	Camera Trapping (with bait) on the 10,889-acre Silver Creek Ranch. 20 camera trap locations *In Progress; 10 stations completed (West half).	Summer/Fall 2012 (September 25-November 5, 2012)	SCRCL	SJKF, AMBA, GKR, BUOW, tricolored blackbird
GOLDEN EAGLE/RAPTOR SURVEY				
Golden Eagle Survey	Golden eagle surveys conducted within a 10-mile radius via helicopter; golden eagles and other raptors were noted.	August 6 & 7, 2010	Helicopter surveys of a 10-mile radius around the Project Footprint and VFCL	GOEA
Golden Eagle Use Survey	USFWS Protocol GOEA surveys on project site and conservation lands	Fall and Winter 2013-2014	Project Footprint, VFCL, SCRCL, VRCL	GOEA
HABITAT SUITABILITY SURVEYS				
Detailed Habitat Mapping	Detailed Habitat Mapping of the Valadeao Ranch	June15-July 1 2010	VRCL	
General Habitat Mapping	General Habitat Mapping of the Silver Creek Ranch	September 3-5, 2010	SCRCL	
Occupancy Sampling	Occupancy sampling (Surveying for special status species within 5-acre plots over 5 survey periods (50 meter radius plots for GKR))	May10-July 27 2010	Project Footprint and VFCL	BNLL, coast horned lizard, San Joaquin coachwhip, GOEA, GKR, SJKF, AMBA
Distance Sampling	Distance sampling (Surveying for burrows and special status species along transects)	Feb 18-March 18, 2010	Project Footprint, VFCL, and VRCL	BNLL, coast horned lizard, mountain plover, GOEA, BUOW, loggerhead shrike, SJAS, GKR, SJKF, AMBA

Survey Name	Survey Description	Dates	Lands Surveyed	Special Status Animal Species Detected
Giant Kangaroo Rat focused surveys	GKR focused surveys (100 50-meter radius plots) on the Silver Creek Ranch in source population polygons identified in Figure 41 of the Recovery Plan (USFWS 1998).	Summer 2012 (September 10-21, 2012)	SCRCL	GKR, SJKF, SJAS, BNLL, GOEA, AMBA
Spotlighting for San Joaquin Kit Fox	Spotlighting on the 10,889-acre Silver Creek Ranch and public roads in the vicinity surrounding the ranch.	Summer/Fall 2012 (September 23-November 5, 2012)	SCRCL	SJKF, AMBA, GKR, BUOW
Giant kangaroo rat distribution surveys	Identified potential and occupied habitat for GKR	February/March 2013	Project Footprint and VFCL, portions of SCRCL and VRCL	GKR, SJKF, GOEA, BUOW, coast horned lizard, mountain plover, SJAS

*Abridged protocol-level BNLL surveys were conducted according to the BNLL survey protocol with the exception of having less replication than the 12 adult and 5 juvenile surveys described in the BNLL survey protocol.

3.2 Environmental Baseline of the Action Area (Project Footprint and Conservation Lands)

The land in the general vicinity of the Action Area has been grazed historically for over 150 years. The earliest nonnative settlers of the San Benito County mountain ranges, foothills and valleys were Mexican citizens. In 1844, Mexican Governor Manuel Micheltorena granted a 22,000 acre tract of land in this region, (but not in the study area for this Project) called "Panoche de San Juan y los Carrisalitos" to Julian Ursua and Pedro Romero. Panoche Valley has always been sparsely inhabited with few buildings. Since the mid-1800s, the land has been used exclusively for cattle, sheep and horse grazing, and associated cultivation of forage crops, primarily alfalfa. According to evidence gleaned from historic maps and aerial photographs of the area dating from throughout the twentieth century, early landowners established clusters of buildings and structures related to their ranching or farming operations. Each cluster (there were less than ten total in the valley) typically had a stand of trees, and may have included residences, barns, sheds, water tanks, wells, shelters, corrals, troughs, and related outbuildings. A number of these clusters of buildings and structures have been demolished over the years, and other clusters of buildings have been destroyed and replaced. Evidence suggests that few, if any, new clusters have formed since the early 1900s.

The Panoche/Silver Creek Watershed is located upstream and west of Mendota, California, and is approximately 50 miles west of Fresno, California (**Figure 1**). The Panoche/Silver Creek Watershed is located in Fresno and San Benito Counties and lies on the western edge of the San Joaquin Valley in the Diablo Range. Soils in the watershed are derived predominantly from marine sediments (sandstones and shales) of the Moreno, Kreyenhagen, and Panoche Formations, and Franciscan Assemblage. These soils support a sparse vegetative cover on most hillsides, with more vegetative cover generally associated with flatter valley floor areas and hillslopes at higher elevations.

The Conservation Lands are surrounded by private cattle ranches and BLM-administered lands. The surrounding land use is primarily cattle ranching and open space. BLM lands are extensive in the Ciervo-Panoche Natural Area surrounding the site. BLM lands almost completely surround the SCRCL to the south, east, and north, and the Valley Floor and VRCL to the east. Areas of Critical Environmental Concern (ACECs), a BLM designation, are also extensive throughout this region.

3.2.1 Biotic Habitats

The Action and Conservation Lands are comprised almost entirely of annual, non-native grasslands used mainly to graze cattle and sheep. Ten biotic habitats were identified for the Action Area (**Table 9**). The habitats were classified as introduced annual grassland, ephedra subshrub/scrub, barrens, saltbush shrublands, juniper woodlands, oak woodlands, wetlands and associated habitats, mechanically disturbed and devegetated, ponds, and vernal pools. To the extent practicable, these habitats are based on the Sawyer and Keeler-Wolf (1995) and Sawyer et al. (2009) vegetation classification schemes. For a full description of these habitat types, please see **Appendix F**, Conservation Management Plan.

TABLE 9 BIOTIC HABITAT ALLIANCES IN THE ACTION AREA

Biotic Habitat Alliances	Project Footprint	Valley Floor Conservation Lands (acres)	Valadeao Ranch Conservation Lands (acres)	Silver Creek Ranch Conservation Lands (acres)	Total
Introduced Annual Grassland	2,460	2,366	6,727	8,314	19,867
Ephedra Shrublands		-	2,705	2,259	4,964
Barrens		-	575	-	575
Saltbush Shrublands		-	476	-	476
Juniper Woodlands		-	68	-	68
Oak woodlands		-	16	-	16
Wetlands and Associated Habitats		-	2.1	233	235.1
Mechanically Disturbed & Devegetated		-	3	-	3
Ponds	1.6	1.6	2.4	-	5.6
Vernal Pools	0.3	2.9	0.2	-	3.4
Wash/Drainage/ Stream	13	88	-	-	101
No Data*	17	65	197	84	363
TOTAL	**2,492**	**2,523**	**10,772**	**10,890**	**26,677**

*No GIS data was available for these acreages

3.2.2 Project Footprint

The Project Footprint consists of the area within the fenceline of the solar facility and is composed of approximately 2,492 acres of introduced annual grassland (**Figure 7**). Historically, the Project Footprint was used for crop production; however, in the past approximately 40 years the site has been used for cattle grazing. The site is surrounded by rangeland and bordered by hills of the Gabilan Range to the west and the Panoche Hills to the east. The topography of the site dips gently down to the east-southeast. The site elevation ranges from approximately 1,200 feet amsl near the southeast end of the site to approximately 1,400 feet amsl near the west end.

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BR
10/15/2013

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Introduced Annual Grassland
- Wash/Drainage/ Seasonal Stream
- No Data
- Vernal Pool
- Stock Pond

N

0 625 1,250 2,500
Feet

Panoche Valley Solar Project

Project Footprint and
Valley Floor Conservation Lands Biotic Habitats

Figure
7

The Action Area experiences a Mediterranean climate with dry hot summers and cool wet winters. However, this region does not experience heavy rainfall. Annual precipitation in the general vicinity of the site ranges from eight to ten inches per year. Approximately 85 percent of precipitation falls between October and March. Temperatures average approximately 80 degrees Fahrenheit (˚F) in the summer and 40˚F in the winter, mid-summer temperatures are often over 100˚F, and winter lows can be close to freezing. Nearly all precipitation infiltrates into the site's soils and flows in creeks and drainages when soil capacity has been reached.

Panoche Creek and Las Aquilas Creek run between portions of the Project Footprint but are contained entirely within the VFCL (**Section 3.2.3**). They are ephemeral creeks that are dry in the summer. Smaller washes and drainages feed these larger creeks. The Project Footprint site supports several seasonally flooded pools and stock ponds, predominantly in the northern portion of the Project Footprint along unnamed washes (**Figure 7**). Habitat for aquatic species and amphibians within the Project Footprint is limited to the few stock ponds and ephemeral pools.

There is no urban development on the Project site or surrounding area. Two ranching communities are located within the Panoche Valley, Panoche and Llanada. Both communities are within two miles of the Project Footprint. The nearest rural community is Firebaugh, approximately 15 miles from the perimeter of the Project Footprint.

Prominent grass species on the Project site include ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis*), foxtail barley (*Hordeum murinum* ssp. *leporinum*), and rat-tail fescue (*Vulpia myuros*). Dominant forbs included broad-leaved filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), shining peppergrass (*Lepidium nitidum var. nitidum*), and vinegarweed (*Tricostema lanceolatum*). Fiddleneck (*Amsinckia menziesii*), devils lettuce (*Amsinckia tessellata*), shepherds purse (*Capsella bursa-pastoris*), turkey mullein (*Eremocarpus setigerus*), and bur clover (*Medicago polymorpha*) were also common, especially along ranch roads. Areas which have not been previously disturbed by grazing or historic cultivation also include a variety of native wildflowers such as blow wives (*Achyrachaena mollis*), blue dicks (*Dichelostemma capitaum*), California gold fields (*Lasthenia californica*), yellow daisy tidy-tips (*Layia platyglossa*), and California creamcups (*Platystemon californicus*).

Reptiles that occur on-site include the BNLL, western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*), coast horned lizard (*Phrynosoma blainvillii*), western whiptail (*Aspidoscelis tigris*), San Joaquin coachwhip (*Masticophis flagellum ruddocki*), Pacific gopher snake (*Pituophis catenifer catenifer*), California king snake (*Lampropeltis getula californiae*), and western rattlesnake (*Crotalus viridis*). Other reptiles that could potentially occur on the Project site include the Gilbert skink (*Eumeces gilberti*), California alligator lizard (*Elgaria multicarinata multicarinata*), and the valley garter snake (*Thamnophis sirtalis fitchi*).

Small mammals that could occur on the Project site include Botta's pocket gopher (*Thomonys bottae*), western harvest mouse (*Reithrodontomys megalotis*), deer mouse (Peromyscus maniculatus), and to a lesser extent the San Joaquin pocket mouse (*Perognathus inornatus*), short-nosed kangaroo rat (*Dipodomys nitratoides brevinasus*), and Tulare grasshopper mouse (*Onychomys torridus tularensis*). The CNDDB does not have any observations of the San Joaquin pocket mouse or short-nosed kangaroo rat within 3.1 miles (5.0 kilometers) of the site, and the most recent and closest observations for the Tulare grasshopper mouse was in 1938, just south of the site. The region and site do support various kangaroo rat species (*Dipodomys* sp.), including the Heermann's kangaroo rat (*D. heermanni*), giant kangaroo rat, and likely Merriam's kangaroo rat (*D. merriami*). Other small mammals observed on-site include the San Joaquin antelope squirrel (*Ammospermophilus nelsoni*) and California ground squirrel (*Otospermophilis beecheyi*). Larger mammals that occur on the Project site include the SJKF (*Vulpes* *macrotis mutica*), coyote (*Canis latrans*), cougar (*Puma concolor*), bobcat (*Lynx rufus*), and American badger (*Taxidea taxus*). Red fox (*Vulpes vulpes*), observed in the vicinity of site, and black-tailed deer (*Odocoileus hemionus columbianaus*) may occasionally occur ons-ite as well.

The abundance of small mammals that occur on the Project site attracts numerous raptor species including turkey vulture (*Cathartes aura*), northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), golden eagle (*Aquila chrysaetos*), American kestrel (*Falco sparverius*), prairie falcon (*Falco mexicanus*), and burrowing owl (*Athene cunicularia*). Other raptors that may use the Project site for foraging include the white-tailed kite (*Elanus leucurcus*), Swainson's hawk (*Buteo swainsoni*), common barn owl (*Tyto alba*) observed in the vicinity of the site, and great horned owl (*Bubo virginianus*) observed in the vicinity of the site. Non-raptor bird species observed on or in the vicinity of the Project site include the cinnamon teal (*Anas cyanoptera*), mountain plover (*Charadrius montanus*), rock dove (*Columbia livia*), mourning dove (*Zenaida macroura*), greater roadrunner (*Geococcyx californicus*), Anna's hummingbird (*Calypte anna*), loggerhead shrike (*Lanius ludoviscianus*), yellow-billed magpie (*Pica nuttalli*), American crow (*Corvus brachyrhynchos*), common raven (*Corvus corax*), California horned lark (*Eremophila alpestris actia*), American pipit (*Anthus rubrescens*), Say's phoebe (*Sayornis saya*), western kingbird (*Tyrannus verticalis*), European starling (*Sturnus vulgaris*), red-winged blackbird (*Agelaius phoeniceus*), tri-colored blackbird (*Agelaius tricolor*), western meadowlark (*Sturnella neglecta*), savannah sparrow (*Passerculus sandwichensis*), and house finch (*Carpodacus mexicanus*).

3.2.3 Project Conservation Lands

Project Conservation Lands include three areas totaling 24,185 acres that would be preserved in perpetuity for the benefit of the listed species discussed in this document as well as many other species of wildlife. A portion of these lands are contiguous with the VFCL that would be preserved, while some are located between the several build out areas in the Project Footprint and would effectively maintain connectivity through the entire Project Footprint. These Conservation Lands are considered a part of the Action, and their preservation in perpetuity is considered part of the Action. The Conservation Lands are described below; the status of federally listed species on these lands is discussed in **Section 4.0;** and the effects associated with the conservation of these lands are discussed in **Section 5.0**.

3.2.3.1 Valadeao Ranch

Figure 8 shows the various habitats within the VRCL.

3.2.3.1.1 Introduced Annual Grassland

The most widespread and dominant species are annual grasses; non-native herbaceous species are distributed more patchily. Species present in the Introduced Annual Grasslands include ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis*), foxtail barley (*Hordeum murinum ssp. leporinum*), and rat-tail fescue (*Vulpia myuros*). Dominant forbs included broad-leaved filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), shining peppergrass (*Lepidium nitidum var. nitidum*), and vinegarweed (*Trichostema lanceolatum*). Fiddleneck (*Amsinckia menziesii*), devils lettuce (*Amsinckia tessellata*), shepherds purse (*Capsella bursa-pastoris*), turkey mullien (*Eremocarpus setigerus*), and bur clover (*Medicago polymorpha*) were also common, especially along ranch roads. Native species that maintain a presence must be generally tolerant of grazing and saline clay-rich soils. Areas which have not been previously disturbed by historic cultivation or been subject to heavy grazing also include a variety of native wildflowers such as blow wives (*Achyrachaena mollis*), blue dicks (*Dichelostemma capitaum*), California gold fields (*Lasthenia californica*), yellow daisy tidy-tips (*Layia platyglossa*), and California creamcups (*Platystemon californicus*).

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Valadeao Ranch Conservation Lands Biotic Habitats

Figure

8

Grasslands dominate the lower slopes and valley bottoms in continuous stands that are interrupted only by a few larger washes. Some grassland patches were entirely comprised of non-native species, though these areas were uncommon. One California Native Plant Society (CNPS) List 4 species, serpentine leptosiphon (*Leptosiphon ambiguous*), was identified in this alliance.

3.2.3.1.2 Ephedra Shrublands

Plant associations that were noted to occur within the Ephedra Shrublands include *Artemisia californica - Senecio flaccidus* scrub, *Eastwoodia elegans - Ephedra californica* scrub, *Ericameria linearifolia - Ephedra californica* scrub, *Ericameria linearifolia - Ericameria nauseosa* scrub, *Ericameria linearifolia - Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Artemisia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Ephedra californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Yucca whipplei* scrub, and *Gutierrezia californica - Ephedra californica* scrub. Ephedra Shrublands occur in Las Aquilas Creek, an arroyo-like wash at the southwestern edge of VRCL, in small patches along ridgelines, steep slopes with a northern aspect, lower slopes, along ephemeral drainages, and steep rocky and thin-soiled south-facing slopes. Most shrub species in this alliance were widespread at low frequencies in areas beyond the extent of the assemblage where it dominates. In the understory layer, introduced annual grasses generally attain overwhelming dominance. The understory assemblage is often sparse, and non-diverse cover is typical of all study area shrublands associations that occupy xeric, steep slopes with southern aspect, although some associations in this alliance had dense understory. Other notable plants found within this alliance included introduced grasses, coyote brush (*Baccharis pilularis*), Silver lupine (*Lupinus albifrons*), narrow leaf milkweed (*Asclepias fascicularis*), Sandberg bluegrass (*Poa secunda*), crinkled onion (*Allium crispum*), white fiestaflower (*Pholistoma membranaceum*), foothill larkspur (*Delphinium hesperium* ssp. *pallescens*), and wild oats (*Avena* sp.) Native perennial species were generally sparse in this alliance. Two CNPS List four plants were observed within this alliance: naked buckwheat (*Eriogonum nudum* var. *indictum*) and Santa Clara thorn mint (*Acanthomintha lanceolata*). The transition zone between the Ephedra alliance of hillsides and the Introduced Annual Grassland alliance typical of lowlands was observed to be extensive and broad.

Other shrubland association canopy dominants are present in this zone at very low frequencies or in small, highly grazed patches. It is likely the position of this transition is maintained by long-standing patterns of range cattle grazing. Mature *E. californica* are apparently among the least palatable shrubs available to cattle, but recruitment of this species was seen only rarely where the populations occupied lowland areas mapped as Introduced Annual Grasslands. In contrast, diversity is much greater (especially among native species) where Introduced Annual Grasslands occupies shrubland canopy gaps on the more remote, upper slopes of the VRCL.

Ephedra shrublands within the VRCL range from nearly pure California ephedra (*E. californica*) stands to highly diverse associations with typical desert shrubs. Occupied habitats occur from lower slopes and valley bottoms to rocky outcrops and alluvial slopes. This 3 to 15 foot tall shrub rarely achieves greater than 10 percent cover (absolute), but the cover provided varies little with soil type, aspect, or grazing pressure. It is generally the only shrub present in the often very broad transition from Ephedra shrublands to Introduced Annual Grasslands.

The Ephedra alliance is more prevalent to the east of Little Panoche Road. There is evidence that it was more widespread on the western face of the Panoche Hills prior to a widespread fire that affected this area within the last decade, leaving many large *E. californica* stumps. Otherwise, all associations that were mapped in this alliance exhibit relatively undisturbed canopy development, have not been recently burned, and due to landscape ruggedness have not received heavy grazing pressure.

3.2.3.1.3 Barrens

Barrens are ridgelines and south or (rarely) west-facing very steep slopes that exhibit a precipitous drop-off in vegetative cover. In terms of vegetation, the assembled species diversity is very low, nearly all species are relatively short-lived annuals, shrubs and trees are absent, and introduced annual grasses become minor components of the species mix. Barrens most commonly interrupt Introduced Annual Grasslands where the transition was often observed to occur over the space of several feet. Barrens that interrupt shrublands alliance vegetation are less common, but were found to support occurrences of rare plant populations more often than any other mapped association. Botanical surveys conducted in the Panoche Valley and Panoche Hills suggest that Barrens habitats, while comparatively lacking in total cover, can support assemblages with greater native character, and can include rare species. Large patches of bare soil were not uncommon within barrens polygons mapped in 2010. Given that barrens are an exclusively annual collection of species, it seems likely that their aerial extent is variable, dependent on local rainfall amounts and the spacing of storm events. In comparatively dry years, it is conceivable that barrens extents could be expressed at up to twice the area mapped in 2010. Aerial photographs dated September 2008 consistently indicate greater barrens extents, especially on the lower western slope of the Panoche Hills immediately above the Panoche Valley Solar Facility.

Two plant associations were identified within the barrens: *Erodium cicutarium* - *Plantago erecta* and *Holocarpha obconica* - *Vulpia macrostachys*. Total cover in barrens rarely exceeds one percent on the VRCL. Members of the relatively sparse barrens assemblage are adapted to some of the harshest habitat available within the study area. Low cover may be resultant at least in part from low soil moisture retention and from erosion and use by rodents. The ridgeline and southern aspects are exposed to intense drying from sun and wind and are very steep. The soil surface appears to be highly eroded, and ground creep is evident. This habitat appears to be attractive to burrowing rodents, whose grazing and digging further affect plant cover. Finally, transitions to barrens are accompanied by a clear change in soil color; barrens can be grouped into "red", "blue-grey", and "white" clay soil types. Adjacent slopes of similar aspect and steepness, but lacking these unusually colored soils support typical (dense and tall) stands of Introduced Annual Grasslands or Ephedra alliance vegetation, suggesting a soil toxicity that may be inherent to the bands of red, blue-grey, and white clays. Plants occurring in barrens on the VRCL include the introduced annual herb *E. cicutarium*, and natives *P. erecta*, *Blepharizonia laxa*, *Monolopia* spp., *Phacelia tanacetifolia*, *Salvia columbariae*, and *Camissonia boothii*. Two CNPS List four species, naked buckwheat (*Eriogonum nudum* var. *indictum*) and benitoa (*Benitoa occidentalis*), and one CNPS List two species, California groundsel (*Senecio aphanactis*) were also identified in this alliance.

3.2.3.1.4 Saltbush Shrubland Alliance

Saltbush Shrubland consists of nearly pure to mixed stands of saltbush (*A. polycarpa*) associations. Occupied habitats range from white clay soils on hills immediately west of Little Panoche Road, to rocky outcrops and alluvial slopes experiencing high ground creep rates near ridgelines east of the road. In all observed occurrences on hills, the aspect of greatest *A. polycarpa* cover is southern. This two to three foot tall shrub also attains dominance within several of the ephemerally flooded washes, where sandier soils are more common. It is always the most common shrub canopy contributor near seasonal springs and seeps that exhibit saline character.

Two associations within this alliance exist on the VRCL: *Atriplex polycarpa* - *Eriogonum fasciculatum* var. *polifolium* and *Atriplex polycarpa* - *Isocoma acradenia* var. *bracteosa*. *Atriplex polycarpa* - *Eriogonum fasciculatum* var. *polifolium* occurs on slopes, appearing as mainly open ground with scattered shrubs. Shrub canopy closure averages five to 10 percent, with scattered clumps of 20 percent closure. Canopy density is greatest on south-facing slopes, where *E. fasciculatum* is often more prevalent, and on slopes that are steep or slippery enough to exclude grazing. The herbaceous layer is largely absent, resembling barrens (described below) that are often present on adjacent slopes of similar aspect. Native character is thus relatively high, and undisturbed habitat (i.e., ungrazed) is available for potentially occurring rare plant species that are associated with saline soil. *Atriplex polycarpa - Isocoma acradenia* var. *bracteosa* occurs in the channel bottoms of ephemerally watered washes and very narrowly along the adjacent slope bases. All channels in which this association occurs also hold one or more ephemeral or seasonal springs that exhibit saline character and exhibit sandy soils that are somewhat atypical of the clay-dominated hill and valley soils of the study area. Shrub canopies are confined to wash edges due to trampling by range cattle, and average cover rarely exceeds 10 percent. The riparian corridor is thus normally rather indistinct in structure relative to the surrounding scrub, but the shift in species is consistent and sharply bounded. It is likely that this association was once and would become more widespread in ephemeral wash habitat in the absence of cattle use. But *A. polycarpa* appears to be highly palatable, and use by livestock in this steep and xeric landscape is concentrated in wash habitats.

3.2.3.1.5 Juniper Woodlands Alliance

Woodlands, including *Juniper woodland*s and *Oak woodland*s (see below), occur only on north-facing slopes of moderate steepness. Rocky outcrops and talus, which are commonly prominent in the study area's shrublands alliances, are absent from woodlands habitat. Finally, the area's woodlands are rather sparsely treed and share a common understory assemblage with shrublands (mainly introduced annual grasses), yet are noticeably devoid of a significant shrub layer.

The ecotones with adjacent shrub associations are often visually distinct, appearing as a sudden loss of the tree canopy. Individual *J. californica* rarely exceed 15 feet in height. Girths of up to 20 inches diameter at breast height suggest that most of the trees in all occurrences have aged enough to be called "mature". The tree population structure, furthermore, appears to be skewed toward older trees, and recruitment was not apparent. It is possible recruitment has been excluded by grazing cattle, as the gentler slopes occupied by this association do not exclude cattle use for grazing and shading. It is apparent from old stumps that trees of narrower girth have been harvested. Both occurrences east of Little Panoche Road were clearly larger in extent prior to harvest, and the older fence posts in these areas appear to be rough juniper.

The Juniper woodlands alliance is not common, totaling only 68 acres of the VRCL. All occurrences are less than 16 acres individually. Two associations within this alliance occur on the VRCL: *Juniperus californica - Ephedra californica* and *Juniperus californica - Ericameria linearifolia*. The *Juniperus californica - Ephedra californica* association occupies middle elevations of north-facing slopes. *J. californicus* canopy cover ranges from 5 to 20 percent. The shrub layer is sparse and is composed of mainly *E. californica*. Subdominant shrubs include *Ericameria linearifolia*, *Gutierrezia californica*, *Eriogonum fasciculatum*, and *Artemisia californica*. The herbaceous layer is never dense. It is composed mainly of introduced annual grasses, the same assemblage as found within the shrublands associations that dominate the surrounding landscape. The contrast in the shrub and herbaceous layers of adjacent shrublands and woodland associations is likely due to the presence of the trees. *J. californicus* patches are the only significant provider of shade across much of the study area, and so are gathering places for range cattle during much or all of the year. As such, trampling and intensified herbivory appear to be important limiting factors for plants that have not reached escape height. Roosting habitat for birds is provided, and evidence was seen of use by other large mammals such as coyote (evidence of deer was not observed anywhere within the study area). It is likely that, in the absence of grazing use, the association would provide habitats for native plant species that require additional shading. The *Juniperus californica - Ericameria linearifolia* association occupies middle to upper elevations of north-facing slopes. On average, canopy closure does not exceed ten percent. Both diversity and abundance of the shrub and understory assemblages are increased noticeably relative to the closely similar *Juniperus californica – Ephedra californica* association. In all occurrences, *E. linearifolia* achieves higher abundance and cover than other shrubs, including *Ephedra californica*. Greater understory development may be related to the higher elevation, along with relatively steep slopes occupied by this association, which would tend to limit use by range cattle.

3.2.3.1.6 Oak Woodlands Alliance

Oak woodlands occupy lower slopes and wash edges with northern aspects. They transition upslope to *Juniper californica* woodlands. The oak woodlands were found in the hills west of Little Panoche Road only. These Oak woodlands can be associated with acorn-processing cultural resource sites. The terrain within the oak woodlands can be very rough. Steeply banked, tree-shaded gullies were observed to support a higher diversity of native annual and perennial herbs than any other habitat available in the woodlands, shrublands, or grasslands associations. This greater diversity likely results from cattle exclusion through rough terrain and fencing. The dependable seasonal shading that is provided by dense canopies of *Q. douglasii* (a winter-deciduous oak) creates additional microhabitats not available elsewhere, and generates considerably greater soil organic matter accumulation. Productivity and nutrient cycling functions, support of diversity (including wildlife), and arrest of ground creep (talus, gullies, and slides are common in shrublands) are enhanced by the presence of trees.

The *Quercus douglasii* - *Juniperus californica* association was the only association in this alliance found on VRCL. This association develops the highest tree canopy cover found within the study area and is starkly evident in the study area's landscape. The association's distribution is limited to two mapped polygons, but each occurrence is relatively large. The occurrence that was mapped at the study area's southwestern corner appears to extend well off-site to the west, and other large examples are visible on Gabilan Range slopes to the west. This woodlands association likely represents the region's most xeric and lowest elevation plant community in which *Q. douglasii* is dominant in this area. One CNPS List four species, Salinas milkvetch (*Astragalus macrodon*), was identified in this alliance.

3.2.3.1.7 Wetlands and Associated Habitats

Many wetland types occur on the VRCL; however, most hold water during only part of the year. Wetlands and associated habitats includes: ephemeral spring or seasonal springs, perennial springs, seasonal streams, washes, drainages, three associations: *Salix laevigata* - *Sambucus nigra* on perennial springs and *Distichlis spicata* and *Distichlis spicata* - *Isocoma menziesii* var. *vernoniodes* on ephemeral/seasonal springs, and riparian habitats consisting of three associations: *Populus fremontii* forest, zonal riparian, and *Tamarix* semi-natural shrublands.

The VRCL support ephemeral and seasonal seeps and springs, including the *Distichlis spicata* and *Distichlis spicata* - *Frankenia salina* associations. Ephemeral Springs and Seasonal Springs occurrences are embedded within or adjacent to occurrences of the *Atriplex polycarpa* - *Isocoma acradenia* var. *bracteosa* association, at ephemeral and seasonal seeps and springs. Dominants occur patchily and sometimes very densely. All occurrences are associated with drying soils (wet just beneath the surface in June) and a moderate to strong development of an evaporative saline soil crust. *A. polycarpa* growing in this association are invariably stunted by the habitat or by regular cattle browsing. Seasonally wet habitats are otherwise rare in the study area. It is certain that native species diversity is enhanced and maintained within these polygons. Species such as *Mimulus guttatus*, *Spergularia marina*, and *Sueada moquinii* were found in this limited association and not elsewhere within the study area.

The VRCL also support perennial springs and the *Salix laevigata* – *Sambucus nigra* association. Three perennial springs intersect the study area near or at its far western edge. All occur in steep, rocky channels at an elevation of about 1,300 feet. Alignment of these springs and of the less persistent seeps in this area suggests fault control of flows. Given the active seismic environment, it is likely expressions of this association are not long-lived in the study area. This hypothesis would be supported by the observations of shrub dominance and general lack of older trees at study area perennial springs. For example, larger willows (*Salix laevigata*) and trees such as Fremont poplar (*Populus fremontii*) that occur at area streams are absent. Native perennial and shrub diversity, however, is greatly enhanced at these features. Cover is multi-layered and approaches 100 percent, providing excellent habitat for wildlife that rely on the surface water. Detailed or focused rare plant surveys and rare wildlife surveys, if implemented, should include these springs (and the widely scattered ephemeral and seasonal spring and seep features of the study area) as important locations for sampling and searching.

3.2.3.1.8 Constructed Ponds/Vernal Pools

There are several constructed ponds and vernal pools on the VRCL to capture occasional brief flows. These areas are typically located in the hills associated with this area and collect ephemeral and/or seasonal flows. The vernal pools located on the VRCL are shown on **Figure 8**.

3.2.3.2 Silver Creek Ranch

Several plant associations discussed below have already been discussed in greater detail above (e.g. Introduced Annual Grasslands). For those associations, please refer to **Section 3.2.3.1** for detailed descriptions. The descriptions below will be limited to the distribution and unique character of those associations within the SCRCL. **Figure 9** shows the habitats associated with the SCRCL.

3.2.3.2.1 Introduced Annual Grasslands

Grasslands on the SCRCL occur primarily on the lower slopes of the Griswold and Panoche Hills and valley bottoms and are largely composed of non-native annuals. Grassy cover was seldom observed to exceed 20 percent, giving the area a sparsely vegetated, somewhat desert-like appearance. In low precipitation years, much of the area classified as Grasslands may appear to be relatively barren of plants.

3.2.3.2.2 Ephedra Shrublands

Plant associations that were noted to occur within the Ephedra Shrublands include *Eriogonum fasciculatum – Ephedra californica* scrub, *Eastwoodia elegans – Ephedra californica* scrub, *Gutierrezia californica – Ephedra californica* scrub, *Ericameria linearifolia – Ephedra californica* scrub, and *Eriogonum fasciculatum – Hesperoyucca whipplei* scrub. Typically, the upland shrub assemblage at the SCRCL is neither dense nor diverse. Total shrub canopy cover exceeds five percent only in patch-scale stands. The most evenly and widely distributed species, *Ephedra californica*, also forms often expansive, monospecific overstories of less than two percent absolute shrub cover, which were classified within the area mapped as Grasslands.

3.2.3.2.3 Barrens

Areas classifiable as true “Barrens” are commonly embedded within Grasslands on south-facing aspects and on ridge areas, in both the Griswold and Panoche Hills. In relatively dry years, Barrens supporting less than one percent total cover may be expressed across as much as 30 percent of the area mapped as Grasslands on the SCRCL.

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BR
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Legend

- Silver Creek Ranch Conservation Lands
- Introduced Annual Grassland
- Wetlands and Associated Habitats
- Ephedra Shrublands
- No Data

N

0 625 1,250 2,500
Feet

Panoche Valley Solar Project

Silver Creek Ranch Conservation Lands
Biotic Habitats

Figure
9

3.2.3.2.4 Wetlands and Associated Habitats

Stands associated with seasonally or perennially moist substrates, including seeps and springs, appear to be very rare and unevenly distributed within the area. Riparian habitats occur along the Panoche and Silver Creeks. It should be noted that the SCRCL were not surveyed during the wet season; therefore, seasonal seeps and vernal pools on-site may not have been identified during the reconnaissance surveys.

Habitats at springs and seeps would typically support plant species that are dependent on a reliable availability of shallow groundwater to survive the annual drought (May-October), and the vegetation extent would be expected to narrowly adhere to the wetted zone. Plant associations adjacent to these resources, however, would also be subject to heavy grazing and trampling, given the historical and ongoing use of SCRCL for raising livestock. No flowing springs were found in an upland setting during the September survey. Evidence of seep zones that provide ephemeral flows and sustained root zone moisture in an upland setting were found only within one relatively deeply incised canyon near the southern survey edge. At the floor of this canyon, a small area of well-developed episalic crust was found at a clear shift from Shrublands to dominance by saltgrass (*Distichlis spicata*). Although not all incised features could be viewed in the available time, areas outside the Silver Creek and Panoche Creek riparian zones appeared to convey little runoff during the 2010 wet season.

Silver Creek riparian vegetation, where it briefly intersects the SCRCL, indicates a seasonally wet, somewhat saline habitat subject to annual or occasional energetic flows. The riparian corridor has become dominated by invasive tamarisk (*Tamarix* sp.) and is classified as Tamarix Semi-Natural Shrubland. Tamarisk has developed semi-open to impassable stands in a 30 to 100 foot wide corridor. The population extends well off-site both upstream and downstream. In this area, saltgrass appears to be the native species most tolerant of the soil salination and groundwater drawdown effects of heavy tamarisk infestation and often forms meadow-like swards between the tamarisk thickets.

Panoche Creek is gaining reach as it crosses through the SCRCL. The streambed upstream off the site for at least three miles was observed to be completely dry and largely devoid of plants. Within the surveyed area, this arroyo-like habitat quickly transitions to zonal wetlands characterized by gaseous springs, highly reduced soils, and marsh or meadow vegetation. The Panoche Creek riparian zone, which ranges from 100 feet to 500 feet in width, may provide the only reliable, naturally occurring surface water for much of the year. The dominant plants are consistently arrayed, with vegetation classified as emergent *Typha* marsh (Typha Herbaceous Alliance) centrally, and *Schoenoplectus americanus* mid-marsh (Schoenoplectus americanus Herbaceous Alliance) at the outer saturated edge, and *Distichlis spicata* meadow (Distichlis spicata Herbaceous Alliance) extending across the moistened to seasonally drying soils at the riparian edge. All riparian zonal alliances within the survey area are patchy, with one or two species at most attaining dominance. Co-occurring with species such as *Frankenia salina* and *Juncus mexicanus*, dominants in these three alliances indicate a somewhat saline and possibly alkaline soil and shallow groundwater environment. Trees are largely absent, as are species adapted to a floating or submerged habitat. A marsh environment that had developed in response to springs with excellent water quality would be expected to support a more diverse assemblage within each alliance, even with pressure from livestock use.

The small area of riparian woodland located south of Panoche Road is, like the *Distichlis* meadow, confined to the first terrace outside the saturated zone. The woodland canopy, classified as a degraded *Populus fremontii* Forest Alliance, reaches about 30 percent closure and includes a significant presence of red willow (*Salix laevigata*) where it is most dense. The stand currently exhibits many mature and dead trees, but essentially no recruitment and no understory due to intense livestock use. It is possible that this occurrence, and the marsh and meadow vegetation associated with the Panoche Creek riparian corridor on the SCRCL, are dependent upon annual inputs of relatively fresh water that originate in the upper

Griswold Creek and Panoche Creek drainages and serve to flush salts and toxins that accumulate in the topsoil and the plants as evapotranspiration consumes the perennial spring flows.

3.2.3.2.5 Constructed Ponds

Ponds constructed to capture any brief flows that do occur such as the ponds located throughout the hills and valleys on the VFCL and the VRCL were largely absent from drainages on the SCRCL; two constructed ponds were identified on the SCRCL. Rather, constructed water tanks and troughs for livestock are more common on the SCRCL, as the area appears to be largely devoid of naturally occurring, fresh surface water during the normal dry season.

3.2.3.2.6 Vernal Pools

Reconnaissance surveys on the SCRCL did not locate any vernal pools, however, these surveys were made during the dry season.

3.2.3.3 Valley Floor Conservation Lands

The VFCL are contiguous with the Project site and are primarily non-native annual grassland habitat with some seasonal ponds and vernal and ephemeral pools, as well as seasonally dry Panoche and Los Aquilas Creeks. The VFCL include the entire 100-year floodplain within the Project boundary on the valley floor. **Figure 7** shows the habitats associated with the VFCL.

4.0 SPECIES ACCOUNTS

An overview of species listing status, ecology, and local distribution is included below for the nine species included in this analysis. Information is based on available literature (peer reviewed as well as technical reports), recovery plans, data from nearby and/or similar projects and online databases such as NatureServe. Local species distributions include population information where available, and results of a search of the CNDDB for the United States Geological Survey (USGS) quads which encompass the Project Footprint, as well as all surrounding quads. No lands within the Panoche Valley, including the Project Footprint, have been designated or proposed Critical Habitat for any species listed under the ESA.

4.1 Giant Kangaroo Rat

<u>Legal Status</u>

The GKR is currently listed as endangered under the ESA. The GKR was proposed for listing on August 13, 1985 (50 FR 32585 32587) and finalized on January 5, 1987 (52 FR 283 288). No critical habitat has been established for the GKR. The species does not have its own recovery plan, but is included in the *Recovery Plan of Upland Species of San Joaquin Valley, CA* (USFWS 1998).

<u>Species Ecology</u>

The GKR is a very large, brownish kangaroo rat with a light brown tail tip. Adult male GKR can weigh up to 157 grams, nearly double the weight of other coexisting kangaroo rats (Grinnell 1932), and can have total length of 31.1 centimeters (cm). Another way to distinguish the GKR from other coexisting kangaroo rat species is the number of toes on the hind foot. The hind feet of adult GKR each have five toes and are longer than 4.7 cm (Best 1993).

Historically, GKR was known to occur over vast stretches of the western San Joaquin Valley, Carrizo Plain, and Cuyama Valley; as well as scattered colonies on steeper slopes and ridge tops in the Ciervo, Kettleman, Tumey, and Panoche Hills, and in the Panoche Valley (Grinnell 1932, Shaw 1934, Hawbecker 1944, USFWS 1998). The Panoche Region in western Fresno and eastern San Benito Counties is currently identified as one of the six major geographical units for remaining GKR populations. The remaining five major geographical units are Kettlemen Hills in Kings County, San Juan Creek Valley in San Luis Obispo County, western Kern County in the area of the Lokern, Elk Hills, and other uplands, Carrizo Plain Natural Area in eastern San Luis Obispo County, and Cuyama Valley in Santa Barbara and San Luis Obispo Counties (USFWS 1998).

The GKR is primarily a seed-eater, but occasionally consumes green plants and insects. Foraging takes place year round in all types of weather from around sunset to near sunrise, and most activity takes place within two hours of sunset. Ripening heads of grasses and forbs are cut off and placed in small surface pits in full sun located near the GKR's burrow system. After a period of time the seeds are moved into storage underground for consumption at a later date. The purpose of curing the seeds is to prevent mold growth after the seeds are moved below ground (Shaw 1934). Full sun exposure is important to ensure that seeds are fully cured. Largeleaf filaree (*Erodium macrophyllum*) and shining peppergrass (*Lepidium nitidum*) are two important seed producers utilized by GKR. Peppergrass species ripen earlier in the year and may be one of the more important seed sources for GKR (Williams et al. 1993). The ability to transport large quantities of seeds in cheek pouches, coupled with the highly developed seed curing and caching behaviors, probably allows GKR to endure prolonged droughts of one or two years without major regional population effects (Williams et al. 1993).

GKR live in burrow systems referred to as precincts, which is the most intensely used portion of the home range. Precincts consist of one to five separate burrow openings within one to eight meters of one another. A typical precinct has three burrows that are independent of one another and not interconnected (Williams and Kilburn 1991). Grinnell (1932) and Shaw (1934) found that precincts are occupied by a single animal. Precincts of individuals are arranged in colonies with other precincts, and colonies are generally separated by several hundred meters (Williams and Kilburn 1991). Precincts are easily spotted in spring due to the denser, lush vegetation compared to the intervening areas. Plants on a precinct are the first to turn green after autumn rains and the last to ripen and turn brown in the spring (Grinnell 1932, USFWS 1998). Population density can be estimated by counting precincts within a colony. Grinnell (1932) found that colonies contained between 18 and 69 precincts, with a mean of 52 individuals per hectare.

Female GKR have displayed an adaptable reproductive pattern that reflects surrounding population densities and food availability. During times of high density females have a short reproductive season during the winter (December to April). However, in times of low population densities females may continue to breed well into the summer (December to September; USFWS 1998). This ability to extend the breeding season can possibly lead to population irruptions during favorable climatic conditions. Populations in the northern reaches of the GKR range went from an estimated 2,000 individuals in 1980 – 1985, to an estimated 37,125 individuals in 1992 – 1993, following the end of a prolonged drought (Williams et al. 1995). During the post-drought January – May breeding season 44% of counted litters contained two young, one female had a litter of three, and the remaining 39% had a litter of one.

Young begin to disperse at approximately 11 – 12 weeks after birth. However, young may remain in their natal precinct in times of high population densities. The young may remain until the opportunity to disperse arises or they are driven off by their mother. Young often disperse into existing burrows of other adults that have died or moved to another location.

The GKR population is divided into two main sections. The northern population section is comprised of sub-populations in the Panoche Region, which include the Tumey Hills, Ciervo Hills, Monocline Ridge, Panoche Hills, and Panoche Valley sub-populations (Loew et al. 2005, USFWS 1998). Connectivity and genetic flow between these sup-populations is key to maintaining genetic diversity in GKR throughout the northern populations. Loew et al. (2005) used microsatellite DNA loci to analyze the amount of gene flow taking place between the northern sub-populations using samples from the various Tumey Hills, Ciervo Hills, Monocline Ridge, and Panoche Valley colonies. Results of these analyses suggested current or relatively recent connectivity between sub-populations in the northern population section (Loew et al. 2005). Results suggested that colonies in the Tumey Hills and Monocline Ridge sub-populations had recent connectivity, most likely via a corridor along Panoche Creek after its confluence with Silver Creek. Results also suggested that colonies in the Ciervo Ridge and Tumey Hills populations had been connected with the Panoche Valley population via long distance migrants or the use of smaller stepping-stone populations (Loew et al. 2005). Panoche Valley appears to be at the northwestern extent of the GKR subpopulations (USFWS 1998).

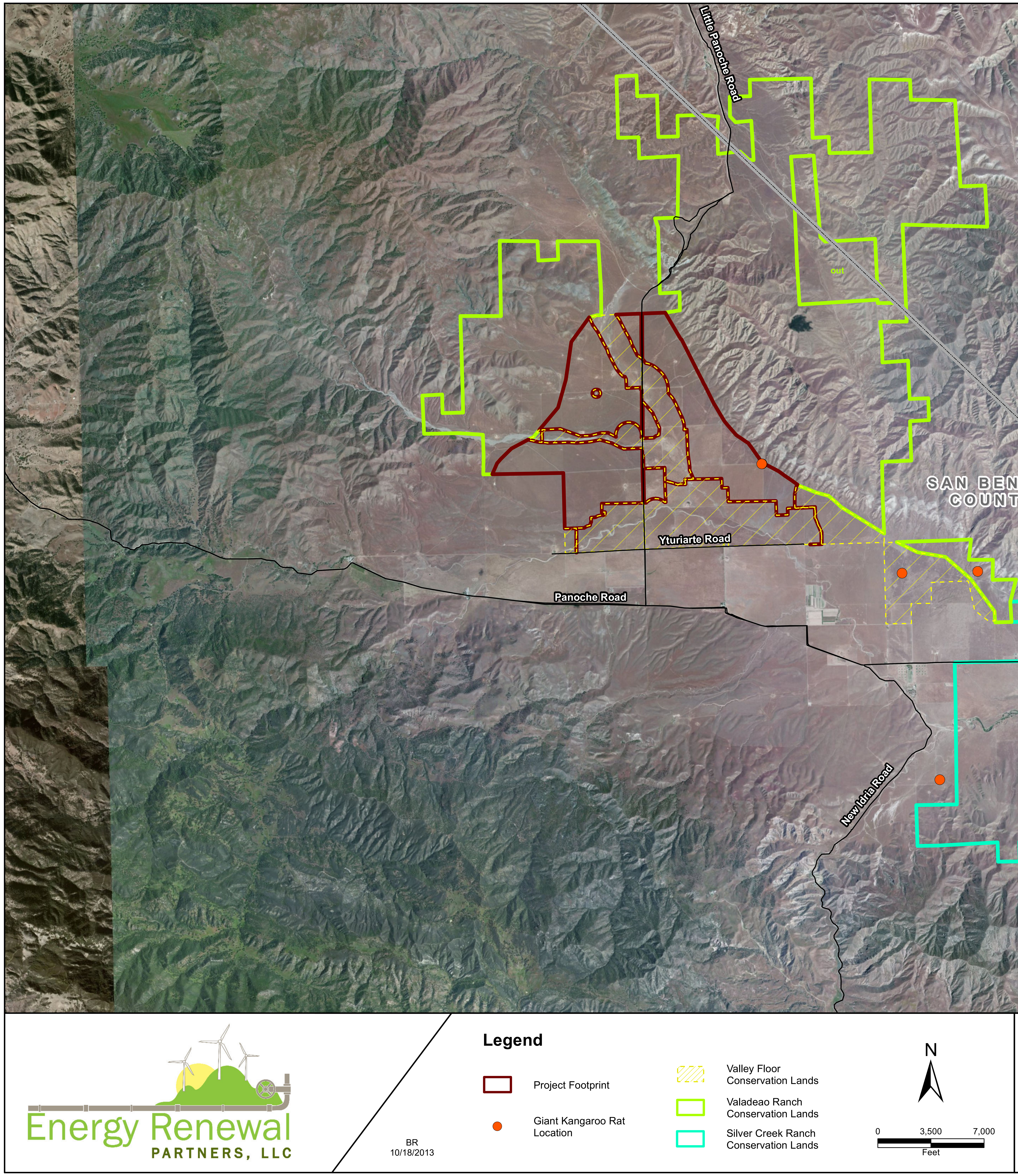
GKR often fall prey to numerous predators, including great horned owl, burrowing owl, short-eared owl, coyote, SJKF, and American badger. Snakes that might prey on GKR include coachwhip, gopher snake, common king snake, and western rattlesnake. When abundant, GKR out-compete other rodents within the colony and are the only rodent present (Grinnell 1932).

<u>Local Distribution</u>

GKR are known to occur within the Action Area. The CNDDB has records of the GKR occurring in Chounet Ranch (1958), Idria (1979), Mercey Hot Springs (1992), Monocline Ridge (1992), Panoche

(2004), and Tumey Hills (2006) USGS quads (**Figure 10**). The years in parenthesis represent the most recent CNDDB documented occurrence in each quad. According to the Recovery Plan (Figure 41 in USFWS 1998) and five-year Review (USFWS 2010a), the total GKR source population area in the Panoche Valley consist of 2,288.4 acres. The SCRCL support 90.3 percent (2,065.8 acres) of the source population area defined in the Recovery Plan and 5-year Review.

A thorough literature review revealed estimates of GKR density ranging from <1 to 271.7 per acre. The Panoche Valley population is likely to fall well within the lower half of this range (e.g., Williams (1992) estimated 0.82 per acre for the Panoche Valley). Most GKR research and studies to date have occurred in the southern portion of the range; however, three papers presented population density estimates for the northern portion of their range in the vicinity of the Project site (Grinnel 1932; Williams 1992; and Williams et al. 1995). All three papers presented densities estimated in above average precipitation years; therefore, it can be assumed that the population estimates presented in these papers are on the high end of real population densities that may occur in normal years. Williams et al.'s (1995) survey took place during a boom in the rodent population in response to precipitatio, and estimated an area with the population of 79 colonies. He estimated both area and colony size for several colonies on BLM land near the VRCL and on the SCRCL. **Table 10** summarizes the results of these studies as they pertain to the vicinity of the Project area.



Panoche Valley Solar Project

CNDDB Giant Kangaroo Rat Records

Figure 10

TABLE 10 HISTORIC GKR DENSITY ESTIMATES REPORTED IN THE LITERATURE

LOCATION	ESTIMATED DENSITY (#GKR/ACRE)	ESTIMATED DENSITY (#GKR/HECTARE)	SURVEY PERIOD	PUBLICATION	ADDITIONAL INFORMATION
Panoche Valley region	0.82 to 21.04	0.33 to 8.51	July 1979 to October 1987 *Note: Above avg. precipitation*	Williams (1992)	2 in 6 hectares
Panoche Creek	3.64	1.47	1986 *Note: Above avg. precipitation*	Williams (1992)	
Panoche Fan	21.04	8.52	1932 *Note: Above average precipitation*	Williams (1992)	
Panoche Hills	2.43	0.98	1981 *Note: Above avg. precipitation*	Williams (1992)	
Panoche Valley	0.82	0.33	1979 *Note: Above average precipitation*	Williams (1992)	
Tumey Hills	2.83	1.15	1981 *Note: Above avg. precipitation*	Williams (1992)	
Near Valadeao Ranch	5.93 and 7.90	2.4 and 3.2	Summer of 1992 *Note: Above avg. precipitation*	Williams et al. (1995)	
On Silver Creek Ranch	2.25 to 36.33	0.91 to 14.71	Summer of 1992 *Note: Above avg. precipitation*	Williams et al. (1995)	
On Silver Creek Ranch	2.26 to 36.35 With an average of 11.99	0.91 to 14.72 With an average of 4.85	Summer of 1992 *Note: Above avg. precipitation*	Williams et al. (1995)	10 colonies were located #28-37; however, population estimates were not calculated for #28.
VFCL and adjacent private land.	No estimate	No estimate	Summer of 1992 *Note: Above avg. precipitation*	Williams et al. (1995)	No population estimate was made for colony #5.

LOCATION	ESTIMATED DENSITY (#GKR/ACRE)	ESTIMATED DENSITY (#GKR/HECTARE)	SURVEY PERIOD	PUBLICATION	ADDITIONAL INFORMATION
Elkhorn Plain Ecological Reserve†	26.9 to 136.8	10.9 to 55.4	5 years	Williams and Germano (1992)	
San Luis Obispo County*	37 to 271.7	15 to 110	7.5 years	Williams and Germano (1994)	Changes in density on 2 study plots.
Carrizo Plain	10	4.05		Braun (1985)	
Overall GKR Density	1 to 44	1 to 110	-	Recovery Plan (1998)	
Panoche Fan along Panoche Creek approx. 5.5 miles to the northeast of Silver Creek Ranch	16, 20, and 28 With an average of 21	6.48, 8.10, and 11.34 With an average of 8.50	February 1932 *Note: Above avg. precipitation*	Grinnell (1932)	For 3 separate acres

*These studies took place in the southern portion of the GKR range, and the Recovery Plan (1998) states that the Elkhorn Plain typically has much higher density estimates than other populations, suggesting that northern populations may exist in much lower densities.

Status On-Site

Reconnaissance surveys conducted in April 2009 found evidence of GKR precincts and scat throughout the Action Area. Multiple focused biological surveys performed in the Action Area between 2009 and 2013 (total of over 25,000 survey hours) have documented the presence of GKR in multiple locations. These surveys included protocol-level rare plant surveys, abridged 2009 protocol-level BNLL surveys, 2010 full-protocol-level BNLL surveys, distance sampling, occupancy sampling, and 100 percent coverage surveys specific to GKR for the purpose of documenting distribution of precincts in 2013.

Distance Sampling

A quantitative distance sampling effort was initiated in February and March 2010 to compare the density of GKR burrowing clusters on the Project Footprint and the VFCL and VRCL. The density estimate for the Project Footprint was 21.27 burrow clusters per kilometer^2 (km), while estimates for the VFCL and the VRCL (combined into a single stratum) were 36.74 burrow clusters per km^2.

Habitat Suitability Model

A patch-occupancy sampling effort was implemented that integrated a set of predictor variables (habitat characteristics) for the objective of deriving patterns of distribution for the GKR in the Action Area and in the Panoche Valley region. This sampling effort was based on repeated sampling (five repeated visits per sample location) for the presence or absence of GKR precincts at 135 sampling locations within the Project Footprint and the VFCL, each comprised of a circle with a 50 meter radius and an area of approximately 1.9 acres. Models were developed to predict the probability of GKR precinct occurrence as a function of landscape-scale habitat variables. A spatially explicit predictive model of GKR occurrence was then derived by the use of a multiple-logistic regression and an information-theoretic approach (**Appendices B and C**). This statistical approach provides for a robust prediction of GKR habitat suitability.

The habitat suitability model (HSM) derived for GKR provided estimates of occurrence based on the underlying habitat predictor variable. Therefore, statistical inferences as to the relative importance (high, moderate, and low) of the habitat for GKR can lead to identifying lands important for conservation. This is critical for a species whose population can increase or decrease by 6.6 times in the span of a few years (Williams et al. 1995). The portion of the source population area previously defined by Williams et al. (1995) and shown in Figure 41 of the Recovery Plan (1998), is entirely categorized as highly suitable GKR habitat per the HSM (**Figures 11 and 12**).

Average densities were calculated for distance sampling transects in high and moderately suitable habitat per the HSM (**Table 11**).

TABLE 11 ESTIMATED GKR DENSITIES IN THE PROJECT FOOTPRINT

HABITAT SUITABILITY	AVERAGE DENSITY OF GKR ON THE PROJECT FOOTPRINT AND VALLEY FLOOR CL (GKR/ACRE)	SOURCE FOR DENSITY ESTIMATES
High	1.56	Average density of GKR precincts for transects in highly suitable habitat on the Project Footprint and Valley Floor CL
Moderate	0.31	Average density of GKR precincts for transects in moderately suitable habitat on the Project Footprint and Valley Floor CL
Low	Count of 15	Adjusted number per the count of GKR precincts observed in habitat of low-suitability during transect surveys on the Project Footprint and Valley Floor CL

Based on the HSM, the VRCL support GKR in similar densities as the Project Footprint; these lands support small colonies, including hilltop colonies, and lack large colonies of GKR. The SCRCL support GKR in much higher numbers and densities than the Project Footprint and includes large areas defined in Figure 41 of the Recovery Plan (USFWS 1998) as source populations for the Panoche Valley. A habitat suitability map for GKR on the Valley Floor Conservation Land was derived, resulting in approximately 6,906 acres of suitable habitat.

Source Population Surveys

The GKR source populations on the SCRCL were surveyed in September of 2012 (**Appendix C**). The source populations were originally mapped by Williams et al. (1995). One hundred 50-meter (m) radius plots were surveyed for GKR and active precincts on the Silver Creek Ranch. GKR presence was verified by the presence of presumed scat (larger than 7 millimeters (mm)) and footprints (larger than 47mm) and further verified by the presence of surface pit caches as well as suitable burrows. Active precincts were identified by the presence of scat, footprints, tail drags and surface pit caches. Ninety-nine of the 100 plots surveyed supported GKR. Average density for these plots was 25.66 GKR precincts per plot, with

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BR
10/18/2013

Legend

- Project Footprint
- HIgh Suitability
- Low Suitability
- Valley Floor Conservation Lands
- Moderate Suitability
- No Data

N

0 625 1,250 2,500
Feet

Panoche Valley Solar Project

Giant Kangaroo Rat Habitat Suitability

Figure 11

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PARTNERS, LLC

BR
11/1/2013

Legend

Project Footprint
High Suitability
Low Suitability
Valley Floor Conservation Lands
Moderate Suitability
No Data
GKR Core Populations
2009-2010 GKR Precincts

N

0 625 1,250 2,500
Feet

Panoche Valley Solar Project

Giant Kangaroo Rat Observations and Habitat Suitability Model

Figure
12

an average of 13.23 per acre. As population densities of GKR on the Silver Creek Ranch within the source population polygons are high, and the suitable habitat of Silver Creek Ranch outside of these polygons is moderate, the average density for GKR plots on the Silver Creek Ranch was used for the source population areas. That density estimate was reduced (proportionally to reductions on the Project site and VFCL form high to moderate) to an estimate of 2.63 GKR per acre for the suitable habitat outside of the source populations. These density estimates were used to estimate a population of up to 44,871 individual GKR (**Table 12**).

TABLE 12 ESTIMATED NUMBER OF GKR ON VALADEAO RANCH AND SILVER CREEK RANCH CONSERVATION LANDS*

MITIGATION SITE	AVERAGE DENSITY OF GKR (GKR/ACRE)	GKR HABITAT (ACRES)	ESTIMATED NUMBER OF INDIVIDUALS	SOURCE FOR DENSITY ESTIMATES
Total Valadeao Ranch CL	**0.31**	**6,830**	**2,137**	**Average density of GKR precincts for transects in moderately suitable habitat on the Project site and Valley Floor CL**
Silver Creek Ranch CL† (High Suitability)	13.23	2,441	32,294	Average density of GKR precincts for 100 50-meter plots focused in source population polygons identified in the Recovery Plan (USFWS 1998) on the Silver Creek Ranch CL
Silver Creek Ranch CL† (Moderate Suitability)	2.63	4,782.3	12,577	Average density of GKR precincts for 100 50-meter plots focused in source population polygons identified in the Recovery Plan (USFWS 1998) on the Silver Creek Ranch CL reduced proportional to reductions in estimates on the Project site and Valley Floor CLs.
Silver Creek Ranch CL (Total)		**7,223.3**	**44,871**	**The total of the two rows above.**

*Based on empirical data collected in 2009, 2010 and Historical Data. 1992-1995 (Williams et al. 1995), 2009 and 2010 appeared to be relatively good for GKR. Population densities can be 6.6 times lower in poor years.
†Based on empirical data collected in 2012 on the Silver Creek Ranch Conservation Lands within source population polygons previously defined and previously identified in Figure 41 of the Recovery Plan (USFWS 1998).

GKR Distribution Surveys

Based on feedback and concerns expressed by the CDFW and the USFWS, a 100 percent coverage survey of the project area for GKR was conducted and a systematic stratified sampling effort was completed on the Conservation Lands in February and March 2013. Follow-up surveys on the Project Footprint were conducted from July 13 to July 15, 2013, to verify and/or update the status of inactive sites. The survey methodology that was implemented was approved by CDFW and was provided to USFWS prior to start of the survey.

Field surveys used a grid sampling system whereby 30m x 30m grid squares were evaluated for the presence of GKR sign. Grid squares were arranged along north-south running parallel transects. Surveyors visually inspected each grid square for evidence of GKR precincts. Burrow precincts were considered occupied based on presence of scat, tracks, tail-drags, pit caches, fresh excavations, and cropped vegetation around a series of suitably sized horizontal and vertical burrow openings.

Precincts that did not appear to be occupied were also identified and mapped as inactive. Precincts were considered unoccupied when characteristic horizontal and vertical burrow openings and the surrounding area are devoid of all sign (fresh scat, tracks, fresh digging, and cropped vegetation). Evidence of other congeneric species was also noted and recorded as “other kangaroo rat”.

Within the project area and Valley Floor Conservation Land, the surveyed grid accounted for 100 percent coverage plus a 500-foot buffer (in areas where landowner access was granted). The SCRCL and VRCL were surveyed using the same methodology described above but with wider transects. No buffers were surveyed for the conservation lands since surveyors did not have landowner access outside these areas. Transects were systematically distributed across the project area and included areas previously identified as high and low suitability habitats in past studies. The SCRCL and VRCL surveys were designed to cover approximately 20-30 percent of the Conservation Lands; therefore, transect spacing was approximately 148 meters.

A total of 48,446 survey grid cells were evaluated for GKR presence; 9,430 grid cells were not evaluated due to lack of landowner access, terrain that was too steep to be safely accessed, presence of bulls or other reasons precluding surveyors from entering the grid cell, or data equipment error. These areas are combined within the cells that are highlighted as “No Data”.

Of the 16,775 total survey grid cells located within the project footprint and the 500-foot buffer study area, approximately 13,825 survey grid cells were able to be evaluated (11,858 within the project area boundaries and 1,967 within the 500-foot buffer). A total of 296 of these grid cells were observed to be active at the time of the survey (1.8% of evaluated cells). A total of 197 cells within the project footprint are considered active (1.7% of evaluated cells in the project footprint), while 99 cells within the 500-foot buffer were considered to be active (0.5% of evaluated cells in 500 foot buffer). The remaining 2,950 grid cells were not evaluated primarily due to lack of landowner access. These areas are combined within the cells that are noted as “No Data”. **Table 13** describes the results of the GKR survey and **Figure 13** depicts the results of the GKR survey on the project footprint.

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BR
10/16/2013

Legend

Project Footprint

Valley Floor Conservation Lands

No Data

No Activity

GKR Evidence, Active

GKR Evidence, Inactive

Relict GKR Sign Present

N

0 1,250 2,500
Feet

Panoche Valley Solar Project

2013 Giant Kangaroo Rat Observations - Project Footprint

Figure 13

TABLE 13 GKR SURVEY RESULTS WITHIN THE PROJECT AREA

	GKR Grid Cell Status					
	Active	**Inactive**	**No GKR**	**Relict GKR**	**No Data**	**TOTAL**
Project Footprint	197	88	11,572	1	99*	11,957
500-foot Buffer	99	183	1,685	0	2,851	4,818
TOTAL	**296**	**271**	**13,257**	**1**	**2,950**	**16,775**

*No data areas in the project footprint were located along fenceline locations along the 500-foot buffer and VFCL. None are wholly within the project area. The entire Project Footprint area was surveyed during the GKR survey.

Of the 11,190 total survey grid cells located within the Valley Floor Conservation Land study area, approximately 10,001 survey grid cells were evaluated. A total of 896 of these grid cells were observed to be active at the time of the survey (9.0% of the cells evaluated). The 1,189 grid cells were not evaluated primarily due to lack of landowner access based on grazing operations or other restrictions. **Table 14** describes the results of the GKR survey and **Figure 14** depicts the results of the GKR survey on the Valley Floor Conservation Land within the study area.

TABLE 14 GKR SURVEY RESULTS WITHIN THE VFCL

	GKR Grid Cell Status					
	Active	**Inactive**	**No GKR**	**Relict GKR**	**No Data**	**TOTAL**
VFCL	896	740	8,364	1	1,189	11,190

VFCL = Valley Floor Conservation Lands

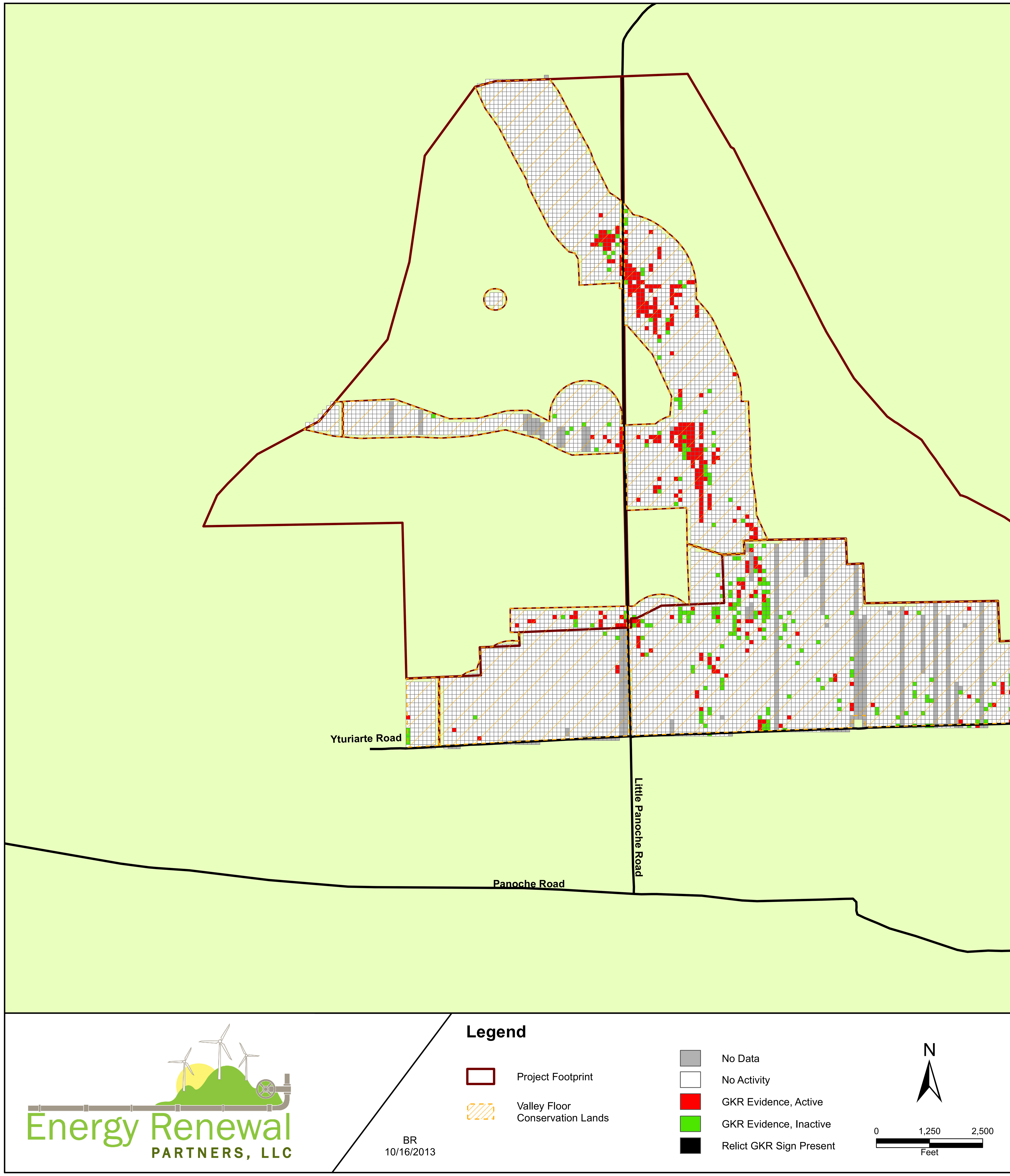
Of the 10,309 total survey grid cells located within the SCRCL study area, approximately 8,211 survey grid cells were evaluated. A total of 1,883 of these grid cells were observed to be active at the time of the survey (23.0% of the cells evaluated). The 2,098 grid cells were not evaluated due to lack of landowner access, terrain that was too steep to be safely accessed, or other reasons precluding surveyors from entering the grid cell. **Table 15** describes the results of the GKR survey and **Figure 15** depicts the results of the GKR survey on the SCRCL within the study area.

TABLE 15 GKR SURVEY RESULTS WITHIN THE SCRCL

	GKR Grid Cell Status					
	Active	**Inactive**	**No GKR**	**Relict GKR**	**No Data**	**TOTAL**
SCRCL	1,883	1,414	4,914	0	2,098	10,309

SCRCL=Silver Creek Ranch Conservation Lands.

Of the 10,166 total survey grid cells located within the VRCL study area, approximately 6,973 survey grid cells were evaluated. A total of 58 of these grid cells were observed to be active at the time of the survey (1.0% of the cells evaluated). The 3,193 grid cells were not evaluated due to lack of landowner access, terrain that was too steep to be safely accessed, presence of bulls or other reasons precluding surveyors from entering the grid cell. **Table 16** presents the results of the GKR survey and **Figure 16** depicts the results of the GKR survey on the VRCL within the study area.



Panoche Valley Solar Project

2013 Giant Kangaroo Rat Observations - Valley Floor Conservation Lands

Figure 14

Legend

- Silver Creek Ranch Conservation Lands
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands
- No Data
- No Activity
- GKR Evidence, Active
- GKR Evidence, Inactive

N

0 1,500 3,000
Feet

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BR
10/16/2013

Panoche Valley Solar Project

2013 Giant Kangaroo Rat Survey Results - Silver Creek Ranch Conservation Lands

Figure
15

Legend

Valadeao Ranch Conservation Lands	No Data
Project Footprint	No Activity
Valley Floor Conservation Lands	GKR Evidence Active
	GKR Evidence, Inactive
	Relict GKR Sign Present

N

0 2,000 4,000
Feet

Energy Renewal PARTNERS, LLC

BR
10/16/2013

Panoche Valley Solar Project

2013 Giant Kangaroo Rat Survey Results - Valadeao Ranch Conservation Lands

Figure 16

TABLE 16 GKR SURVEY RESULTS WITHIN THE VRCL

	GKR Grid Cell Status					
	Active	**Inactive**	**No GKR**	**Relict GKR**	**No Data**	**TOTAL**
VRCL	58	48	6,866	1	3,193	10,166

VRCL = Valadeao Ranch Conservation Lands

Based on this most current survey information, a map of the active and inactive GKR cells was prepared, and larger colonial concentrations were delineated. Four of the larger colony concentrations within the Project Footprint were converted to GKR avoidance areas and added to the Valley Floor Conservation Land (approximately 58% of total active and inactive GKR blocks within the original project footprint). These areas were selected due to the large numbers of concentrated active and inactive GKR precincts, presence of high quality habitat, and direct connectivity to protected lands such as the Valley Floor Conservation Land, SJKF corridor, VRCL, and adjacent BLM landholdings. The summary above takes the move of the avoidance areas to the conservation lands into consideration.

The results of the 100 percent survey were used to generate estimates of the total number of GKR potentially supported in the Project Footprint. It was conservatively assumed that all 197 active cells were located in high quality GKR habitat even though habitat quality in the Project Footprint appears to be compromised over much of the occupied area due to past land use practices. An attempt was made to field verify the density of GKR per active cell; however, based on field conditions (heavy grazing), it was not possible to identify individually clipped precincts within the grid cells. Without performing systematic grid trapping study, it is assumed that each active cell within the Project Footprint is occupied with at least one individual GKR. This resulting assumed minimum density is within the range provided by Williams and above the density predicted by the HSM for the Project.

Using this density estimate for GKR within the Project Footprint, a minimum of 197 GKR are expected to occur within the Project Footprint currently. Typically GKR populations can fluctuate significantly from year to year and within years, potentially leading to a population increase across the Project Footprint outside of the cells identified as active during the survey. A population increase would likely result in occupancy of at least the currently inactive GKR cells found within the Project Footprint. Therefore, a minimum reasonably expected estimate of the population potentially supported within the Project Footprint is 285 individual GKR.

To account for possible increases in density from one year to the next, a potentially higher density should be assumed. Project Footprint densities of GKR are not available in literature. The only colony evaluated in Williams (1992) from the Valley Floor was not trapped and no density estimate specifically for that GKR colony was calculated. In the Panoche region, other density estimates are available for Silver Creek Ranch, the vicinity of Valadeao Ranch, and on the east side of the Panoche Region in the vicinity of Panoche Creek alluvial fan. Of these, the Project Footprint is most likely more similar to Valadeao Ranch than Silver Creek Ranch or Panoche Creek, given the very high quality habitat conditions present on the latter two. Therefore, using the maximum measured density for the Valadeao Ranch area (7.90 GKR/acre), up to 506 GKR may be present within the Project Footprint.

GKR are a species that has periodic population irruptions, resulting in large increases in numbers of individuals and potentially large areas of adjacent habitat becoming occupied over very short time periods. Although these population increases may follow years of favorable precipitation, a direct causative link has not been determined. When these events occur, existing populations can increase greatly. While this type of population increase is an observed phenomenon, predicting the resulting population on a particular area (e.g. Project Footprint) is problematic and not the typical condition.

4.2 San Joaquin Kit Fox

Legal Status

The SJKF is currently listed as endangered by the ESA. The SJKF was originally listed as being in danger of extinction under the Endangered Species Preservation Act of 1966 (32 FR 4001, March 11, 1967) and is currently listed as endangered under the ESA of 1973, as amended. No critical habitat has been designated for the SJKF. The SJKF is included in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998).

Species Ecology

The kit fox was originally described by C. Hart Merriam (1888) near Riverside, CA. That area is now highly urbanized and no longer supports kit fox. Historically, eight subspecies of kit fox have been recognized, but now only two are recognized: kit fox (*Vulpes macrotis macrotis*) and SJKF (*Vulpes macrotis mutica*; Mercure et al. 1993). The kit fox is the smallest canid species in North America, and the SJKF is the larger of the two subspecies. Kit foxes have long, slender legs and are approximately 30 cm tall at the shoulder. The average male weighs 2.3 kilograms, and the average female weighs 2.1 kilograms (Morrell 1972). Kit foxes have a relatively small, slim body, large ears set close together, and a long, bushy tail tapering toward the tip. The tail is usually carried low and straight. The most common colorations are described as buff, tan, or yellowish-gray on the body. Two distinctive coats develop each year: a tan summer coat, and a silver-gray winter coat. The undersides vary from white to light buff. The tail is distinctly black tipped.

Other species of fox that occur in the Panoche Valley region include the red fox (*Vulpes vulpes*) and gray fox (*Vulpes cinereoargentus*). Because these three species inhabit the same region and are often fast moving, as well as nocturnal, identification of SJKF can be a challenge. The coat color and black tipped tail can usually distinguish the SJKF from the red fox. Gray foxes also have a black tipped tail, but also have a distinct black line running along the top to the tail, which is lacking in the SJKF. The small body size of the SJKF can also aid in identification.

Historically, SJKF was known to occur in most of the San Joaquin Valley from southern Kern County north to San Joaquin County (Grinnell et al. 1937); however the SJKF may have already had its range substantially reduced by the 1930's. Currently, the largest extant populations of SJKF are in western Kern County on and around the Elk Hills and Buena Vista Valley, and the Carrizo Plains Natural Area in San Luis Obispo County (USFWS 1998). The USFWS (1998) identified three core areas for SJKF populations: Carrizo Plain, western Kern County, and the Ciervo-Panoche Natural Area. The Ciervo-Panoche Natural Area consists of the Ciervo Hills, Tumey Hills, Panoche Hills, and the Panoche Valley. Cypher et al. (2007) identified the Panoche Valley and the Pleasant Valley populations as potential source populations for recolonizing reclaimed farmland in the San Luis Unit of the Central Valley Project. This study showed reasonable connectivity between Panoche Valley and Pleasant Valley along the western edge of the San Luis Unit, as well as reasonable connectivity between Panoche Valley, Pleasant Valley, and reclaimed farmland to the east. Survey efforts to determine SJKF population size are currently underway at Ciervo Panoche Natural Area in Fresno and San Benito Counties, Fort Hunter Liggett in Monterey County, and Camp Roberts in Monterey and San Luis Obispo Counties. Recent records from the 1980s and 1990s also exist for San Luis Reservoir in Merced County (Briden et al. 1987), North Grasslands and Kesterson National Wildlife Refuge on the valley floor in Merced County (Paveglio and Clifton 1998), and in the Los Vaqueros watershed in Contra Costa County. Optimal habitat for SJKF is arid with relatively low grassland vegetation. Preferred habitat is often dependent on the density of kangaroo rats and lagomorphs, the two favored prey items of SJKF.

SJKF are predominantly nocturnal, with peaks in activity occurring during crepuscular periods and are occasionally seen during the day during late spring and early summer (Meaney et al. 2006, Orloff et al. 1986). Distance of nightly movements varies depending on the season. Nightly movements on the Elk Hills Naval Petroleum Reserves averaged 15.4 km during the breeding season and 10.2 km during the pup-rearing season (USFWS 1998). Home ranges have been reported from as small as 2.6 km^2 to as large as 31 km^2 (USFWS 1998). Home ranges may overlap, depending on prey density and prey allocation. Zoellick et al. (2002) found that home range size and home range overlap of kit foxes did not differ between undisturbed areas and areas disturbed by the Naval Petroleum Reserves. Zoellick et al. (2002) showed up to a 30% home range overlap in kit foxes and surmised that this was due to a localized food source such as a high density of rabbits.

The diet of the SJKF varies seasonally and annually, based on variation in abundance of potential prey. In descending order of occurrence, white-footed mice (*Peromyscus* sp.), California ground squirrels, kangaroo rats, San Joaquin antelope squirrels, black-tailed jack rabbits (*Lepus californicus*), and chukar (*Alectoris chukar*) were identified in SJKF scat (USFWS 1998, Archon 1992). Other studies have shown that kangaroo rat and lagomorphs are important staples in the diet of SJKF (Meaney et al. 2006). Laughrin (1970) collected over 600 scat samples of SJKF, and 80 – 90% of this contained kangaroo rat remains (Laughrin 1970 *in* Meaney et al. 2006). Cypher et al. (2000) noted that SJKF abundance in the southern San Joaquin Valley was highly correlated with precipitation based prey abundance, particularly kangaroo rat. Drought years, which decreased kangaroo rat abundance, produced significant negative and rapid changes in kit fox abundance. SJKF is also an opportunist and will not pass up potential scavenging opportunities. Scat samples have also included human foods, paper, cloth, and larger mammals such as cattle and sheep that had been scavenged.

SJKF occupy several dens throughout their home range during the year. Dens are usually modified ground squirrel, badger, or coyote dens and can be up to 2.3 m deep (Tannerfeldt et al. 2003). Radiotelemetry studies indicate that foxes use individual dens for an average of 3.5 days before moving to a different den. Possible reasons for frequently changing dens include parasite load, prey depletion, and predator avoidance (Egoscue 1956, USFWS 1998); however, an adult SJKF can easily cover its entire home range in one night (Cypher et al. 2005). Multiple dens in the home range of an individual SJKF are necessary for thermal regulation, resting, and predator avoidance. Den openings are 20 – 25 cm high and less than 20 cm wide to exclude coyotes and badgers (Meaney 2006). Resting dens usually are simple with only one opening, while natal dens can be much deeper and more complex and have multiple openings. Artificial dens constructed by humans can act as suitable dens for SJKF. Artificial dens are generally lengths of buried pipe or culvert approximately 20 cm in diameter (Cypher et al. 2007).

Females are capable of reproducing at ten months old and begin searching for natal dens in September and October (USFWS 1998). Pair bonds between male and female kit foxes vary; some will mate for life while others may only remain together for a single breeding season. Kit fox litters can range from one to six pups, and success is often dependent on prey abundance (White and Ralls 1993). SJKF litter size averaged 3.8 for adults more than one year old and 2.5 for yearlings (Cypher et al. 2000). Natal dens have more than one opening and are changed two to three times per month. Females rarely hunt while lactating, and the male supplies the female with prey during the first few weeks of pup-rearing (Meaney 2006). Family groups generally split up in October, although pups may remain with the parents and assist with rearing the next generation.

Dispersal of yearling SJKF averaged eight kilometers during a six-year study on the Naval Petroleum Reserves (Scrivner et al. 1987). Long distance dispersals of up to 69 km by kit foxes throughout their range have also been noted (Meaney 2006). While agricultural lands may not represent suitable habitat for SJKF, they have been known to disperse through them. Agricultural lands, highways, aqueducts, and urban areas have all been used by dispersing SJKF (USFWS 1998). While these man-made obstacles do not seem to inhibit SJKF dispersal and nightly movements (Zoellick et al. 2002, Cypher et al. 2005), fences and walls can create impenetrable barriers to kit fox movement (Cypher and Van Horn Job 2009). Simple fence alterations such as portals, larger mesh or hog wire, and elevating the bottom six inches off the ground can negate the negative effects of fences and walls and make them permeable to SJKF (Cypher and Von Horn Job 2009).

Predators of the SJKF include golden eagles, domestic dogs, coyotes, red foxes, and badgers. Cypher et al. (2005) radio collared 63 SJKF. Twenty-five of those were recovered dead, and of those 25, 12 (48%) were killed by large predators, most likely coyotes. Fences that are not permeable to SJKF as described above, can cause a serious threat to SJKF being chased by potential predators. However, a permeable fence may aid in SJKF escape if the fence is situated to provide through points at reasonable intervals and limits the ability of predators to pass through (Cypher and Van Horn Job 2009).

Local Distribution

SJKF are known to occur in the Project Footprint. The CNDDB has records of the SJKF occurring in Chounet Ranch (1977), Hammonds Ranch (1920), Idria (1975), Laguna Seca Ranch (2001), Llanada (1994), Mercey Hot Springs (2006), Ortigalita Peak (1975), Panoche (2006), Topo Valley (1987), and Tumey Hills (1989) USGS quads (**Figure 17**). The years in parenthesis represent the most recent CNDDB documented occurrence in each quad.

In addition to data that were collected in 2010 within a quantitative occupancy framework (135 five-acre plots visited five times each), a series of focused biological surveys have been performed on the Project Footprint since April of 2009, totaling over 25,000 hours of survey time (**Table 8**). These surveys have provided general information about the abundance and distribution of SJKF over the Project site.

The multitude of surveys conducted on-site found evidence of SJKF burrows and scat throughout the Project site.

Scat-sniffing Dog Surveys

Evidence of SJKF on the Project Footprint (and on the VFCL and portions of the Valadeao Ranch) was gathered during scat-sniffing dog surveys conducted by Working Dogs for Conservation. These surveys were conducted on-site between July 30th and August 16th, 2010, walking 33.19 miles (53.42 km) of non-random transects (**Appendices I and J**). During these surveys, 52 fresh (< 8 days old) and 311 old scats (> 8 days old) were collected. Individual SJKF mark their territory with urine and feces, as well as use latrines several times per day. The scats collected during these surveys were sent to the Smithsonian to have DNA analyzed. From these scat, 22 separate individual SJKF were identified in the study area of the Project site, VFCL, and VRCL (11 male and 11 female). Nine individuals were located on both the Project site and Conservation Lands, and 13 individuals were located exclusively on the Conservation Lands. As the scat-sniffing dog surveys were conducted at the end of the summer of 2010, the data collected represents a good estimate of the number of individuals occurring in the study area for a good year (the winter of 2009-2010 was a year with high precipitation, and 2010 was a year with a high density of prey species).

Scat was collected from up to 35 percent slopes, a slope that is much steeper than typically reported for this species. These results from empirical data defining slope use by SJKF in the local vicinity of the Project site is important to note, as species use landscapes differently in different locations and settings. Studies often report much lower slope ranges in the literature for this species, without defining what slopes were available for use in the study area (i.e., if all slopes in the study area are less than 15 percent, then SJKF use on slopes greater than 15 percent cannot accurately be assessed). The report entitled *SJKF*

Legend

Project Footprint

San Joaquin Kit Fox Location

Valley Floor Conservation Lands

Valadeao Ranch Conservation Lands

Silver Creek Ranch Conservation Lands

N

0 3,500 7,000 Feet

BR
10/18/2013

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Panoche Valley Solar Project

CNDDB San Joaquin Kit Fox Records

Figure 17

Scat-sniffing Dog Survey Results, Panoche Valley Solar Farm Biological Assessment provides additional details about these surveys (**Appendices I and J**).

Spotlight Surveys

Spotlighting surveys on the Silver Creek Ranch have been completed with 20.5 nights of spotlighting producing two to 10 SJKF observations per night. A total of 137 detections of SJKF and 11 detections classified as probable SJKF have occurred to date. It is important to note that kit foxes were detected within drainages, on flat land, on hill slopes, and even on ridges or hills. The SJKF observed on the Silver Creek Ranch Conservation Lands appear to use hills with much steeper slopes than previous literature suggests, which is similar to the results of the scat-sniffing dog surveys on the VRCL.

Camera Trap Surveys

Twenty camera trap stations were set up on the SCRCL and have recorded SJKF at 17 out of 20 stations. All camera traps were placed at least a half-mile from each other. The 17 detections occurred on 119 of 275 trap nights, resulting in approximately 43 percent detection. Individual camera trap detections of SJKF ranged from 0 percent to almost 64 percent detection (**Figure 18**). Only one station (#6) detected two SJKF in the same photo, all other stations detected one individual at a time. As SJKF rarely exhibit unique identifying features, individuals are difficult to distinguish. Therefore, it is not possible to confirm the exact number of individuals that visited any given camera trap location. See **Appendix G** for further discussion of Silver Creek Ranch surveys.

SJKF Den Locations

Concurrent with the 2013 GKR surveys, all known SJKF den and known SJKF natal den locations were recorded and mapped. A total of 46 SJKF dens were observed within the study area (37 known adult dens and 8 natal dens). **Table 17** presents the results by study area component and **Figure 19** shows the locations of these dens within the study area.

TABLE 17 SAN JOAQUIN KIT FOX OBSERVATIONS

	Project Footprint	VFCL	SCRCL	VRCL	Total
Known Dens	2	17	7	11	**37**
Known Natal Dens	1	5	1	1	**8**
TOTAL	**3**	**22**	**8**	**12**	**46**

VFCL-Valley Floor Conservation Lands
SCRCL-Silver Creek Ranch Conservation Lands
VRCL-Valadeao Ranch Conservation Lands

Habitat Suitability

The project conservation lands will be preserving approximately 24,185 acres that benefit the SJKF. However, any lands with greater than 11% slopes were presumed to be less than optimally suitable. This decision was made based on scat-sniffing dog results on the Project site, VFCL, and part of the VRCL. The proportion of lands considered suitable for SJKF was contingent upon the slope values such that, for example, 100% of lands with <11% slopes were considered suitable but only 50% of lands with 11.01-21% slopes was considered suitable. The scale used for ranking is described in **Table 18**.

Legend

- Silver Creek Ranch Conservation Lands
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands
- SJKF Detected
- SJKF Not Detected

N

0 1,500 3,000 Feet

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Panoche Valley Solar Project

San Joaquin Kit Fox Camera Trap Locations

Figure 18

Legend

Project Footprint	
Valley Floor Conservation Lands	
Valadeao Ranch Conservation Lands	
Silver Creek Ranch Conservation Lands	

Status

- Natal/Pupping Den
- Known Den

N

0 3,500 7,000 Feet

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10/15/2013

Panoche Valley Solar Project

San Joaquin Kit Fox Den Locations

Figure
19

TABLE 18 SLOPE CLASSES AND SJKF SCAT

SLOPE CLASS	SCATS COLLECTED IN THIS SLOPE CLASS	PRORATED HABITAT SUITABILITY ACRES	ACRES OF LAND: ACRES OF SUITABLE HABITAT
0-11%	70%	100% Suitable	1:1
11.01-21%	18.5%	50% Suitable	1:0.5
21.01-35%	11.5%	25% Suitable	1:0.25
>35%	0%*	0% Not Suitable	1:0

The Project Footprint contains 2,492 acres of suitable SJKF habitat. The Conservation Lands contain approximately 14,863 acres of suitable SJKF habitat according to this method. It is important to note that the Conservation Lands contain approximately 24,185 acres that would be managed for and could potentially be used by SJKF.

4.3 Blunt-nosed Leopard Lizard

<u>Legal Status</u>

The BNLL was originally listed as being in danger of extinction under the Endangered Species Preservation Act of 1966 (32 FR 4001, March 11, 1967) and is currently listed as endangered under the ESA of 1973, as amended. No critical habitat has been designated for the BNLL. The BNLL is included in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998).

<u>Species Ecology</u>

The BNLL is most closely related to the long-nosed leopard lizard (*Gambelia wislizenii*) and was originally thought to be a subspecies. Montanucci (1970) presented solid information for the separation of the two species based upon studies of hybrids between the BNLL and long-nosed leopard lizard. The two species will hybridize where their ranges overlap. Adult male BNLL are larger than females, ranging in size from 8.7 to 12.0 cm in snout-vent length. Total length including the tail can be up to 35.7 cm (Germano and Williams 2005). Adult males weigh between 31.8 and 37.4 grams, and adult females weigh between 20.6 and 29.3 grams. BNLL are quite often the largest lizard throughout its range, and coloration can vary greatly. Background colors on the dorsal surface can range from yellowish, light gray or dark brown depending on the surrounding soil and vegetation. The ventral surface is uniformly white. The color pattern on the back consists of longitudinal rows of dark spots interrupted by white, cream, or yellow bands. These cross bands can aid in distinguishing the BNLL from other leopard lizards; the cross bands of the BNLL are much broader, more distinct, and extend from the lateral folds on each side of the body. Juvenile BNLL have blood-red spots on the back that darken with age.

BNLL originally inhabited the San Joaquin Valley, ranging from Stanislaus County in the north to the Tehachapi Mountains of Kern County in the south (Montanucci 1970). The foothills of the Sierra Nevada and Coast Range Mountains defined the eastern and western boundaries. The currently known occupied range of the BNLL is scattered in undeveloped lands of the San Joaquin Valley and Coast Range foothills. The Ciervo, Tumey, and Panoche Hills and the Panoche Valley all support populations of BNLL in the northern portions of its range. They inhabit native and non-native grassland and alkali sink scrub communities characterized by poorly drained, alkaline, and saline soils. They are also found in the chenopod (i.e., goosefoot) community associated with non-alkaline, sandy soils in the alluvial fans and foothills of the southern San Joaquin Valley and Carrizo Plain. Other suitable habitat types on the valley floor for this species include Valley Needlegrass Grassland (Holland 1986), Alkali Playa (Holland 1986) and Atriplex Grassland (Tollestrup 1976). Habitats in order of decreasing favorability include:

1) clump grass and saltbush grassland, with sandy soil,
2) dry washes with scrub brush, in native/non-native grassland, with sandy soil,
3) alkali flats, with saltbush in sandy or gravelly soil, and
4) grassland with hardpan soil.

The BNLL is generally absent from areas of steep slopes and dense vegetation, and areas subject to seasonal flooding (USFWS 2010). The most important aspect of any BNLL habitat is sparse vegetation. BNLL rely mainly on speed to avoid predators and catch prey. A thick cover of herbaceous vegetation impedes BNLL movement, making them more vulnerable to predators and less likely to capture prey. In areas with thick herbaceous vegetation, BNLL will utilize barren washes and roads (Warrick et al. 1998). Adult BNLL emerge from below ground dormancy in early- to mid-April and remain active into July and August (Germano and Williams 2005, CDFG 2004). Adults are rarely seen in September. Hatchlings emerge in July and remain active into late October and early November (Germano and Williams 2005, CDFG 2004). Optimal air temperatures for BNLL range between 23.5˚ and 40˚C, and optimal ground temperatures are between 22˚ and 36˚C. Home range areas differ between males and females, and BNLL home range estimates have been estimated by several individuals. Early BNLL home range studies (i.e., Tollestrup 1979), described home ranges of less than 2.4 acres for both males and females. However, that study was based on only three days of lizard assessment on a habitat grid. Later studies provided additional information on home range estimates (**Table 19**).

TABLE 19 BNLL HOME RANGE ESTIMATES

Investigator	Date	Study Location	Findings	Home Range Estimate
Tollestrup	1979	Western San Joaquin Valley	Home range < 2.4 acres for both males and female BNLL. Based on 3 days of data.	<2.4 acres
Warrick et. al.	1998	Kern County	16 BNLL radio-tagged (8 dense grassland vegetation, 8 sparse grassland vegetation) at 2 sites at Naval Petroleum Reserves.	22 acres
Germano	Unpublished data (2004)	Kern County (western)	Based on the data from 60 BNLL (total of 83 BNLL radio-tagged) at >25 locations at Lokern Natural Area Study site (southeast of San Benito County). Habitat included scrub wash, flats with no wash, and scrub flats.	52.4 acres

Males will aggressively defend their home ranges against other males. Germano and Williams (2005) noted many instances of males with scars matching the outline the jaws of other adult BNLL. Other studies had Passive Integrated Transponders (PIT tags) broken by fighting males (Germano and Williams 1993).

Other lizards which may overlap with the BNLL include the side-blotched lizard (*Uta stansburiana*), western whiptail (*Aspidoscelis tigris*), and coast horned lizard (*Phrynosoma coronatum*; Stebbins 2003). The BNLL is the largest of these lizards and will consume smaller lizards when given the opportunity. Germano and Williams (2005) noted adult BNLL eating side-blotched lizards and smaller BNLL. While adult BNLL do not hesitate to prey on smaller lizards, grasshoppers, crickets, and beetles make up the majority of their diet (Germano et al. 2007). Diet preferences can vary by location and year. Coleopterans made up the bulk of BNLL diet on the Elkhorn Plain and Lokern Natural Area. Grasshoppers were the main prey source on the Kern Front Oil Field (Germano et al. 2007). Bees, wasps, and ants will also be taken by BNLL, although in smaller numbers than grasshoppers and beetles.

Adult BNLL emerge from dormancy in early April, and breeding activity begins within a month of emergence. Breeding activities last from April through the beginning of June and may last throughout June. Eggs are laid in June and July, with clutch size ranging from two to six eggs (Montanucci 1967), and hatchlings emerge after approximately two months of incubation. Germano and Williams (2005) first noted hatchlings appearing on the Elkhorn Plain in mid-July, depending on the weather trends of that year. Cool wet weather patterns in April may delay the emergence of adults, thus delaying egg lying and hatchling emergence.

Potential predators for the BNLL include other adult BNLL, whipsnakes, gopher snakes, western rattlesnake, American kestrel, prairie falcon, burrowing owl, various diurnal raptors, loggerhead shrike, coyote, SJKF, and American badger. Germano and Williams (2005) found several individuals which had been struck by passing vehicles.

Local Distribution

The BNLL is known to occur in the Project Footprint. The CNDDB has records of the BNLL occurring in Cerro Colorado, Chounet Ranch (1958), Hammonds Ranch (1978), Idria (1980), Laguna Seca Ranch (1993), Mercey Hot Springs (2005), Panoche (2004), and Tumey Hills (1993) USGS quads (**Figure 20**). The years in parenthesis represent the most recent CNDDB documented occurrence in each quad.

Few studies have calculated population density estimates for the BNLL. **Table 20** Shows density estimates in the literature.

TABLE 20 BNLL POPULATION DENSITY ESTIMATES IN THE LITERATURE

LOCATION	DENSITY (ACRES)	LITERATURE	NOTES
Elkhorn Plain	0.95-21.85	Williams et al. (1993) and Germano and Williams (2005)	Both of these studies show a strong response of BNLL to precipitation patterns, with drought years resulting in lower populations and low to no observed occurrences of adults.
Pixley National Wildlife Refuge in Tulare County	1.3	Recovery Plan (1998) citing Tollestrup (1979)	
Pixley National Wildlife Refuge in Tulare County	0.1-4.2	Recovery Plan (1998) citing Uptain et al. (1985)	Surveyed the same population as Tollestrup at a later date.
Pixley National Wildlife Refuge in Tulare County	0.12-4.17 with an estimated 1.01-33.32	Uptain et al. (1992)	Overall density on eight 8-hectare plots.
Pixley National Wildlife Refuge in Tulare County	1.01-33.32	Uptain et al. (1992)	For each plot ranging from 1.01-33.32 BNLL/acre with densities varying between Spring, Summer, and Fall surveys. (same paper as above)
Unknown location in Marginal habitat	0.2	Recovery Plan (1998) citing Mullen (1981), Le Fevre in lit (1976), and Madrone Associates (1979)	

As none of these surveys took place in a shrubless habitat such as occurs on the Project site in Panoche Valley, population densities are expected to be less in the Panoche Valley than the previous reports for the Elkhorn Plain and Pixley National Wildlife Refuge.

Abridged Surveys

Abridged protocol-level adult BNLL surveys on Section 10 and 15 were completed (within the portions of both the Project area and the VFCL) between June 10th and July 15th, 2009, following the CDFW protocol for such surveys. The surveys conducted in 2009 consisted of the following:

- 3.5 full-coverage adult-BNLL surveys completed on Section 15 between June 10th and July 15th, 2009
- Eight full-coverage adult-BNLL surveys completed on Section 10 between June 10th and July 15th, 2009
- Five juvenile-BNLL full-coverage surveys completed on Sections 10 and 15 between August 3rd and September 1st, 2009

In late April of 2010, the Applicant initiated both full-protocol adult season BNLL surveys on Section 16 (covering portions of both the Project Footprint and the VFCL) and dynamic occupancy sampling

(**Appendix K**) within 135 sample locations (each point was buffered by five acres or two hectares) spread over the entire Project Footprint and VFCL (**Figure 20**).

No BNLL were observed in Section 10 at any time during the 2009 surveys, however two adults were detected in Section 10, within the 100-year floodplain of Las Aquilas Creek, during the occupancy sampling conducted in 2010. The adult BNLL found in Section 15 were mainly in association with Panoche and Las Aquilas Creeks, which is consistent with known habitat preferences of washes and floodplains (Warrick et al. 1998), especially in areas where dense vegetation comprises the upland habitat. Juvenile BNLL were found along washes and farther into the upland habitat as they dispersed. Adult BNLL were observed in and near Panoche Creek in Sections 10, 14, 15, and 16 (**Figure 21**) during 2010 surveys.

No BNLL were observed on VRCL, although suitable habitat is contiguous within the western and southeastern edges of the Project site. Additional potential habitat occurs on the floor of Little Panoche Valley (northern portion of the VRCL).

Silver Creek Ranch BNLL Surveys

Four individual BNLLs were observed on SCRCL in dry washes during reconnaissance surveys between August 30th and September 3rd, 2010. In addition, focused BNLL surveys were conducted on the SCRCL in September of 2012. Because the abridged protocol-level surveys in 2009 and full protocol-level surveys in 2010 of the VFCL and southern portions of the Project Footprint located all observations of BNLL in or near the washes, the Silver Creek Ranch surveys targeted survey areas on the drainages of the ranch. **Figure 22** shows BNLL detections during these surveys.

BNLL focused surveys were conducted from September 10th through September 17th, 2012 on the SCRCL. Each team of three surveyed drainages with one biologist walking in the drainage and two biologists on either side. Focused BNLL surveys were conducted according to specifications within the BNLL survey protocol except that drainages were targeted and surveys were conducted on September 17th (two days past the protocol dates). However, Dr. Jennings determined that the weather was still warm enough to continue with surveys, as evidenced by incidental BNLL sightings through September 21st, 2012. During BNLL focused surveys, juvenile BNLL were observed within drainages, on hill slopes, and even on top of rocks on top of ridges. In addition, BNLL were incidentally observed during GKR focused surveys from September 11th through September 21st, 2012. The majority of these incidental observations were not associated with a drainage. Thirty-one BNLL were observed during focused surveys for BNLL, and there were 30 incidental BNLL detections during GKR focused surveys. A total of 61 BNLL detections occurred in a two-week period. All BNLL observed were juveniles except for two subadults.

Full Protocol BNLL Surveys

The 2013 BNLL survey (adults, hatchlings, and sub-adults) was conducted on the Project site and portions of the VFCL. Survey methodology was based on the CDFW Approved Survey Methodology for the Blunt-nosed Leopard Lizard (CDFG 2004), the letter "Updated Blunt-nosed Leopard Lizard (BNLL) Survey Methodology" dated May 2, 2013 to CDFW, verbal conversations with Dave Hacker of CDFW and Patrick Golden of Energy Renewal on June 26, 2013, and email correspondence between CDFW and PVS on June 27, 2013.

No BNLL were found within the Project Footprint during the 2013 adult season surveys (May 9 to July 13, 2013). There were a total of 27 observations of BNLL in the VFCL (**Figure 23**) with the majority of the observations associated with the wash habitat along Panoche Creek. Also included on **Figure 23** are

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Legend

- Project Footprint
- Valley Floor Conservation Lands
- Plot Location
- BNLL Observed
- 100-year Floodplain

N

0 625 1,250 2,500
Feet

Panoche Valley Solar Project

2010 Blunt-nosed Leopard Lizard Occupancy Sampling Locations

Figure
20

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Legend

- Project Footprint
- Valley Floor Conservation Lands
- 2009 - 2010 BNLL Observation
- 100-year Floodplain

N

0 625 1,250 2,500
Feet

Panoche Valley Solar Project

2009-2010 Blunt-nosed Leopard Lizard Observations

Figure
21

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Blunt-nosed Leopard Lizard Observations
on Silver Creek Ranch Conservation Lands

Figure
22

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2013 Blunt-nosed Leopard Lizard
Protocol Survey Results

Figure 23

the 105 observations of BNLL from previous surveys in 2009 and 2010 (LOA 2010). None of the previous observations are located in the Project Footprint, but are fully located within the VFCL.

The 2013 hatchling and sub-adult season surveys were completed between August 2 and September 10, 2013. There were a total of 13 observations of BNLL made during the surveys (**Figure 23**). A majority of the observations made during the hatchling and sub-adult season surveys were associated with the wash habitat along Panoche Creek in the VFCL (**Figure 23**). However, there was 1 observation of a BNLL hatchling made outside the VFCL. This BNLL hatchling observation was found just north of the VFCL boundary that encompasses Las Aquilas Creek (**Figure 23**). The Project boundaries were modified to avoid this observation (using the 52.4-acre buffer). For information on the rational for the 52.4-acre buffer, see **Appendix E**.

"Decision Rule" Based Habitat Suitability

The entire 2,523 acres of the VFCL were found to be suitable for BNLL. The majority of BNLL observations within the Action Area occurred within the VFCL.

To determine the suitable habitat acreage for BNLL on the VRCL and the SCRCL, two decision rules were used together:

1) A slope analysis was performed, and considering 100 percent of the highly suitable VFCL known to support BNLL are between 0 and 11 percent slope, it was determined that all areas within the same slope range supporting appropriate habitat (i.e., sparse vegetation, friable soils and small mammal burrows) would be considered suitable habitat for the species.

2) Use of a 625-foot buffer around the "rivers" GIS layer. The rivers layer was used due to the fact BNLL were found closely associated to this type of habitat on the VFCL; and 625 feet was the average distance from the center of Panoche Creek to where juvenile BNLL were observed during surveys conducted in 2009 and 2010. This buffer connects most of the 0 to 11 percent slope polygons on the VRCL and the SCRCL and serves as a viable connection between 11 percent slopes as suitable habitat or corridors.

All observations of individual BNLLs on the VRCL were within these areas. Based on this model there are approximately 1,485 acres of suitable habitat for the BNLL on the VRCL. There are at least 7,875 acres of suitable habitat for BNLL on the SCRCL. Although the majority of BNLL observed on the SCRCL were observed within these acres, five BNLL were observed just outside of this area during the focused September 2012 surveys. Therefore, there may be more than 7,875 acres of suitable habitat for BNLL on the SCRCL.

Habitat Suitability Modeling

An HSM was completed in 2010 for portions of the Action Area including the Project Footprint and the VFCL.

The way in which sensitive species such as BNLL use a large area such as the Project site is best framed within a statistical model that, among other things, permits robust estimates of spatial use of the site by BNLL, predicts impacts to the species from full build-out of the PVS, and demonstrates how the Project may affect changes in distribution, other demographic parameters, or use of the site of the site by BNLL over time.

Presence/absence of BNLL were therefore derived from occupancy sampling, full protocol and abridged protocol surveys over certain Sections, and incidental sightings during non-target surveys. The HSM did not use the results of the 2013 full protocol surveys.

Presence or absence inputs of BNLL allowed the use of multiple logistic regression and an information-theoretic approach to build predictive models of BNLL occurrence across the entire Project site. Models were developed to predict the probability of BNLL occurrence as a function of the landscape-scale habitat variables indicated below. Specifying the relationships between BNLL occurrences and a small set of habitat variables required a focus on the parameterization of a single 'global' model, and a spatial model was constructed based on this analysis.

Statistical and spatial models used five landscape-scale habitat predictor variables hypothesized to influence the occurrence of BNLL in the area that includes the Project site:

- Soils - To determine dominant soil types occurring on the site, LOA obtained a soil data layer from NRCS. LOA reclassified this categorical data layer to emphasize the 'river wash' soil type, and compared this type to all other types on the Project site using the statistical model.

- Streams - Within a Geographic Information System (GIS; ArcGIS v9.3.1, ESRI, Redlands, CA), LOA used the USGS National Hydrography Dataset to derive a variable estimating the Euclidean distance to the nearest ephemeral stream or river, which allowed us to capture fine-scale habitats adjacent to these features.

- Slope - LOA used the USGS National Elevation Dataset to estimate slope (in degrees) across the study area.

- Location (Latitude and Longitude) - Because spatial location can serve as a surrogate for unmeasured biotic and abiotic influences on species occurrence, LOA also included coordinates for longitude and latitude in the models. All habitat variables were projected in the same coordinate system and datum (UTM, Zone 10, NAD83) and derived at a 30-meter resolution. Each sampling point was spatially related to the vector of habitat information using an intersect operation in the GIS. Latitude and longitude were considered independent variable for this analysis.

The six parameter global model of BNLL occurrence was >160 AICc units better (i.e., lower) than the intercept-only model, suggesting exceptional approximation of the data. Additional fit statistics were calculated to further evaluate model performance, including Nagelkerke's R-Square (0.82) and a Hosmer and Lemeshow Goodness-of-Fit test (Chi-Square = 11.11, P > 0.196). Classification accuracy for this model was high (ROC=0.97), although each of the above statistics suggested high clustering in the data and a somewhat overfitted model.

Based on Wald Chi-Square values, lower latitudinal values (16.0), closer proximity to river washes (11.5), and river wash soil types (8.6) were the strongest predictors of BNLL occurrence. In addition, higher slopes (7.3) were a reasonably strong negative predictor of occurrence. A weak negative relationship between BNLL occurrence and longitude was also observed (3.6). **Figure 24** shows the Occupancy points over the HSM.

Observed BNLL locations in the VFCL correspond with the HSM produced by the occupancy sampling of 2010 and fall mostly within high suitability habitat with a few in moderately suitable habitat. BNLL are likely to occur along the Panoche and Las Aquilas Creeks' drainages and floodplain; few are likely to occur more than a third of a mile from the floodplain as dispersal events, and it is unlikely that any BNLL

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Legend

Project Footprint
Valley Floor Conservation Lands
2009 - 2010 BNLL Observation
High Suitability
Moderate Suitability
2009 - 2010 BNLL Absent
Low Suitability
No Data

N

0 625 1,250 2,500
Feet

Panoche Valley Solar Project

Blunt-nosed Leopard Lizard Occupancy and Habitat Suitability Model on Project Footprint and Valley Floor Conservation Lands

Figure 24

occur further than a half-mile from the floodplain and drainages, as occupancy sampling of 135 plots did not find BNLL to be present in these areas.

Conservation Land Surveys

Species-specific surveys were not conducted for BNLL on the Valadeao Ranch, and no BNLL were observed during other surveys. Population density cannot be estimated for Valadeao Ranch until surveys have been completed; however, it can be assumed that low areas extending from the Project site onto Valadeao Ranch may be included as suitable habitat for BNLL.

Four BNLL were observed on Silver Creek Ranch, all within the same drainage system, during the 2010 reconnaissance surveys. Sixty-one BNLL were observed during the September 2012 focused BNLL surveys. This species occurs differently on the landscape of Silver Creek Ranch compared to the Project. Because Silver Creek Ranch provides more complex terrain than the Project site, BNLL occur less clumped on the landscape (**Figure 22**). Two ACECs designated by the BLM and cited in the BNLL 5-year Review (2010) as protecting "4,800 acres and 3,800 acres of contiguous blunt-nosed leopard lizard habitat" occur adjacent to and east of the Silver Creek Ranch. These ACECs include terrain and habitat similar to that of the Silver Creek Ranch.

It can be assumed that areas within drainages and areas outside drainages can be included as marginal to suitable habitat for BNLL, because four individuals were located in drainages on Silver Creek Ranch during the 2010 reconnaissance surveys, and 61 BNLL were located both in drainages and away from drainages during the September 2012 focused surveys. Additionally, the two adjacent ACECs support similar terrain and habitat as Silver Creek Ranch.

4.4 California Tiger Salamander

Legal Status

The CTS population segment which may occur within the Project Footprint is currently listed as threatened by the ESA. Two other distinct population segments in Sonoma County and Santa Barbara County are listed as endangered by the ESA. The Santa Barbara County Distinct Population Segment was listed as endangered in 2000. The Sonoma County Distinct Population Segment was listed as endangered in 2002. The remaining population occurs throughout central California, including the Project Footprint. The Central California Distinct Population Segment was listed as threatened in 2004. No Recovery Plan has been written for the CTS to date.

Species Ecology

The CTS was formerly classified as a subspecies of tiger salamander (*Ambystoma tigrinum*), but has since been identified as an individual species (Kraus 1988; Shaffer et al. 1991). They are characterized by a broad head, small eyes, and tubercles on the side of the feet. Coloration is a black back with yellow, cream, or white oval spots or bars. Some individuals may have a prominent cream band on the undersides. Snout-vent length ranges from 7.6 – 12.7 cm, and total length ranges from 15 – 22 cm (Stebbins 1966; 2003).

The CTS originally inhabited most of central California and remains in remnant populations throughout much of its original range. CNDDB records for CTS show its distribution encompasses portions on Alameda, Amador, Calaveras, Contra Costa, Fresno, Kern, Kings, Madera, Mariposa, Merced, Monterey, Sacramento, San Benito, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Tulare, Tuolumne, and Yolo Counties (NatureServe 2009). About

80% of all extant occurrences are in Alameda, Contra Costa, Madera, Merced, Monterey, San Benito, and Santa Clara Counties, with 30% of all occurrences in Alameda County (NatureServe 2009). The use of vernal pools and other temporary bodies of water for breeding limits the CTS to areas of low elevation and low topographic relief throughout their range (Stokes et al. 2008). Ephemeral vernal pools, which refill with water on a yearly basis, that are 40 – 80 cm in depth and have a surface area of 0.2 hectares or more are optimal for breeding CTS; although small, shallower pools will also house breeding CTS (Stokes et al. 2008). Depth of the breeding pool was highly correlated with breeding CTS. Stokes et al. (2008) found no CTS larvae in pools with an average depth of less than 22 cm. Deep pools with permanent water may not be optimal for breeding populations of CTS because they often house predatory fish, crayfish, or bullfrogs that prey upon larval CTS. This creates a narrow range of pool depths where the pool will not completely dry out before CTS have metamorphosed, but also not contain water year round and house predators. Metamorphosed CTS move out of the vernal pools and into upland habitats. Small mammal burrows are important features of upland habitat. Adult CTS occupy small mammal burrows in grassland, savanna, or open woodland habitats (Trenham and Shaffer 2005).

Activity patterns of adult CTS are not well understood. Adult CTS live their entire lives in the burrows of small mammals such as the California ground squirrel. Adults begin moving toward breeding pools when the first fall rains begin to inundate pools. Breeding adults will continue moving to pools through the winter and spring. Adults can generally be found at breeding pools from October through May, although breeding is highly dependent on the amount of precipitation (Trenham et al. 2001; Trenham and Shaffer 2005). Adult CTS leave the breeding pools in late spring and return to upland habitats. Trenham and Shaffer (2005) used pitfall traps at various intervals away from a pool to determine the extent of upland use. They found that the numbers of adult CTS declined as distance from the pool increased out to 620 meters. Subadults also moved up to 600 meters away from the pools, but most were concentrated between 200 and 600 meters from the pool. This has led managers to suggest preserving upland habitats with suitable small mammal burrows out to 600 meters from breeding pools (Trenham and Shaffer 2005).

CTS may take upward of four to five years to reach sexual maturity (Trenham et al. 2000). Although individuals can live upward of ten years, less than 50% of individuals breed more than once (Trenham et al. 2000). Rainfall can significantly alter adult breeding pool attendance, and production of metamorphs tends to be a boom-or-bust scenario (Loredo and Van Vuren 1996). Typically, greater numbers of breeding adults return to pools during years with greater rainfall (Trenham et al. 2000; 2001; Cook et al. 2006; Stokes et al. 2008). Males are often the first to arrive at breeding pools and remain in the pool longer than females (Trenham et al. 2000). Larvae remain in the pools approximately four months and emigrate from the pools as they dry. Metamorph emigration typically occurs throughout May and is directly related to the pool drying date (Trenham et al. 2000).

Amphibian populations are often used as an example for the metapopulation/source-sink models. The CTS populations at different breeding pools often act in a metapopulation fashion (Trenham et al. 2001). Mark – recapture studies found that while most breeding adults return to their natal pool, 22% dispersed to different ponds (Trenham et al. 2001). It should be noted that Trenham and Shaffer (2005) did not capture any CTS, adult or subadult, more than 620 meters from the pool. Thus, pools more than 1,240 meters from one another may limit dispersal. Breeding CTS have been known to use artificially created pools, and the creation of pools in a stepping-stone fashion has been suggested to aid dispersal between populations (Stokes et al. 2008).

The diet of larval and metamorphosed CTS is not well studied. Studies on the diet of other larval *Ambystomids* have found that less developed larvae prey mainly on zooplankton, and larger, more developed larvae prey on amphipods, mollusks, and insect larvae as well as zooplankton (Dodson and Dodson 1971; Hoff et al. 1985; McWilliams and Bachmann 1989). Adult diet consists of terrestrial invertebrates such as earthworms, snails, and other insects. Vertebrates, such as small mammals and fish, may be taken as well (Stebbins 1959; NatureServe 2009).

CTS populations are negatively affected by predatory fish and amphibian populations. Mosquitofish (*Gambusia* sp.), smallmouth bass (*Micropterus dolomieu*), green sunfish (*Lepomus cyanellus*), and bullfrogs (*Rana catesbiana*) are common predators of CTS larvae and adults (NatureServe 2009). Yearly drying of vernal pools used for breeding greatly reduces the numbers of these potential predators; however, heavy spring and winter rains can connect pools to other permanent water sources and introduce CTS predators.

<u>Local Distribution</u>

Population centers for the Central California Distinct Population Segment identified by the USFWS include the Central Valley Region, Southern San Joaquin Region, East Bay Region, and Central Coast Region. San Benito County falls in the East Bay Region. Fresno County falls in the Southern San Joaquin Valley Region. The CNDDB has records of the CTS occurring in Cerro Colorado (1992), Mercey Hot Springs (1992), Ortigalita Peak (1992), Rock Springs Peak (1999), Ruby Canyon (1993), San Benito (2003), and Topo Valley (2000) USGS quads (**Figure 25**). The years in parenthesis represent the most recent CNDDB documented occurrence in each quad.

CTS larvae were observed in two off-site ponds (Ponds #3 and #12; **Figure 25**) during the 2009-2010 rainy season while conducting protocol-level vernal pool branchiopod surveys (**Table 21**). Pond #3 is a large stock pond that still contained sufficient water level for complete metamorphosis of CTS larvae by May 21st. Seven large CTS larvae were netted at this location. Pond #12 is a vernal pool where small CTS larvae were first observed in February during branchiopod surveys. During the May 21 sampling event, there were several dozen larvae in the pond attempting to metamorphose (due to the drying of the pond). Some may have metamorphosed successfully, though 10 were observed desiccated in the shallow and muddy portions of the pond. Such conditions make these larvae susceptible to avian predation. Protocol CTS Larval Surveys, performed in March, April, and May of 2010, also noted larval CTS in these two ponds. CTS were not observed in the two historic ponds (Ponds #8 and #9) during these protocol larval surveys.

TABLE 21 PONDS SURVEYED DURING PROTOCOL CTS LARVAL SURVEYS, MARCH, APRIL, AND MAY 2010

LOCATION #	HABITAT TYPE	FINDINGS	DRY BY DATE
01	Stock Pond	Clam Shrimp	Still Hydrated 21 May
02	Old Stock Pond	None	21 May (completely dry)
03	Stock Pond	CTS Larvae	Still Hydrated 21 May
04	2 Stock Ponds	None	21 May (completely dry)
05	Old Stock Pond	None	12 April (completely dry)
06	Stock Pond	None	21 May (completely dry)
07	2 Old Stock Ponds	None	21 April (almost dry)
08	Ephemeral Pool Complex	None	21 May (only 1 pool hydrated)
09	3 New Stock Ponds	None	21 May (only 2 pools hydrated)
10	Ephemeral Pool Complex	None	21 May (completely dry)
11	Old Stock Pond	None	Still Hydrated
12	Stock Pond	CTS Larvae	Drying fast 21 May

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Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- Known CTS Breeding Pond
- CTS Pond Buffer

N

0 1,000 2,000 4,000
Feet

Panoche Valley Solar Project

Known California Tiger Salamander Breeding Ponds
Outside Project Footprint and Valley Floor Conservation Lands

Figure 25

No CTS breeding were observed in the Project Footprint during the 2009-2010 rainy season. However, breeding was confirmed in the two nearby, but off-site ponds discussed above. CTS breeding in those ponds could estivate on portions of the Project site, as discussed below in **Section 5.4**. While aquatic life was devoid in Ponds #8 and #9 during that same rainy season (2009 to 2010), these two pond areas supported historic breeding for CTS in 1992, and thus will be treated as known breeding ponds for this analysis.

4.5 California Condor

Legal Status

The California condor (CACO) is currently listed as endangered by the ESA. The CACO was originally listed as being in danger of extinction under the Endangered Species Preservation Act of 1966 (32 FR 4001, March 11, 1967) and is currently listed as endangered under the ESA of 1973, as amended. As of October 2008 the total population of CACO was 327, with 162 of those in captivity (Natureserve). Approximately 574,400 acres of critical habitat have been designated in Ventura, Los Angeles, Santa Barbara, San Luis Obispo, Kern, and Tulare Counties. The *California Condor Recovery Plan Third Revision* was published in April of 1996 (USFWS 1996).

Species Ecology

The CACO is the largest soaring bird in North America and one of the largest flying birds in the world. It has a wingspan of 2.8 meters and a broad, wedge-shaped tail. The sexes appear similar, but there is a slight difference in mass, with males averaging 8.8 kilograms (kg), and females averaging 8.1 kg (Snyder and Schmitt 2002). Adult birds are generally black, with mostly bald heads and necks. The bill is long, hooked at the end, and enveloped with flesh along the majority of its length. A feathered ruff is located at the base of the neck into which the neck and lower head can be withdrawn in order to warm the bird. White feathers of the underwing coverts and white tips on the upperwing coverts produce an elongated triangle on the leading half of the wing undersides and a white bar on the upperwing, respectively. Mature birds possess brightly colored heads and necks, which range from yellow to red on the head and gray to yellow on the neck. The front of the neck just above the ruff is a deep red color that can vary in intensity depending on the mood of the bird. Air sacs located under the brightly-colored regions can be inflated during antagonistic or reproductive displays. During hot weather, their legs are often white with excrement, as the evaporating waste functions to cool the bird by a process known as urohydrosis (Sibley 2001).

Prehistorically, the CACO ranged over much of the southern United States from Baja California to Florida. Fossils have even been reported from as far north as New York (Steadman and Miller 1987). The disappearance from much of its range occurred 10,000 – 11,000 years ago, coinciding with the late Pleistocene extinction of North American megafauna (USFWS 1996). By the time of European settlement in western North America, the CACO occurred only in a narrow strip along the Pacific Coast from British Columbia, Canada to Baja California, Norte, Mexico. Their range shrunk rapidly until 1987, when the last free flying individual was caught, the CACO only occupied a wish-bone shaped area overlaying nine California counties: Los Angeles, Ventura, Santa Barbara, San Luis Obispo, Monterey, San Benito, Fresno, Kern, and Tulare Counties. Since capturing the last wild individual in 1987, a captive breeding program has led to the re-release of the CACO back into the wild. Individuals have been released in southern California, Arizona around the Grand Canyon, and the Baja Peninsula of Mexico. Currently, there are four active release sites in California, one in Arizona and one in Mexico.

The CACO is a habitat generalist, nesting in areas as diverse as chaparral and snow-covered montane forests. Nesting sites typically occur in cliff cavities, large rock outcrops, and large trees. Roosting sites are usually nearby (Snyder and Schmitt 2002, USFWS 1996). Both types of sites require isolation from human disturbance. Foraging tends to occur in relatively open foothill grasslands and oak savannah habitats, somewhat separate from nesting habitat. Occasionally densely vegetated areas may be used and possibly even in chaparral and forest, though this has not been frequently observed. The CACO locates its food by sight, not olfactory receptors, so open areas with little brush to conceal carrion are required. The CACO requires sufficient food availability, open habitat to locate and reach food sources, and consistent thermal wind patterns for soaring. Because of their large mass, condors tend to only flap their wings during takeoff and landing, meaning that foraging usually only occurs when there are winds strong enough to sustain flight during the activity.

The CACO feeds primarily on mammalian carrion, and occasionally on the remains of reptiles and birds. In recent years this diet has ranged from large to relatively small prey and has included domestic animals, mule deer (*Odocoileus hemionus*), coyotes (*Canis latrans*), ground squirrels (*Spermophilus* spp.), common gray foxes (*Urocyon cinereoargenteus*), long-tailed weasels (*Mustela frenata*), kangaroo rats (*Dipodomys* sp.), and Botta's pocket gophers (*Thomomys bottae*) (Snyder and Schmitt 2002; USFWS 1996). Various types of shells have also been found in CACO nests. Historically, CACO populations in coastal areas consumed fish and marine carrion as well, though those do not appear to be a very common food source anymore. Condors generally soar several hundred meters above the ground and watch for other scavengers in order to locate carcasses. They will then circle over the carcass, likely to guide other condors to the food source (USFWS 1996), before landing and subsequently taking the carcass from smaller species. If golden eagles are present, condors will typically wait until the eagles leave, rather than engage them. Fresh carrion is preferred, though the birds will occasionally feed on decayed carcasses, depending on food availability. The CACO is believed to feed only one to three days per week, though this may differ seasonally or by individual.

Pair formation generally begins in December and lasts throughout spring. Once a pair forms, they will remain together year-round for multiple years. Several weeks prior to egg-laying, a network of alternate nest sites are visited until one is selected by the female. Nest investigations consist of the pair entering the site and spending several hours moving organic substrate about with their bills and feet in the area where egg-laying will occur (Snyder and Schmitt 2002). Different nest sites are used by the pair from year to year (Snyder and Sibley 1986), which may be an adaptation to reduce parasite infestation (Snyder and Schmitt 2002). The network of nest sites used by a single pair may be distributed over an area many miles in diameter. After females select a suitable nest, they lay a single egg (averaging 281 grams), usually between early January and early April (Snyder and Schmitt 2002). Incubation is a cooperative "tag-team" effort between parents and lasts from 53 to 60 days (Snyder and Schmitt 2002), resulting in the hatching of a white downy chick with open eyes.

Nestlings are brooded by both parents almost constantly for the first two weeks, after which there is a rapid decline until only erratic night-brooding occurs from about one month of age (Snyder and Snyder 2000). During the initial two-week period, parents invest a large amount of time feeding, grooming, and inspecting their young when not brooding. Feeding, like all other parental duties, is performed by both parents and is accomplished by regurgitation (Snyder and Snyder 2000). After one month of age, attendance by parents declines substantially to stabilize at a level that will be maintained until fledging occurs at approximately six months of age. Post-fledging care by parents lasts approximately six months and consists of intermittent feedings with ever-growing time lapses between each occurrence. This prolonged parental care is most likely the reason that condors do not breed annually on a regular basis. Fledglings are considered fully independent when able to successfully compete with other species normally displaced by mature individuals during feeding.

The CACO usually occupies traditional roosting sites until mid-morning and return to the same roosting sites in mid- to late-afternoon. However, it is not unusual for a CACO to remain on a roost for an entire day. Cliffs and tall conifers, including dead snags, are generally utilized as roost sites. Studies performed during the 1980s showed that the CACO was capable of making extremely long daily flights. Mature condors tended to travel shorter distances than immature condors. Paired nesting individuals rarely traveled more than 70 km (44 miles) from their nest site. The longest recorded flight during a single day was by an immature male and was 225 km (141 miles; Meretsky and Snyder 1992). The CACO uses thermal patterns created by topography for flights. High wing loading values allow the CACO to remain aloft for long periods of time while expending little energy; however, favorable winds and thermals are required for extended foraging flights. Foothills and mountainous terrain create the most favorable wind and thermal conditions. The CACO is rarely observed over large flat areas.

The CACO rarely falls prey to other predators; however, golden eagles, ravens, coyotes, and black bears (*Ursus americanus*) have been known to take CACO chicks and eggs in the past (Snyder 1986). Perhaps the largest known killer of the CACO in recent times is the ingestion of lead from unrecovered game animals and gut piles (Fry 2003, Parish et al. *in press*).

<u>Local Distribution</u>

One of the active CACO release sites is located at Pinnacles National Monument in the Gabilan Mountains of San Benito County. Pinnacles National Monument is located approximately 16 flight miles southwest of the Project Footprint. In 2007, this population stood at 12 individuals. No critical habitat for the CACO has been designated in San Benito County. The CNDDB has no records of the CACO in San Benito County, even though Pinnacles National Monument is an active release site in the county.

No suitable nesting habitat exists on the Project Footprint. Although possible foraging habitat may exist on the Project Footprint and Conservation Lands, the CACO has not been observed during other biological surveys on-site (including ongoing golden eagle/raptor use surveys). According to the USFWS, radio-tracking surveys of released CACO have identified CACO occurring over the Action Area while in flight, likely while foraging.

Aerial nest surveys targeting nesting golden eagles did not identify any potential CACO nests within ten miles of the Project Footprint.

4.6 Vernal Pool Fairy Shrimp

<u>Legal Status</u>

The VPFS is currently listed as threatened by the ESA. The VPFS was listed under the ESA on September 19, 1994. On February 10, 2006 the USFWS designated 858,846 acres (347,563 hectares) of critical habitat for four vernal pool crustaceans (including the VPFS) and 11 vernal pool plants. The VPFS does not have its own recovery plan, but is included in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005).

<u>Species Ecology</u>

The VPFS are distinguished from other fairy shrimp by the presence and size of several mounds on the male's second antennae and by the female's short, pyriform brood pouch. VPFS are typically a translucent off-white to grey and vary in size from 11 to 25 mm (0.4 to 1.0 inch) in length (Eng et al. 1990). Locomotion is obtained by swimming through the water column on their backs and using paddle-like feet that also function as gills (USFWS 2005; Wildlands, Inc. 2004).

The VPFS was first described to science in 1990, although it had been collected and misidentified as a Colorado fairy shrimp as early as 1941 (Eng et al. 1990, USFWS 2005). Given the VPFS' late description to science, information on its historical distribution is limited. However, the VPFS is currently known to occur in a wide range of vernal pool habitats in the southern and Central Valley regions and coastal ranges of California and in two vernal pool habitats in the Agate Desert region of southern Oregon (USFWS 2005). The historical range of the VPFS most likely was similar to the historical distribution of vernal pools across California. As such, the historical distribution was likely similar to the current distribution, although less habitat is available than historical levels. The VPFS is one of the most widely distributed fairy shrimps in California, but is uncommon throughout its range and rarely abundant when it does occur (Eng et al. 1990).

Helm (1998) found VPFS in 21 different types of habitat, including vernal pools, vernal swales, alkaline pools, and road-side ditches. Optimal pools tend to be a neutral to slightly alkaline pH, have low dissolved salts, and are dominated by native vernal pool plants. VPFS can occur in pools as large as 10 hectares (25 acres), but most occur in much smaller pools measuring less than 0.02 hectares (0.05 acres; Gallagher 1996, Helm 1998). Helms (1998) found the average depth of pools containing VPFS to be 15 cm, with an average maximum depth of 22 cm. Optimal pools tend to be a neutral to slightly alkaline pH, have low dissolved salts, and are dominated by native vernal pool plants. The common thread between all types of habitat is that they dry out during the summer and fall. The eggs, or cysts, of VPFS require a drying and inundation cycle to trigger hatching. If the cysts do not dry out, a fungal infection can occur, killing the cyst.

Once hatched, VPFS can mature to adulthood in as little as 14 days, given the optimal water temperature (Gallagher 1996). Helm (1998) observed VPFS mature to adulthood in 18 days following a late-October rain followed by mild weather and water temperatures at 15˚C. Time to maturation varies greatly with water temperature. Warmer water temperatures increase the maturation process, but cooler water temperatures are necessary for cyst hatching. Helm (1998) observed that the mean time to reproduction was 39.7 days, and the mean population longevity was 90.6 days; although one population lasted 139 days. The VPFS is typically a univoltine species (one generation per year); however, different generations may be present in a single wet season if a pool partially dries out, leaving the upper banks dry and then re-inundates (Helm 1998, USFWS 2005, Yolo Natural Heritage Program 2009).

VPFS forage on bacteria, protozoan, algae, rotifers, and bits of detritus. Vernal pool branchiopods in general provide a major foraging source for migrating waterfowl and shorebirds. Mallard (*Anas platyrhynchos*), green-winged teal (*A. crecca*), bufflehead (*Bucephala lbeola*), greater yellowlegs (*Tringa melanoleuca*), and killdeer (*Charadrius vociferus*) all forage actively on vernal pool branchiopods during spring migrations (Yolo Natural Heritage Program 2009). Western spadefoot (*Spea hammondii*) bullfrog (*Lithobates catesbeianus*), mosquitofish (*Gambusia affinis*), and vernal pool tadpole shrimp (*Lepidurus packardi*) also forage on VPFS.

Mobile predators, such as waterfowl and shorebirds, can expel viable cysts in their excrement, thus aiding in the dispersal of VPFS. VPFS also disperse in high water events that can temporarily interconnect adjacent pools.

Local Distribution

The 2005 USFWS *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* only notes two locations of VPFS populations in San Benito County. The CNDDB has records of the VPFS occurring in Topo Valley (1989) USGS quad. No critical habitat for the VPFS has been designated in San Benito County.

One-hundred and twenty-one (121) ephemeral pools were identified within the Project Footprint, which were classified as ephemeral drainages within seasonal drainages (50 features; 1.88 acres), road puddle or roadside ditch (36 features; 0.22 acres), stock pond (5 features; 0.34 acres), trough puddles that were created by livestock around leaky troughs (15 features; 0.13 acres), and vernal pools (15 features; 0.26 acres; **Figure 26**).

The winter 2010 Protocol Vernal Pool Branchiopod Surveys identified VPFS within the Action Area in one pool, a small berm pond located along the boundary of Sections 4 and 9. One other pool, created by excavated dirt used for the berm around the occupied pool, was identified as hydrologically connected with the VPFS occupied pool. VPFS were not found in any other potential habitat throughout the project site or the VRCL (**Figure 27**).

4.7 Conservancy Fairy Shrimp

Legal Status

The CFS is currently listed as endangered by the ESA. It is not listed by the California Endangered Species Act (Fish and Game Code §§ 2050 *et seq*). The CFS was listed under the ESA on September 19, 1994. On February 10, 2006 the USFWS designated 858,846 acres (347,563 hectares) of critical habitat for four vernal pool crustaceans (including the CFS) and 11 vernal pool plants. The CFS does not have its own recovery plan, but is included in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005).

Species Ecology

The CFS is distinguished from other fairy shrimp by variations to the male's second antennae and the female's brood pouch. The distal segment of the male's second antennae is about 30% shorter than the basal segment, and the tip is bent medially about 90˚. The female's brood pouch is tapered at each end and typically extends to the eighth abdominal segment (Eng et al. 1990). Mature CFS are 14 to 27 mm (0.6 to 1.1 inches) in length. The CFS is typically off-white to grey, although the brood pouch may be green or yellow. Locomotion is obtained by swimming through the water column on their backs and using paddle-like feet that also function as gills (USFWS 2005).

The CFS was first described to science in 1990, although the specimens used in identification were collected in 1982 (Eng et al. 1990). Information on the historical distribution of CFS is limited, however it is likely that the species once occupied suitable vernal pool habitat throughout the Central Valley and southern coastal regions of California. The CFS is currently known from a few isolated populations over a large portion of the Central Valley from Tehama, Butte, Solano, Glenn, Yolo, Merced, Stanislaus, and Ventura Counties.

Suitable habitat for the CFS includes vernal pools, alkaline pools, and vernal lakes (Helm 1998). Occupied pools ranged from 30 square meters (m^2) to 356,253 m^2. Occupied pools averaged 27,865 m^2 (299,865 square feet (ft^2)), which is larger than the average pool size of all other endemic California branchiopods. Pool depth ranged from 10 to 40 cm with an average of 23.1 cm. Other habitat characteristics include low alkalinity, low total dissolved solids, a pH near 7, and being dominated by native vernal pool plants (USFWS 2005). The common thread between all types of habitat is that they dry out during the summer and fall. The eggs, or cysts, of VPFS require a drying and inundation cycle to trigger hatching. If the cysts do not dry out, a fungal infection can occur, killing the cyst.

Once hatched, CFS can mature to adulthood in an average of 46 days, although reproduction has been observed in as little as 19 days in optimal water conditions. All CFS observed in this instance died once

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Legend

- Project Footprint
- Valley Floor Conservation Lands
- Vernal Pool within 100-year Floodplain (56)
- Vernal Pool outside 100-year Floodplain (71)
- 100-year Floodplain

N

0 625 1,250 2,500
Feet

Panoche Valley Solar Project

Ephemeral Pool Habitat Locations

Figure 26

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10/15/2013

Panoche Valley Solar Project

Vernal Pool Fairy Shrimp Observations

Figure 27

the water temperature reached a steady 25˚C. CFS may live as long as 154 days (Helm 1998). Time to maturation varies with water temperature. The CFS is typically a univoltine species (one generation per year); however, different generations may be present in a single wet season if a pool partially dries out, leaving the upper banks dry and then re-inundates (Helm 1998, USFWS 2005, Yolo Natural Heritage Program 2009).

CFS forage on bacteria, protozoan, algae, rotifers, and bits of detritus. Vernal pool branchiopods in general provide a major foraging source for migrating waterfowl and shorebirds. Mallard, green-winged teal, bufflehead, greater yellowlegs, and killdeer all forage actively on vernal pool branchiopods during spring migrations (Yolo Natural Heritage Program 2009). Western spadefoot, bullfrog, mosquitofish, and vernal pool tadpole shrimp also forage on CFS.

Mobile predators, such as waterfowl and shorebirds, can expel viable cysts in their excrement, thus aiding in the dispersal of CFS. The CFS also disperse in high water events which can temporarily interconnect adjacent pools.

Local Distribution

The 2005 USFWS *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* does not note any extant populations of CFS in San Benito County. The CNDDB has no records of CFS occurring in the Project Footprint or on USGS quads or the encompassing quads. No critical habitat for CFS has been designated in San Benito County.

No CFS were observed on the project site or the VFCL and VRCL during winter 2010 Protocol Vernal Pool Branchiopod Surveys.

4.8 Longhorn Fairy Shrimp

Legal Status

The LHFS is currently listed as endangered by the ESA. It is not listed by the California Endangered Species Act (Fish and Game Code §§ 2050 *et seq*). The LHFS was listed under the ESA on September 19, 1994. On February 10, 2006 the USFWS designated 858,846 acres (347,563 hectares) of critical habitat for four vernal pool crustaceans (including the LHFS) and 11 vernal pool plants. The LHFS does not have its own recovery plan, but is included in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005).

Species Ecology

Male LHFS are easily distinguished from other fairy shrimp by the very long second antennae, which is about twice as long, relative to its body size, as the second antennae from other species. Females can be distinguished by their cylindrical brood pouch which extends below abdominal segments six and seven. Mature adults range from 12 to 21 mm (0.3 to 0.4 inches) in length. Locomotion is obtained by swimming through the water column on their backs using paddle-like feet that also function as gills (USFWS 2005).

The LHFS was first described to science in 1990, although specimens were collected as early as 1937 (Eng et al. 1990). Given the late description to science, information on the historical distribution of LHFS is limited. It is surmised that the species does not extend into the northern portion of the Central Valley or into southern California, based on extensive surveys in southern California, and because the northern Central Valley may not reach the necessary temperatures for maturation. Currently the LHFS is extremely rare and only known from eight distinct populations in San Luis Opisbo, Merced, Contra Costa, and Alameda Counties (USFWS 2005).

Helm (1998) surveyed 4,008 vernal pools, and similar habitats, for fairy shrimp. Only four pools contained LHFS. Habitat that contained LHFS in Helm's study included alkaline pools and rock outcrop pools. Pools which contained LHFS ranged from 4.6 to 2,788 m^2 (49 to 30,009 ft^2) and averaged 678 m^2 (1,195 ft^2). Pool depths ranged from 10 to 40 cm (3.93 to 15.75 inches) and averaged 23.1 cm (9.09 inches). Other characteristics of pools with extant populations include a pH near neutral, and temperatures ranging from 10 to 28˚ C. The common thread between all types of habitat is that they dry out during the summer and fall. The eggs, or cysts, of VPFS require a drying and inundation cycle to trigger hatching. If the cysts do not dry out, a fungal infection can occur, killing the cyst.

Time to maturation and time to reproduction is currently unknown. The LHFS is typically a univoltine species (one generation per year); however, different generations may be present in a single wet season if a pool partially dries out, leaving the upper banks dry and then re-inundates (Helm 1998, USFWS 2005). The LHFS has been found in the same general areas as CFS, VPFS, California fairy shrimp (*Linderiella occidentalis*), and versatile fairy shrimp (*Branchinecta lindahli*; Eng et al 1990, Eriksen and Belk 1999).

LHFS forage on bacteria, protozoa, algae, rotifers, and bits of detritus. Vernal pool branchiopods in general provide a major foraging source for migrating waterfowl and shorebirds. Mallard, green-winged teal, bufflehead, greater yellowlegs, and killdeer all forage actively on vernal pool branchiopods during spring migrations (Yolo Natural Heritage Program 2009). Western spadefoot, bullfrog, mosquitofish, and vernal pool tadpole shrimp also forage on LHFS.

Mobile predators, such as waterfowl and shorebirds, can expel viable cysts in their excrement, thus aiding in the dispersal of LHFS. LHFS also disperse in high water events that can temporarily interconnect adjacent pools.

Local Distribution

The 2005 USFWS *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* does not note any extant populations of LHFS in San Benito County. The CNDDB has no records of LHFS occurring in the Project Footprint or the encompassing USGS quads. No critical habitat for LHFS has been designated in San Benito County.

No LHFS were observed on the project footprint or Valley Floor and VRCL during the winter 2010 Protocol Vernal Pool Branchiopod Surveys.

4.9 Vernal Pool Tadpole Shrimp

Legal Status

The VPTS is currently listed as endangered by the ESA. It is not listed by the California Endangered Species Act (Fish and Game Code §§ 2050 *et seq*). The VPTS was listed under the ESA on September 19, 1994. On February 10, 2006 the USFWS designated 858,846 acres (347,563 hectares) of critical habitat for four vernal pool crustaceans (including the VPTS) and 11 vernal pool plants. The VPTS does not have its own recovery plan, but is included in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005).

Species Ecology – The VPTS is identified by a large, shield-like carapace that covers the anterior half of the body. They have 30 to 35 pairs of phyllopods, a segmented abdomen, and paired cercopods or tail-like appendages. When seen from above, the carapace and cercopods give the VPTS the appearance of a tadpole. Mature VPTS range from 15 to 86 mm (0.6 to 3.3 inches; USFWS 2005). VPTS are typically green, but coloration may vary from clear to tan, depending on water clarity (Yolo Natural Heritage Preserve 2009).

The VPTS is an extremely old species which has remained relatively unchanged over the last two million years. From the end of the Pleistocene until the mid-1800s most of California's Central Valley contained extensive seasonal wetlands, which may have periodically covered the entire valley (Oakeshott 1978). Historically, VPTS was probably distributed throughout these wetlands of the Central Valley and Central Coast regions, but did not range outside the Central Valley (USFWS 2005). Currently the VPTS is distributed across the Central Valley and into the San Francisco Bay area. The extant populations are known from Shasta, Butte, Tehama, Sacramento, Yuba, Placer, Solano, Glenn, Merced, Tulare, Kings, Fresno, Stanislaus, Madera, Sutter, Fresno, and Alameda Counties (USFWS 2005, Yolo Natural Heritage Program 2009). However, the VPTS is considered rare throughout the remaining vernal pool habitat in its range. Helm (1998) found VPTS in only 17% of vernal pools sampled.

Helm (1998) found VPTS in 17 different types of habitat, including alkaline pools, vernal pools, vernal swales, ditches, road ruts, and stock ponds. Average occupied pool size was 1,828 m^2. Occupied pool depth ranged from two to 151 cm, with an average of 15.2 cm. Optimal pools are neutral to slightly alkaline, clear, low in dissolved solids, and dominated by native vernal pool plants. The common thread between all types of habitat is that they dry out during the summer and fall. The VPTS was able to withstand water temperature as high as 32˚C, and only died when their pools dried. The eggs, or cysts, of VPFS require a drying and inundation cycle to trigger hatching. If the cysts do not dry out, a fungal infection can occur, killing the cyst. However, cysts can hatch during the wet season without the pool drying out.

Once hatched, VPTS can mature to adulthood in as little as 25 days, given optimal water temperature (Helm 1998). Helm (1998) observed the mean time to reproduction of 54 days, with a minimum of 41 days. Tolerance of higher water temperatures may explain why the VPTS has one of the longest life spans of vernal pool crustaceans. Mean population longevity was 143.6 days, and maximum longevity was 168 days (Helm 1998). Unlike other vernal pool crustaceans, VPTS eggs do not require a dry period before hatching, although they do require inundation. Multiple generations may occupy one pool. Females could deposit as many as six clutches of eggs in a single wet season.

VPTS are omnivorous with a strong preference for animal matter. Live invertebrates, amphibian larvae, carrion, and detritus filtered from the water column make up the VPTS diet.

Vernal pool branchiopods in general provide a major foraging source for migrating waterfowl and shorebirds. Mallard, green-winged teal, bufflehead, greater yellowlegs, and killdeer all forage actively on vernal pool branchiopods during spring migrations (Yolo Natural Heritage Program 2009). Western spadefoot, bullfrog, and mosquitofish also forage on VPTS.

Mobile predators, such as waterfowl and shorebirds, can expel viable cysts in their excrement, thus aiding in the dispersal of VPTS. VPTS may also disperse in high water events which can temporarily interconnect adjacent pools.

Local Distribution

The 2005 USFWS *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* does not note any extant populations of VPTS in San Benito County. The CNDDB has no records of VPTS occurring within the Project Footprint or the encompassing USGS quads. No critical habitat for VPTS has been designated in San Benito County.

No VPTS were observed in the Project Footprint or VFCL during the winter 2010 Protocol Vernal Pool Branchiopod Surveys. However, VPTS were observed in one pool on the VRCL during the winter 2010 Protocol Vernal Pool Branchiopod Surveys.

5.0 EFFECTS ANALYSIS AND DETERMINATIONS

Federally listed species that occur in the Project Footprint would be affected by activities associated with construction, operation, and maintenance of the Action. Potential direct and indirect impacts include temporary disturbance and displacement, loss and fragmentation of habitat, and mortality of individual plants and animals. Direct impacts are those that cause immediate responses such as mortality, habitat loss, and disturbance (resulting in behavioral changes e.g. flushing, displacement, etc.). Indirect impacts are those that cause a protracted response such as increased foraging time or increased roost tree searching due to habitat reduction and/or habitat degradation from noxious weed invasions or habitat fragmentation.

The solar arrays, roads, and supporting facilities are expected to have some adverse effects on federally protected T&E species. Continued use of the site for solar (PV) production would likely alter the micro-climate under the arrays due to shading, change vegetation compositions or directly exclude species occupancy. However, construction and operation of the solar facility has been designed to avoid and minimize impacts to existing resources to the maximum extent practicable, and on-going management of the grasslands that will remain on site are intended to be specifically managed to maximize food production for such species as GKR and other small burrowing animals. Therefore, while some degradation is expected, the site is expected to continue to provide suitable habitat attributes for some of these species to persist.

Many of the species addressed in this document exhibit life history strategies that would be best classified as R-selected species, with high reproductive capacity that more closely tracks changes in resource production than species with lower reproductive rates that usually exhibit longer lag time as functional and/or numerical response(s). In fact, populations of such species (GKR, BNLL, CTS, VPFS, CFS, LHFS, and VPTS) that occur within the Project vicinity are known to fluctuate substantially with rainfall patterns – wetter years tend to produce higher food resources, higher reproductive rates, and increasing populations. Poorer rainfall years, particularly several in a row can lead to depressed populations. R-selected species exhibit life history strategies that may allow them to occur in areas of high disturbance.

The Project may result in the incidental take of individuals of several federally listed species as a result of:

1. Solar array installation, grading, relocation of species, erection of fences, and other ground disturbing activities associated with construction, and vehicle traffic specific to construction.
2. Operations and maintenance.
3. Preservation and management of Conservation Lands.
4. Decommissioning.

The Action would also result in the preservation and management of approximately 24,185 acres of Conservation Land in perpetuity that would provide significant benefits to several listed species, including species that would experience take as a result of project implementation.

A thorough study of the federally listed species occurring within the project footprint was completed for the Project and vicinity. The *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) and other relevant literature was reviewed, and the resource agencies and species experts were consulted regarding the federally listed species in the Action area and in the region.

The spatial scale for analyzing impacts to the federally listed species (and determining appropriate conservation measures to mitigate unavoidable impacts of the Project on such species) is the Action Area. The Action Area is situated within the Ciervo-Panoche Natural Area that provides a regional context for impacts. Haight et al. (2004) described the Ciervo-Panoche area as a region that consists of approximately 214,000 acres (866 square kilometers [km^2]) and is made up of approximately 59,305 acres (240 km^2 or 28 percent) of protected public lands, and approximately 154,688 acres (626 km^2 or 72 percent) of unprotected private lands. This region is referenced in the Recovery Plan (USFWS 1998) and the USFWS 5-Year Review for the relevant species.

Within the Ciervo-Panoche Natural Area, the Panoche Creek Watershed encompasses approximately 33,000 acres. The rangeland valley floor of Panoche Valley encompasses approximately 14,000 acres. The developed Project would permanently disturb approximately 2,492 acres within the Project Footprint. Temporarily disturbed areas would be restored after construction is completed. Once restoration of temporarily disturbed areas is complete, the total interstitial space would be approximately 941 acres. Undisturbed areas would include on-site drainages, the 100-year floodplain, and biological avoidance areas included in the VFCL.

Construction of the Project will include solar panels that will be mounted above ground on steel posts driven into the ground, and areas under and around the solar arrays will continue to exist as grasslands. Unfortunately, little is known about how the federally listed species will react to the placement of a solar facility on the landscape. The elevated solar arrays, roads, and supporting facilities are expected to have some adverse effect on these species' continued use of the site, may alter the micro-climate under the arrays (shading), the vertical structures may alter species behavior, and undisturbed habitats will be fragmented. It is assumed that some unquantifiable amount of habitat value will remain within and under the solar arrays post-construction. However, given that such residual value of habitat within and under solar arrays cannot be calculated at this time based on current information, residual value of habitat was not given significant weight in the assessment of impacts.

The Action also includes the permanent conservation of approximately 24,185 acres adjacent to the Project Footprint in the form of three distinct conservation areas: the VFCL (approximately 2,523 acres), the VRCL (approximately 10,772 acres), and the SCRCL (approximately 10,890 acres). Together these conservation lands will permanently conserve suitable, occupied habitat for several listed species analyzed in this document. Portions of these conservation lands (e.g. Silver Creek Ranch) have been identified by the USFWS as highest priorities for conservation in order to achieve recovery for several species (e.g. GKR). Because the Conservation Lands are considered a part of the Action, the direct and indirect effects of the preservation of the 24,185 acres of conservation lands on the individual federally listed species are analyzed below.

Table 22 provides a summary of the species impacted by the Action, the number of individuals potentially impacted and conserved, and mitigation measures to be implemented for each species.

TABLE 22 INDIVIDUALS IMPACTED AND POPULATION ESTIMATES FOR SELECT T&E SPECIES ON CONSERVATION LANDS

Species	Estimated Number of Individuals				Acres of Habitat		Additional Mitigation
	Project Footprint	VFCL	VRCL	SCRCL	Acres Impacted	Acres on Conservation Lands	
CTS	94	150 (total for VFCL and VRCL)		Unknown. 2 ponds with unknown hydrology were located during reconnaissance surveys.	2,371 (no breeding ponds impacted)	4,028.1	Creation of CTS Breeding Ponds and Conservation Management Plan
GKR	197-506	311-568	Up to 2,137 individuals	Up to 44,871 individuals	2,492	16,576.3	GKR Relocation Plan Conservation Management Plan
SJKF	11**	12 individuals	10+ individuals	Unknown (≥Valadeao Ranch)	2,492	14,863	Conservation Management Plan
BNLL	0	145*	Unknown (suitable habitat present, none observed)	Unknown (suitable habitat present, BNLL observed)	2,492	11,833	Conservation Management Plan

*105 BNLL observations during the 2009/2010 surveys seasons and 40 observations of BNLL were recorded during the 2013 survey season. The estimated number of BNLL does not account for repeat observations of individuals during the BNLL surveys.

Number estimated in Project Footprint is not the estimated number to be impacted by the Project (Section 5.2**)

5.1 Giant Kangaroo Rat

Direct Impacts

Direct impacts to GKR could occur as a result of the Action. Potential direct impacts to GKR during construction of the Action include mortality from construction related vehicles (road kill), crushing of individuals that may be in burrows, precinct destruction during installation of panels, habitat loss, and disturbance resulting from construction activities. As noted in **Table 22**, an estimated 197-506 GKR can be expected to inhabit the approximately 63 acres of occupied habitat that would be impacted by the Project. However, GKR mortality is expected to be lower than these estimates due to the implementation of avoidance and minimization measures which will result in the trapping of individuals from construction zones and the relocation of these individuals to suitable areas on- or off-site.

Impacts to individual GKR and their burrows would likely occur during ground disturbing activities without the implementation of avoidance and minimization measures. In addition, GKR could be taken (killed or injured) by moving vehicles, and occupied burrows and food caches (i.e., haystacks) could be damaged by heavy equipment. Mortality from construction related vehicles is expected to be minimal given that GKR are a nocturnal species and nighttime construction will be limited, and a posted speed limit will be enforced. Permanent direct impacts to GKR from maintenance vehicles are not expected during operation of the Action, given the low level of maintenance activities for the facility. The amount of night time activities will be reduced from day time activities, and thus, result in less potential for take of GKR. This decrease in construction workers on-site during the GKR's above ground active period (generally 15 minutes per individual per night) will reduce the likelihood of mortality from construction related vehicles. GKR that re-occupy the site subsequent to the initiation of constructions could also be subject to injury and/or mortality from occupied burrows being crushed.

Increased noise and ground vibration between 7:00 a.m. and 7:00 p.m. may displace individuals from occupied burrows during construction. Displacement from occupied burrows could make individual GKR more vulnerable to predation by excluding them from potential burrows. These impacts would be localized, between 7:00 a.m. and 7:00 p.m., and temporary, especially if individuals are relocated, with the authorization of the regulatory agencies, to artificial burrows outside of the work zone either on-site or on mitigation lands. See **Appendix C** for the GKR Relocation Plan.

Ground disturbance resulting from trenching required for burial of power and communications cables may directly impact GKR where trenches are excavated through burrow precincts. Open trenches would create impassable barriers that could disrupt movement between burrows and foraging areas. Individual GKR could be injured or killed due to entrapment in trenches and pipes stored on the project site. Individuals using pipes as refuge could be buried, or directly killed or injured. Open trenches could create impassable barriers that could disrupt movement of individuals. Individuals that inadvertently fall into deep, steep-walled trenches would be vulnerable to predation, starvation, and entombment.

GKR precincts will be graded and destroyed during construction if they fall in line with a designed access road or placement of panels, resulting in a direct loss in habitat; however, preconstruction surveys would ensure that all precincts are unoccupied at the time of excavation. GKR identified in preconstruction surveys in burrows that will be excavated will be trapped and relocated to suitable nearby habitat (see GKR Relocation Plan in **Appendix C** for more details) within 15 miles of the Project Footprint. These 15 miles will include the conservation lands or regions within the Project Footprint that will not be affected by construction. Other suitable relocation areas may be identified through additional consultation with the USFWS. There is some potential for injury or mortality of individuals during this relocation process. The measures to minimize and avoid these risks are described in the GKR Relocation Plan provided in **Appendix C**.

Implementation of the Action would result in the loss of approximately 2,492 acres of suitable GKR habitat. Based on survey results, project implementation could adversely affect between 197 to 506 individual GKR occupying approximately 63 acres within the Project Footprint. The occupied portion of the Project Footprint represents approximately 1.84% of all occupied acres (Table 23).

Project Conservation Lands (including the VFCL, VRCL, and SCRCL) would result in the permanent conservation of 16,125.3 acres of GKR habitat including 3,507.8 acres of highly suitable habitat (**Figure 28**). Of this suitable habitat, approximately 3,358 acres were estimated to be occupied based on the GKR Distribution Surveys. **Table 23** provides a breakdown of acres of occupied GKR habitat impacted, occupied Conservation Lands, percent of occupied acres found within each area and percent of total suitable habitat occupied by GKR.

TABLE 23 ESTIMATED GKR DENSITIES ON THE VALLEY FLOOR, VALADEAO RANCH AND SILVER CREEK RANCH CONSERVATION LANDS*

	PROJECT FOOTPRINT	VFCL	VRCL	SCRCL	TOTAL
Acres Occupied[1]	63	360	102[2]	2,896[2]	3,421
Percent of occupied acres	1.84	10.52	2.98	84.65	100
Acres Suitable Habitat	2,492	2,523	6,830	7,223.3	19,068.3
Percent of suitable habitat occupied (by site)	2.53	14.26	1.49	40.09	N/A
Percent of total suitable habitat (19,068.3 acres) occupied	0.34	1.89	0.53	15.19	17.95

[1]GKR Distribution Survey results – detections of active and inactive 30m grids
[2]Percent of habitat occupied by GKR from sampled 30m grids applied over suitable habitat present

These Conservation Lands represent the preservation and enhancement of nearly 90 percent of the core population areas of the Panoche Valley GKR as defined by the USFWS Recovery Plan (**Figure 29**). In addition to preserving the most important habitat for the species in the region, the Project will employ avoidance and minimization measures to reduce harm, injury or death to individuals where feasible. As such, the GKR Relocation Plan (**Appendix C**) employs methodology consistent with other successful kangaroo rat relocations and includes guidance from local knowledge of the GKR.

The relocation plan will utilize a hybrid approach, hand or mechanically excavating burrows in areas defined by the HSM as high quality and then relying on trapping to remove GKR from the remaining areas of the site, once they have been surrounded by enclosure fencing (e.g., fencing for the purpose of prohibited recolonization). Hand or mechanical excavation will not occur in areas defined by the HSM as moderate to low quality habitat. Efforts in those areas will rely on trapping to remove the majority of GKR. Because of relocation efforts, the number of GKR negatively impacted by project implementation is expected to be less than the 506 estimated to occur within the Project Footprint. However, this number is assuming that the Project will be completed outside of an extreme population irruption period for GKR within the Project Footprint.

These GKR will be relocated to unoccupied portions of the Conservation Lands as to avoid territorial conflict and stress; if possible, these GKR will be relocated to locations where GKR used to exist but do not anymore, as they were most likely extirpated by disease or otherwise extirpated. By returning this species to previously occupied habitat, they will be returned to a place where GKR were known to exist in the past, and therefore, are more likely to remain in the future This relocation strategy will allow the species to multiply rather than simply preserve the existing population number.

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Panoche Valley Solar Project

Giant Kangaroo Rat Mitigation Lands*

*For the purpose of this figure, data from Live Oak Associates was used for the Valadeao and Silver Creek Ranches, and clipped to the boundaries as shown. Locations with a slope between 0 and 11% were used for the Valley Floor Conservation Lands.

Figure 28

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10/21/2013

Legend

- Project Footprint
- Giant Kangaroo Rat Core Population Area
- BLM Lands
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands

N

0 3,500 7,000
Feet

Panoche Valley Solar Project

Giant Kangaroo Rat Core Population Areas

Figure
29

The relocation of GKR from the Project Footprint into suitable, but unoccupied lands provides a significant opportunity to increase the regional population of GKR, while also managing all of the Conservation Lands (existing or relocated population) in ways that maximize the carrying capacity on the landscape. Given that only 17.61% of the suitable habitat for GKR on the Conservation Lands is occupied, there is adequate capacity to support additional individuals. As noted previously, maintaining appropriate livestock stocking rates in most rainfall years can provide consistent forage for GKR.

In addition, during the operational phase, wildlife exclusion fencing will be removed. This will allow GKR occupying lands in the VRCL and VFCL adjacent to the project footprint to reoccupy suitable areas that they were previously excluded from. Expected suitable areas would include those areas that are between the perimeter fence and the panel arrays and interstitial areas between the arrays that are not shaded for significant portions of the day. It is less certain whether GKR would reoccupy available habitat that is shaded by panels and other structures.

Indirect Impacts

Indirect impacts may include mortality or injury during the build-out due to artificial increases in predator populations attracted to the project site as a result of improper disposal of garbage, food, food wrappers, etc.

The solar panels and other permanent features associated with the Project (e.g., perimeter fencing, solar panels, electrical substation, O&M building) could increase predation of GKR that forage or travel during daylight hours by providing increased perching opportunities for diurnal predatory birds such as hawks, ravens, and loggerhead shrikes, each of which may prey on the species.

The Proposed Action may adversely affect (both directly and indirectly) between 197 to 506 individual GKR (including relocation efforts) and approximately 2,492 acres of suitable habitat, but the Proposed Action also includes significant beneficial effects to the species including the permanent conservation of approximately 16,576 acres of moderate to highly suitable GKR habitat (including 90 percent of the species' core population area) and the protection of up to 52,746 GKR individuals. In addition to the protection of these individuals, implementation of the Conservation Management Plan (**Appendix F**) is expected to increase the carrying capacity of GKR on the Project Conservation Lands. The effects of the Proposed Action taken as a whole represent a net conservation benefit for the continued existence of the species due to the avoidance and minimization measures described above, including the GKR salvage and relocation program and the protection and management of the Conservation Lands in perpetuity.

Mitigation

The following mitigation measures will be implemented within the Project Footprint in order to avoid and minimize adverse impacts to GKR to the maximum extent practicable:

- Surveys documenting the presence of GKR in and around the Project Area were used to delineate areas of high GKR occupancy. Several of these areas were removed from the original Project Footprint in order to minimize impacts to GKR. A total of 212 acres of GKR avoidance areas were removed from the (FEIR) Project Footprint and have been incorporated into the VFCL. These areas were selected due to the large numbers of concentrated active and inactive GKR precincts, presence of high quality habitat, and direct connectivity to protected lands.

- The project footprint will include a 20-foot setback from Little Panoche Road based on the number of GKR active and inactive precincts identified along the adjacent fence line.

- Prior to surface disturbance or other covered activity, a Designated Biologist(s) or their representative shall conduct a listed species education program (tailgate briefing) for all project personnel.

- All activities that will result in permanent or temporary ground disturbances shall be preceded by a preconstruction survey conducted by a Designated Biologist or their representative. The biologist(s) shall identify and clearly mark the location(s) of areas where GKR was/were identified, and dens, burrows, and habitats of GKR.

- Biological monitors will oversee all construction activities from the first day of work through the duration of construction activities. The Designated Biologist or their representative shall be present at all times during ground disturbing activities immediately adjacent to, or within habitat(s) that supports populations of the listed or T&E Species.

- All GKR burrows (active and inactive) shall be avoided to the extent feasible. Should avoidance not be feasible capture/relocation efforts shall insure that all excavated burrows are unoccupied.

- Vegetation shall be cleared in the area immediately surrounding active burrows/precincts, followed by a period of one night without further disturbance to allow the GKR to vacate the burrow/precinct.

- If GKR do not voluntarily leave occupied burrows/precincts, they shall be live trapped prior to commencing ground disturbing activities in the area. If the disturbance is temporary (<1 day), trapped individuals will be held under suitable conditions, during the period of disturbance, and then released at the same location at which they were trapped. For instances where the disturbance is longer term or permanent, individuals will be trapped and relocated to unoccupied burrow precincts, located as nearby as possible in areas that will not be disturbed.

- Methods shall be taken to prevent reentry to the burrow (e.g., one way doors) by GKR (and other small mammal species) until construction is complete in these areas.

- Once construction activities are complete access to the burrows shall be restored where possible. If construction related impacts would result in the crushing or destruction of a burrow, then the burrow shall be excavated (either by hand or mechanized equipment under the direct supervision of the qualified biologist, removing no more than four inches at a time). GKR burrows/precincts shall not be disturbed from January through June (recognized breeding/mating season) unless a qualified biologist, utilizing video technology, verifies that no young are present in the burrow.

- All captured GKR which are not re-released at the same location as capture will be relocated within 15 miles of the Project Footprint (including possible relocation on unaffected regions of the Project Footprint or Conservation Lands) or other locations determined through further USFWS consultation.

- All open holes, steep-walled holes, or trenches more than two feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks (wooden planks should be 10 inches in width and should reach to bottom of trench, placed at an angle appropriate for GKR to exit).

- Unless biological monitors allow alterations to routes, all project vehicles shall be confined to existing roads or prominently staked and/or flagged access routes that are surveyed prior to use.

- Exclusion fencing will be constructed if it is deemed necessary to prevent GKR from entering construction areas.

- In order to preserve, manage, and maintain the ongoing functionality of the proposed GKR corridors within the VFCL, the Action shall implement the following measures:

  - To ensure the ongoing functionality of the habitat corridors, the habitat corridors shall satisfy the following requirements:

    - The habitat corridors need not be of uniform width, but at no point shall a corridor width be less than 100 feet on either side of the incised channel, or more than 100 feet from the ordinary high water mark where no incised channel is evident.
    - Habitat corridors shall conform to contours of natural ecological features in the landscape in which the ecological requirements of the species are the foremost consideration.
    - Habitat corridors shall be fenced with 3-strand barbed wire. Fence locations shall be a maximum of 25 feet from edges of all panel installations.
    - Project design shall incorporate road designation that avoids roads adjacent to the corridors (i.e., there shall be no driving on the side of any panel block adjacent to a designated habitat corridor).

  - New construction of buildings, ornamental tree plantings, or other features not already identified that would reduce available habitat and will provide perching opportunities for predatory birds shall not be permitted within or directly adjacent to the habitat corridors.

- Prior to the start of construction of the Project, habitat corridors shall be placed under a biological conservation easement to be preserved in perpetuity with endowments to The Conservation Fund and subject to the following restriction: driving or road building shall be prohibited across habitat corridors except where this provision conflict with the emergency access requirements of the CAL FIRE/San Benito County Fire Department.

Conclusion

None of the source populations defined by the Recovery Plan (1998) will be directly affected by this Project. Based on the GKR source population survey data, Williams's 1992 research, and discussions with GKR expert Randi McCormick, the Project Footprint can be expected to support a minimum population of GKR between 197 to 506 individuals, some of which could be taken either directly or indirectly (**Table 22**). The Action is expected to result in the loss of approximately 2,492 acres of suitable GKR habitat. As stated previously, the impacts from the first phase of construction of the Project will be offset by the acquisition high quality mitigation lands (the VFCL and the SCRCL) before the start of construction. And lastly, the impacts from the second phase of construction will be offset by the acquisition of the VRCL.

The Action includes the conservation and management of 24,185 acres of Conservation Lands that include 16,125.3 acres of GKR habitat (the Valley Floor, Valadeao Ranch, and Silver Creek Conservation Lands). Project Conservation Lands include over 90 percent of the source population of GKR in the region that will be protected and managed in perpetuity. The Conservation Lands in total are estimated to currently support up to 48,909 GKR and could support a greater number following GKR relocation efforts into suitable but unoccupied lands, and enhancement of Conservation Lands pursuant to the Conservation Management Plan.

For the reasons discussed above the Action **"may effect, and is likely to adversely affect"** the GKR. This determination is based on the fact the Action may adversely affect (both directly and indirectly) between 197 to 506 individual GKR (including relocation efforts) and approximately 2,492 acres of suitable habitat. It should be noted that the Action also includes significant beneficial effects to the species including the permanent conservation of 16,576.3 acres of suitable GKR habitat (including 90 percent of the species' core population area) and the protection of up 52,746 individuals. In addition to the protection of these individuals, implementation of the Conservation Management Plan is expected to increase the carrying capacity of GKR on the Project Conservation Lands. The effects of the Action taken as a whole represent a benefit for the continued existence of the species due to the avoidance and minimization measures described above including the GKR salvage and relocation program, and the protection and management of the Conservation Lands in perpetuity.

5.2 San Joaquin Kit Fox

Direct Impacts

Impacts to individual SJKF and their dens could occur during ground disturbing activities without the implementation of avoidance and minimization measures. SJKF could be killed or injured by moving vehicles and occupied dens could be damaged by heavy equipment. Because SJKF are primarily nocturnal (but have been observed above ground during the day), it is unlikely that an individual will be killed or injured above ground during normal daily operations. However, without precautionary measures, individuals could be harmed or killed in their dens during ground disturbing activities. SJKF could also become entrapped in uncovered pipes and trenches.

A vehicle strike analysis was prepared for the SJKF (**Appendix L**). Few studies address SJKF-vehicle strikes in the Panoche Valley region; however, other studies in the literature may direct actions taken by the Project to minimize the probability of a SJKF-vehicle strike. Information from these studies identified several variables that affect the probability of SJKF-vehicle strikes; these variables include speed limit, traffic volume, time of day, and species density. The vehicle strike analysis indicated that up to two SJKF could be expected to be killed via collisions with project related vehicles on public roads in the vicinity of the Project Footprint.

SJKF activity is primarily crepuscular and nocturnal. Most Project construction, O&M activities that could pose a potential risk to SJKF will be performed during the daytime, thereby minimizing risks to SJKF. Reduced activity and slower speed limits during dusk and nighttime hours will further reduce risks to SJKF.

Operation of the Project is expected to require minimal maintenance, and a significant decrease in vehicle activity is expected after construction. Although loss of habitat is the main impact to individual SJKF, it is anticipated that SJKF will use the Project site post-buildout, as SJKF are known to coexist with anthropogenic land uses such as agriculture and cities and other energy-producing facilities such as oil fields. Ongoing direct impacts to SJKF resulting from vehicle mortality during O&M of the site are not expected, given the low level of maintenance anticipated at the facility.

Increased noise and ground vibration during construction may displace individuals from occupied burrows adjacent to the Project Footprint. Displacement from occupied or suitable burrows could make individual SJKF more vulnerable to predation. These impacts would most likely occur between 7:00 a.m. and 7:00 p.m., and be temporary in nature.

Nightly movements of SJKF on the Elk Hills Naval Petroleum Reserves averaged 9.57 miles (15.4 km) during the breeding season, and 6.34 miles (10.2 km) during the pup-rearing season (USFWS 1998).

Home ranges have been reported from as small as approximately one square mile (mi^2) (2.6 km^2) to as large as 11.97 mi^2 (31 km^2) (USFWS 1998). A minimum of nine SJKF are known to use the Project Footprint (based on Working Dogs surveys and genetics; **Appendices I and J**). Fencing around the Action will be designed in such a way as to be permeable to SJKF and to allow for wildlife movement. Gated eight-foot high chain link fences with possible animal exclusion modifications would be constructed around the substation per the PG&E standard, and temporary fencing would be placed around construction staging areas. The fencing surrounding the substation is planned to not allow wildlife to pass through. Because of the permeable nature of fencing surrounding the site SJKF foraging or dispersal movements would not be constricted, though SJKF may avoid the site during or following construction. The inclusion of a minimum 500-foot wide movement corridor through the center of the project area will also help to ensure that movement within and through the project area is preserved. In addition, fencing will be used to exclude SJKF form the laydown area and construction staging areas during construction activities if possible.

SJKF burrows and dens may be damaged or destroyed during construction if they fall in line with a designed access road or placement of panels, resulting in a direct loss of habitat or individuals if they are present in those burrows. Preconstruction surveys would ensure that all dens are unoccupied at the time of excavation. As scat-sniffing dog surveys on the Project site identified nine individual SJKF using the Project Footprint and at least 22 SJKF use lands within the local vicinity of the site, at least nine SJKF are expected to be directly impacted by the Action, mainly by loss of suitable burrows.

Increased injury and mortality of individual SJKF could occur due to predation from larger carnivores such as the domestic dogs, coyote and red fox that could be attracted to the Action Area by trash discarded by personnel during construction and O&M activities or due to increased prey availability.

The VFCL contain approximately 2,523 acres of SJKF habitat that would be preserved in perpetuity. At least 12 SJKF individuals were identified using these lands in the genetic analysis (including 4 SJKF individuals also using the Project Footprint and one SJKF also using the VRCL; **Appendix J**). It was determined that a 500 meter (1,604.4 feet) wide corridor associated with the existing Las Aquilas Creek/ Valley Floor Conservation Land corridor would be beneficial in providing additional undisturbed connectivity and would promote movement through the site to the north (Cypher pers. comm.). The undisturbed Valley Floor Conservation Land along Las Aquilas Creek was widened to accommodate this SJKF enhancement. The Valley Floor Conservation Land also includes and east west movement corridor along Panoche Creek.

The VRCL contain 5,378 acres of suitable SJKF habitat using the prorated HSM, and a total of 10,772 acres that would be available to SJKF and would be preserved in perpetuity. At least 12 unique individuals were identified using these lands in the genetic analysis (including 4 individuals also using the Project Footprint and 1 individual also using the VRCL; **Appendix J**).

The SCRCL contain 7,413 acres of suitable SJKF habitat using the prorated HSM, and a total of 10,890 acres that would be available to SJKF and would be preserved in perpetuity. Genetic studies were not completed on the SCRCL but spotlighting and camera trap surveys did regularly detect SJKF. A precise population estimate is lacking for these lands but is should be assumed, based on the similar amount of suitable habitat, that the SCRCL would support at least as many SJKF as the VRCL.

In total, more than 14,863 acres of suitable SJKF habitat will be preserved and managed for the SJKF in perpetuity (**Figure 30**). Additionally, SJKF will likely use most of the 23,000+ acres of Conservation Lands that will be preserved, as the SJKF uses varying slopes and may traverse less suitable slopes to get to more suitable habitat. Therefore, the 14,863 acres is based on a ranking scale, and over 23,000 acres will be protected and will allow for the preservation and recovery of the SJKF.

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Legend

Project Footprint

Valley Floor Conservation Lands

Valadeao Ranch Conservation Lands

Silver Creek Ranch Conservation Lands

N

0 3,500 7,000
Feet

Panoche Valley Solar Project

San Joaquin Kit Fox Mitigation Lands

Figure 30

The species' Recovery Plan identifies three core SJKF populations, with one being the Ciervo-Panoche Natural Area of western Fresno and eastern San Benito Counties. Haight et al. (2004a) reports that the Ciervo-Panoche Natural Area consists of approximately 214,000 acres (866 km^2), which includes both protected public lands [59,305 acres (240 km^2 or 28 percent)] and unprotected private lands [154,688 (626 km^2 or 72 percent)]. This core area acreage includes all lands regardless of slope. The Action would result in the permanent preservation of approximately 24,185 acres representing 10.9% of the core area and 15.1% of the unprotected portion of the core population area as noted in the Recovery Plan.

<u>Indirect Impacts</u>

Increased noise and ground vibration from heavy equipment, during construction and O&M activities, may displace individuals from occupied burrows. Displacement from occupied burrows could make individual SJKF more vulnerable to predation by excluding them from potential burrows and cause the SJKF to be more susceptible to injury or mortality from vehicular traffic. These impacts would be localized and temporary.

The Project Footprint contains 2,492 acres of suitable SJKF habitat that will be impacted. Fences around the Project site will be designed so as to be permeable to wildlife, including the SJKF. Because the SJKF is known to thrive within petroleum fields and even in downtown Bakersfield, it is reasonable to expect that individuals will use the site to some extent after build-out. With fencing designed to maximize potential for continued use by SJKF, at a minimum, the site should be used for ingress and egress, and to some extent for foraging, and potentially even denning. SJKF have been observed in the last few years denning in human dominated landscapes within the environs of Bakersfield (e.g., landscape strips contained within shopping malls).

It is unknown how the presence of a large-scale solar generation facility will impact small mammal communities which, when combined with lagomorphs, provide the main prey base for SJKF. A decline in small mammal communities could result in fewer hunting opportunities. There is a potential for loss of individuals due to predation by or competition with species such as domestic dog (*Canis domesticus*), coyote, or red fox that might be attracted to the project site by trash improperly discarded by construction, operation and maintenance, or security personnel.

As stated above, nightly movements of SJKF on the Elk Hills Naval Petroleum Reserves averaged 15.4 km during the breeding season, and 10.2 km during the pup-rearing season (USFWS 1998). Home ranges have been reported from as small as 2.6 km^2 to as large as 31 km^2 (USFWS 1998). Fencing around the Action will be designed in such a way as to be permeable to SJKF. Fencing will be six feet high, consisting of smooth-top chain link in the upper portion and smooth wire for the bottom portion. Fencing around the blocks of panels within the Project Footprint will be elevated approximately 5 to 6 inches off the ground to allow for wildlife movement. Gated eight-foot high chain link fences with possible animal exclusion modifications would be constructed around the substation per the PG&E standard, and temporary fencing would be placed around construction staging areas. The fencing surrounding the substation is planned to restrictwildlife access. The permeable nature of the fencing is not expected to disrupt SJKF foraging or dispersal movements. Additional fencing around the on-site conservation lands would be three-strand barbed wire, which is also permeable to SJKF and other wildlife. If new fencing is installed, wildlife friendly fencing will be installed with at least three-strand barbed wire with a fourth (bottom) strand of smooth wire at least 8 inches above the ground and shall be consistent with local BLM guidelines.

Changes in the current grazing regime could affect the abundance of SJKF but the use of the managed grazing is expected to be beneficiation to the SJKF, especially in the Conservation Lands. A grazing management plan, covering the Action Area, will be prepared for the project.

The Panoche Valley population of SJKF has been identified as a possible source population for recolonizing reclaimed farmland in the San Luis Unit of the Central Valley Project (a large water project within California's Central Valley). Connectivity currently exists between the Panoche Valley population and populations in the Ciervo Hills, Tumey Hills, Panoche Hills, Pleasant Valley, and reclaimed farmland to the east. The Action would reduce the availability of suitable habitat for SJKF, thus decreasing the ability of this population to serve as a source. SJKF permeable fencing and all Conservation Lands, especially including the SJKF 500-meter movement corridor, would allow dispersing SJKF to pass through the Project Footprint in connection with the Ciervo Hills, Tumey Hills, Panoche Hills, Pleasant Valley, and reclaimed farmland to the east. The permanent protection of approximately 24,185 acres of conservation land directly adjacent to the Project Footprint would ensure SJKF populations in the immediately surrounding areas would maintain current levels of connectivity with other surrounding populations and would provide additional protection for those portions of the species' core range.

<u>Mitigation</u>

The following mitigation measures and the other mitigation measures noted in Section 2.42 will be implemented in order to avoid and minimize adverse impacts to SJKF to the maximum extent practicable:

- Prior to surface disturbance or other covered activity, a Designated Biologist or their representative shall conduct a listed species education program (tailgate briefing) for all project personnel.

- All activities that will result in permanent or temporary ground disturbances shall be preceded by a preconstruction survey conducted by a Designated Biologist or their representative. The biologist(s) shall identify and clearly mark the location(s) of areas where SJKF was/were identified, and dens, and burrows of SJKF.

- A Designated Biologist will determine that a biological monitor(s) shall be present while ground disturbing activities are occurring based on the sensitivity of the habitat.

- All activities that will result in permanent or temporary ground disturbances shall be preceded by a preconstruction survey conducted by a Designated Biologist or their representative. The biologist(s) shall identify and clearly mark the location of areas where SJKF individuals, dens, or burrows was/were identified. Appropriate buffers will be established with highly visible markers. All known or occupied SJKF dens shall be identified by flagging and avoided by a buffer with a radius of 30.5 meters (100 feet)

- All known SJKF natal dens shall be identified by flagging and buffered by a radius of 150 feet.

- All occupied SJKF natal dens shall be identified by flagging and buffered by a radius of 200 feet.

- Potential kit fox dens that cannot be avoided will be excavated and back-filled pursuant to USFWS guidelines (January 2011) without prior notification, provided that excavation is approved and supervised by a biological monitor or other qualified biologist.

- All open holes, steep-walled holes, or trenches more than two feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks (wooden planks should be no less than 10 inches in width and should reach to bottom of trench).

- Construction materials will not be stacked in a manner that allows SJKF to establish den sites within the material.

- Unless biological monitors allow alterations to routes, all project vehicles shall be confined to existing roads or prominently staked and/or flagged access routes that are surveyed prior to use.

- Speed limits shall be restricted to 15 mph during daylight hours (5:00 am to 9:00 pm) and 10 mph during night-time hours on the site and 25 mph on public roads in the vicinity during both day and night-time driving.

- Signage designed to be both informative and eye-catching will be posted at the boundary of the Project site along Little Panoche Road to alert drivers both to construction traffic and to the presence of special status species on the site, and will include a posted speed limit.

Determination

Under the Action, which is a reduction of the original Project Footprint of over 75 percent and includes avoidance of the highest quality suitable habitat, the Project will impact a total of 2,492 acres. The Project may impact up to 75 SJKF individuals, including impacts by construction-related traffic via vehicle-strike on public roads and avoidance and minimization measures (trapping and telemetry collaring).

The above number is based on a combination of the information in the Vehicle Strike Analysis, the actual mortalities that have been observed on the Carrizo near the California Valley Solar Ranch and Topaz Solar Facility during construction, and the number of SJKF that are estimated in the Scat Analysis, personal conversation with Mr. Brian Cypher and the CDFW request to capture and collar all SJKF found within the Project Footprint. The number of individual SJKF to be taken is broken down into two separate take categories. The first category is for the potential SJKF that will be accidentally killed or injured due to vehicle strike or becoming entrapped in a hole, other accidental injury, or mortality on Project site. A total of 15 SJKF fall into this category which is assuming three injuries or mortalities per construction year (assuming five year construction period).

The second category is for the potential SJKF that will have to be trapped and collared and part of the avoidance and minimization measures requested by the CDFW. PVS is assuming that up to 12 SJKF may be collared per year of construction (assuming five year construction period) in association with the trapping and telemetry tracking of resident foxes or foxes that venture onto the site due to travel or foraging. Therefore a total of 60 SJKF individuals falls within this category. If any SJKF that are occurring in adjacent habitats are trapped for research purposes, those are not to be included in the take estimate for the Project.

Furthermore, if the Biological Opinion addresses post-construction operations, it is estimated that one SJKF per year could be harassed, injured, or killed on the Project site. This additional take number is not included in the categories above and will have to be addressed separately.

The Project will be preserving 15,314 acres of suitable SJKF habitat, which includes 2,523 acres of the VFCL; 5,378 acres on the VRCL; and 7,413 acres on the SCRCL. All conservation lands will also provide movement corridors through the site and across the valley floor. Additionally, SJKF will likely use most of the over 24,000 acres of Conservation Lands that will be preserved, as the SJKF has been documented to use varying slopes in the Action Area and may traverse less suitable slopes to get to more suitable habitat. The 14,863 acres is based on a ranking scale; approximately 24,185 acres will be protected, and most of it will allow for the preservation and recovery of the SJKF. These 24,185 acres represent over 15% of the currently unprotected lands within the species' mapped core range.

The Conservation Lands are expected to preserve habitat that currently supports at least 12 individuals for the VFCL, at least 10 individuals on the VRCL, and an unknown but likely similar number on the SCRCL. These lands will be preserved in perpetuity for conservation of the SJKF and other regional species. As the Conservation Lands and Project site are all contiguous with one another, individual SJKF are likely to use multiple lands that may include both Conservation Lands and the Project site. The Conservation Lands also create a large cohesive preservation area that includes BLM lands to the northeast (Panoche Hills and Tumey Hills) and BLM lands to the southeast (Griswold Hills, Laguna Mountain, and Clear Creek Management Area) of the Project site. These lands provide linkage between the Panoche population and greater Ciervo-Panoche SJKF population (**Figure 31**). Corridors across the Panoche Valley intersecting the Project Footprint in two places are provided by the VFCL, and the Project site itself will support and maintain SJKF movement through the site via wildlife-friendly fencing and interstitial spaces between rows within the Project Footprint, once temporary disturbance areas are reclaimed. As stated previously, the impacts from the first phase of construction of the Project will be offset by the acquisition high quality mitigation lands (the VFCL and the SCRCL) before the start of construction. And lastly, the impacts from the second phase of construction will be offset by the acquisition of the VRCL.

The Conservation Lands provide habitat for foraging, breeding, and dispersal, and the Project site supports foraging and dispersal habitat. It is unknown whether SJKF will use solar facilities for breeding habitat; however, Bakersfield supports a healthy population of urban SJKF that have adapted to anthropogenic structures, which suggests that SJKF may breed within the Project site once construction is completed.

For the reasons discussed above, the Action **"may effect, and is likely to adversely affect"** the SJKF. This determination is based on the fact the Action may adversely affect (both directly and indirectly) approximately 75 individual SJKF and approximately 2,492 acres of suitable habitat. The Action also includes significant beneficial effects to the species including the permanent conservation, enhancement and management of 14,863 acres of suitable SJKF habitat (with up to 24,185 acres being available to SJKF) and the protection of habitat that likely supports greater than 30 individual SJKF. In addition to the protection of these individuals, implementation of the Conservation Management Plan is expected to increase the carrying capacity of SJKF on the Project Conservation Lands. The effects of the Action taken as a whole represent a net benefit for the species and would help secure the continued existence of the species.

5.3 Blunt-nosed Leopard Lizard

Development of the Action will likely result in permanent alteration of 2,492 acres of potential BNLL habitat. BNLL use of the open areas between and adjacent to the array panel rows is expected to be limited by the presence of numerous vertical structures.

The Action has undergone several design iterations in order to avoid impacts to BNLL. To date, most BNLL have been observed in association with the Panoche Creek and Las Aquilas Creek drainages, most likely due to sparse vegetation and the presence of more favorable soil types within the drainages. Literature reviews also indicate that the barren habitat created by ephemeral streams and washes provide optimal habitat for BNLL. Solar panels have been located to avoid all major washes and associated 100-year floodplains. By avoiding all major washes and 100-year floodplains, and grouping the blocks of panels in the northern portion of the Project Footprint, the Action would avoid BNLL on the Project Footprint by avoiding the most optimal habitat. The Project Footprint has been designed to avoid and maintain a minimum 52.4-acre buffer from all BNLL detections to date. The site drainages of Panoche and Las Aquilas Creeks along with adjacent land make up the 2,523 acres of VFCL. This region consists of highly suitable habitat for the BNLL, as discussed in **Section 4.3**. The remaining areas that will be

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Legend

- Project Footprint
- County Line
- City Limit
- Mitigation Lands
- BLM Land
- Ciervo-Panoche Natural Area

N

0 2 4
Miles

Panoche Valley Solar Project

Ciervo-Panoche Natural Area

Figure 31

directly impacted by the project are less suitable habitat for BNLL based on the HSM developed for BNLL and indications from the extensive surveys that have been completed onsite.

Direct Impacts

Potential direct impacts to BNLL could include mortality from construction related vehicles, crushing individuals that may be dormant in burrows and removal of suitable burrows during installation of solar panels. The project is expected to require minimal maintenance and an increase in vehicle activity is not expected after construction. Direct impact to BNLL resulting from vehicle mortality during O&M of the site is not expected, given the low level of maintenance for the facility. No take of BNLL species is expected to occur if all mitigation measures outlined below are implemented and followed.

Without the proposed avoidance measures and BMPs, potential habitat for this species would be permanently lost to the development of the O&M building, electrical inverter pads, substation, switchyard, on-site perimeter roads, and emergency bridge crossings of Panoche Creek and Las Aquilas Creek. In the absence of appropriate preventative measures, individuals could be injured or killed due to collision or crushing by construction equipment (e.g., graders, scrapers, bulldozers, trucks, etc.), entombment in burrows, and destruction of eggs as a result of soil compaction.

Ground disturbance resulting from installation of the solar panel support structures could affect BNLL using small mammal burrows for refuge. Solar panels will be mounted on metal frames anchored with direct drive steel posts. Steel post anchors driven into the ground will disrupt small mammal burrows and could result in mortality or injury to BNLL through direct contact or as a result of burrows being collapsed by vibration or crushed by equipment.

Without the proposed conservation measures, individuals could potentially be injured or killed due to entrapment in trenches and pipes stored on the project site. Individuals using pipes as refuge would be buried, or directly killed or injured. Open trenches would create impassable barriers that could disrupt movement of individuals. Individuals that inadvertently fall into deep, steep-walled trenches could be vulnerable to predation, starvation, and entombment.

The Project Footprint will permanently impact a total of approximately 2,492 acres. The Project is being constructed, operated and maintained to optimize residual value for BNLL within areas not disturbed, largely by avoiding habitat occupied by BNLL. This includes preserving occupied habitat of BNLL along the washes and within a 52.4-acre buffer around each BNLL detection (**Figure 32**).

To date, there have been no detections of BNLL on the Project Footprint. Most detections have been clustered in habitat along Panoche Creek largely within the VFCL. Therefore, these avoided and preserved habitats along Panoche Creek, including the 100-year floodplain, are not factored into the final assessment of habitat loss because they will be managed for the species and protected from development by a conservation easement.

Based on the estimated number of BNLL occurring within the Project (5.7, **Section 4.3**), the loss of low quality BNLL habitat from the Project Footprint would equate to a disturbance of a maximum of 6 (i.e., 5.7) individuals. In practice, as the BNLL is a California Fully Protected Species and thus a no-take species, the Project will be constructed and operated in such a way as to not injure or kill any individual BNLL.

The Applicant will conduct a series of protocol surveys, quantitative sampling, preconstruction surveys and construction monitoring to further ensure that the Project is built and operated such that direct take is avoided (see Mitigation section above).

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BR
10/17/2013

Legend

- Project Footprint
- Valley Floor Conservation Lands
- 100-year Floodplain
- 52.4-acre BNLL Observation Buffer
- 2013 Adult BNLL Observation (In Protocol)
- 2013 Adult BNLL Observation (Incidental)
- 2013 Hatchling/Sub-Adult Observation (In Protocol)
- 2013 Hatchling/Sub-Adult Observation (Incidental)
- 2009 - 2010 BNLL Observation

N

0 625 1,250 2,500
Feet

Panoche Valley Solar Project

Blunt-nosed Leopard Lizard Buffer Locations

Figure
32

Each phase of Project construction will employ extensive pre-construction and construction monitoring to further ensure that take does not occur. Qualified biologists will (1) conduct one full-coverage pre-construction survey within 30 days prior to the onset of construction; (2) conduct an additional pre-construction survey immediately prior to the onset of construction; and (3) conduct ongoing monitoring of construction activities in any areas that could potentially be occupied by BNLL.

The Project will operate in a way that does not harm or injure BNLL during the life of the Project. Standard procedures will be employed as are done for other projects in BNLL range (e.g., oil fields) and will include, but not be limited to, staff training, pre-established speed limits, clearance surveys and relocation. Minimization and avoidance procedures are discussed in more detail below.

The *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) has identified current distribution and recovery goals for BNLL in terms of regional conservation efforts. The Recovery Plan reported that extant populations of BNLL occur, among other places, in the "…Ciervo, Tumey, and Panoche Hills…". Recovery goals include preserving the natural areas in the Panoche Valley area of Silver Creek Ranch, San Benito County; and natural lands of the linear, piedmont remnants of their habitat west of Interstate Highway 5 between Pleasant Valley and Panoche Creek, Fresno County.

The Action would result in the permanent conservation of approximately 11,883 acres of suitable habitat for the BNLL, including 2,523 acres on the VFCL, 1,485 acres on the VRCL, and 7,875 acres on the Silver Creek Conservation Lands (**Figure 33**). The overall average density of BNLL within 635 feet of streams (as measured on the Project Footprint and VFCL) of 0.05511 BNLL/acre was used to estimate the number of individual BNLL potentially occupying suitable habitat within the Conservation Lands. These 11,883 acres of permanently protected Conservation lands could result in the protection of over 655 individual BNLL.

Indirect Impacts

Indirect impacts may include displacement from occupied habitats as a result of construction related activities. These impacts would be localized and temporary. Use of the open areas between and adjacent to the array panel rows (approximately 941 acres) is expected to be limited by the presence of numerous vertical structures.

BNLL rely on the burrows of small mammals such as the GKR for refuge during harsh conditions where they may remain underground for extended periods (Germano and Williams 2005). Reductions or alterations in the distribution of appropriately sized mammal burrows, in the areas impacted by the construction of the arrays, could preclude the use of these areas or reduce survival of BNLL during periods of extreme temperature and drought.

The solar panels and other permanent features associated with the site (e.g., perimeter fencing, solar panels, electrical substation, O&M building) could increase predation of BNLL by providing increased perching opportunities for diurnal predatory birds such as hawks, ravens, and loggerhead shrikes. Any indirect impacts to BNLL which may occupy the Project Footprint should be eliminated or minimized by the implementation of general avoidance and minimization measures (Section 2.4.1), species-specific avoidance and minimization measures (Section 2.4.2), and O&M avoidance and minimization measures (Section 2.4.3) as well as the mitigation measures stated below.

Mitigation

The following mitigation measures will be implemented in order to avoid and minimize adverse impacts to BNLL to the maximum extent practicable:

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BR
10/21/2013

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valley Floor Suitable Habitat (approx 2,517 acres)
- Valadeao Ranch Conservation Lands
- Valadeao Ranch Suitable Habitat (approx 7,876 acres)
- Silver Creek Ranch Conservation Lands
- Silver Creek Ranch Suitable Habitat (approx 8,824 acres)

N

0 3,500 7,000
Feet

Panoche Valley Solar Project

Blunt-nosed Leopard Lizard Mitigation Lands*

*For the purpose of this analysis, locations with a slope between 0 and 11% or within 625' of an area of drainage are considered suitable BNLL habitat.

Figure 33

- Prior to surface disturbance or other covered activity, a Designated Biologist or their representative shall conduct a listed species education program (tailgate briefing) for all project personnel.

- Designated Biologist or their representative shall be present while ground disturbing activities are occurring.

- No construction shall take place within at least 100 feet of all streams and washes (except at designated crossing locations) in the Project Footprint. As a result, the most likely locations for BNLL occurrence will be avoided.

- A reduced speed limit (e.g. 15 mph during the day and 10 mph at night) will be observed throughout the entire Action.

- Unless Designated Biologists or their representative allow alterations to routes, all Project vehicles shall be confined to defined access routes that will be staked and/or flagged.

- Project-related motorized vehicles are prohibited (with the exception of emergency vehicles on designated roads) within occupied BNLL habitat and established buffers.

- All construction activities shall be preceded, by not more than 30 days, by a preconstruction BNLL survey. Additional preconstruction surveys shall be performed immediately prior to the onset of construction. BNLL observations in or adjacent to the construction area will be buffered by 52.4-acres and avoided.

- Protocol BNLL surveys shall be completed for all road crossings through washes and streams that are unavoidable. Any BNLL detected in washes and streams shall be avoided with a 52.4-acre buffer and exclusion fencing will be erected to keep BNLL out of work areas. Wash crossings will only be used by emergency vehicles for emergency response.

- Protocol BNLL surveys have been completed prior to ground disturbance for solar panel array construction during the adult season (April 15 – July 15), regardless of habitat type. Project elements shall avoid all observations of BNLL by a 52.4-acre buffer.

- All construction zones shall be demarcated with exclusion fencing to ensure that no BNLL move into construction area.

- To prevent inadvertent entrapment of BNLL, all open holes, steep-walled holes, or trenches more than two feet deep shall be covered at the close of each working day by plywood or similar materials or provided with one or more escape ramps constructed of earth fill or wooden planks (wooden planks should be more no less than 10 inches in width and should reach to bottom of trench). Before such holes or trenches are filled, they should be thoroughly inspected for trapped animals.

<u>Determination</u>

Under the Action, which is a reduction of the original project footprint of over 75 percent and includes avoidance of the highest quality suitable habitat, the Project will impact a total of 2,492 acres of BNLL habitat. The Project may impact habitat associated with up to six BNLL individuals within the Project Footprint. The rigorous pre-construction surveys, monitoring and conservation measures proposed by the Applicant are designed to avoid direct mortality to BNLL.

- The Project will be preserving 11,883 acres of suitable BNLL habitat, which includes 2,523 acres of the VFCL, 1,485 acres on the VRCL; and 7,875 acres on the SCRCL. As stated previously, the impacts from the first phase of construction of the Project will be offset by the acquisition high quality mitigation lands (the VFCL and the SCRCL) before the start of construction. The impacts from the second phase of construction will be offset by the acquisition of the VRCL.

The Conservation Lands are expected to preserve habitat that supports up to an estimated 655 individual BNLL. These lands will be preserved in perpetuity for conservation of the BNLL and other regional species. It is unknown whether BNLL will continue to use the Project Footprint for breeding habitat.

For the reasons discussed above the Action **"may effect, and is likely to adversely affect"** the BNLL. This determination is based on the fact that the Project Footprint may destroy (both directly and indirectly) habitat associated with approximately 2,492 acres of suitable BNLL habitat. No individual BNLL are anticipated to be harmed or killed by the Project. It should be noted that the Action also includes significant beneficial effects to the species including the permanent conservation of 11,883 acres of suitable BNLL habitat and the protection of up to 655 individual BNLL in perpetuity. The effects of the Action taken as a whole represent a benefit for the species and would help secure the continued existence of the species.

5.4 California Tiger Salamander

Direct Impacts

Potential direct impacts that could occur as a result of implementation of the Action include mortality from construction vehicles (road kill), crushing individuals in burrows, and burrow destruction from the installation of panels. Mortality from construction related vehicles is expected to be minimal given that CTS spend nearly their entire adult lives in small mammal burrows and movement to and from breeding ponds is primarily nocturnal. Some Project construction activities may occur at night, depending on the needs of the project. These nighttime activities are noted in **Section 2.3.3** of this document. Direct impacts to CTS from O&M vehicles are not expected during operation of the Action, given the low level of maintenance that would be required for the facility. Early in the construction process there will be 40 percent less personnel on site during the second shift than for the first shift. Construction personnel during the third shift will be approximately 70 percent less than the first shift. These percentages increase to 50 percent and 83 percent, respectively, as construction progresses. This decrease in construction workers on-site during the CTS' above ground active period will reduce the likelihood of mortality from construction related vehicles.

Individuals could be injured or killed due to entrapment in trenches and pipes stored on the project site. Individuals using pipes as refuge could be buried, or directly killed or injured. Open trenches would create impassable barriers that would disrupt movement of individuals. Individuals that inadvertently fall into deep, steep-walled trenches would be vulnerable to predation, starvation, and entombment.

Small mammal burrows utilized for estivation by CTS may be graded and destroyed during construction if they fall in line with a designed access road or placement of panels, resulting in a direct loss in habitat. Preconstruction surveys would assure that all burrows are unoccupied at the time of excavation. If aestivating CTS are detected they will be removed from the burrow prior to excavation and relocated to another burrow on site that will not be impacted by access roads or solar panels, and is in close proximity to the off-site breeding pond or, with the approval of the regulatory agencies, individuals may be moved to burrows associated with off-site ponds known to support breeding habitat or in ponds newly created on the mitigation lands to increase breeding habitat for the species regionally.

Twelve ponds were surveyed for CTS, all 12 ponds are on the Conservation Lands. While no ponds supporting breeding have been detected onsite, there are historic accounts of CTS breeding in two stock ponds (Ponds #8 and #9; **Figure 6**) on the VFCL adjacent to the Project Footprint. Additionally, even though surveys for CTS were negative, Pond #11 (**Figure 6**) is considered a potential breeding pond because of its hydrology. Out of the 12 ponds surveyed, only two off-site ponds adjacent to the Project site contained CTS (Ponds #3 and #12; **Figure 25**). No breeding ponds or potential breeding ponds will be impacted by Project construction, as all ponds are either off-site within the Valadeao Conservation Lands or the VFCL.

CTS are known to estivate up to 1.2 miles (2 kilometers [km]) from breeding ponds; therefore, impacts to CTS were assessed based on Project impacts to potential upland estivation habitat within 1.2 miles (2 km) of these ponds (breeding Ponds #3 and #12; historic Ponds #8 and #9; and potential breeding Pond #11; Trenham and Shaffer 2005) (**Figure 25**). Impacts were categorized based on three distances from each pond: zero to 2,100 feet; 2,100 to 2,640 feet; and 2,640 to 6,336 feet (see **Section 4.4**; **Table 24**).

TABLE 24 ACRES OF ESTIVATION HABITAT AFFECTED BY THE PROJECT

BUFFER	PROJECT FOOTPRINT (ACRES)	CONSERVATION LANDS (ACRES)	PRIVATE LAND (ACRES)
0 – 2,100 foot buffer	410.7 (31.1%)	669.7 (50.7%)	241.0 (18.2%)
2,100 – 2,640 foot buffer	214.3 (32.5%)	287.2 (43.5%)	158.0 (24.0%)
2,640 – 6,336 foot buffer	1,746.0 (24.4%)	3,071.2 (42.8%)	2,351.5 (32.8%)
Cumulative Total Acres	2,371.0 (25.9%)	4,028.1 (44.0%)	2,750.5 (30.1%)

Private Land represents acreages within the habitat buffers that are not a part of either the Project Footprint or Conservation Lands. Percentages represent the CTS habitat classification that falls within the Project Footprint, Conservation Lands, or private lands.

The Project Footprint may affect a maximum of approximately 2,371 acres (25.9%) of potential estivation habitat associated with the two breeding ponds, potential estivation habitat associated with the two historical breeding ponds, and potential estivation habitat associated with one potential breeding pond. There are a total of approximately 4,028.1 (44.0%) acres of potential estivation land on Conservation Lands and a total of approximately 2,750.5 (30.1%) acres of potential estivation land on private lands adjacent to the Project Footprint (**Table 24**).

Small mammal burrows utilized for estivation by CTS may be damaged during construction if they fall in line with a designed access road or placement of panels, resulting in a direct loss in habitat. The majority of land disturbance will occur during the installation of the poles that support the solar arrays. Pile-driving equipment will be used to install the poles and onsite monitors will assist work crews to site access points and work in areas that will disturb the fewest burrows where practicable. Therefore, preconstruction surveys and onsite monitors will decrease, but not eliminate the likelihood that burrows occupied by estivating CTS will be collapsed. Any estivating CTS that are detected will be removed from the burrow prior to excavation and relocated to another burrow onsite that will not be impacted by access roads or solar panels, and is in close proximity to the off-site breeding ponds, or, with the approval of the regulatory agencies, individuals may be moved to burrows associated with off-site ponds known to support breeding habitat or in ponds newly created on the mitigation lands to increase breeding habitat for the species regionally.

While CTS may continue to use small mammal burrows under the solar arrays after construction, to what extent they may do so is not presently known. Therefore, the Project will consider the 2,371.0 acres of potential upland estivation habitat as a loss of potentially occupied habitat. None of the five ponds will be disturbed by the Project because they all occur off-site (one on the VRCL, three within the VFCL, and one on private lands). After construction, most of the estivation areas around the known CTS ponds within the Project boundary are expected to retain most if not all of their ability to support estivating CTS, and estivation areas on the Conservation Lands will continue to retain all of their ability to support estivating CTS.

Dr. Mark Jennings, an expert herpetologist, evaluated the ponds and estimated the likely number of breeding adults based on the size of the ponds; the number and condition of the larvae detected in the two off-site ponds where CTS were detected; and the condition of the surrounding habitat. Based on these various parameters he estimated that the breeding population likely varied from 24 to up to 60 breeding adults per pond. For the purpose of this analysis, it is assumed that the two ponds that supported CTS, plus the two historic ponds (1992 CNDDB record) and the potential pond could each support an upper limit of approximately 60 breeding adults which is consistent with the conditions observed in the field for this Project. To estimate the number of CTS that may be associated with the Project Footprint and Conservation Lands, it was assumed that each of the five ponds can support up to 60 adults. It was further assumed that 95 percent of all CTS associated with any given pond would estivate within 2,100 feet of that pond, that 99 percent would estivate within 2,640 feet of that pond, and that 100 percent would estivate within 6,336 feet of that pond.

Table 25 describes the number of CTS expected to occur within the three distance bands associated with the breeding ponds in the action area. The estivation habitat surrounding these ponds overlaps the Project Footprint, Conservation Lands as well as private lands that are not associated with the project. The number of CTS expected to occur on each of these areas is based on the proportion of the estivation habitat occurring on each land class (Project Footprint, Conservation Land, or private land). As such, the Project may impact up to 114 individual adult CTS within 2,100 feet of the ponds, up to five between 2,100 and 2,640 feet of the ponds, and up to one between 2,640 and 6,336 feet of the ponds, for a total of 120 individual adult CTS potentially impacted (**Table 25**).

Conservation Lands (including the VRCL and the VFCL) could protect up to 119 individual adult CTS within 2,100 feet of the ponds, up to four between 2,100 and 2,640 feet of the ponds, and up to one between 2,640 and 6,336 feet of the ponds, for a total of 124 individual adult CTS potentially protected (**Table 25**).

TABLE 25 CALCULATION OF INDIVIDUALS WITHIN THE ACTION AREA

BUFFER	# CTS	PROJECT FOOTPRINT	CONSERVATION LANDS	PRIVATE LAND (OUTSIDE THE ACTION AREA)
0 – 2,100 foot buffer	285	89 ((0.95*300)*(0.311))	144 ((0.95*300)*(0.507))	52 ((0.95*300)*(0.0.182))
2,100 – 2,640 foot buffer	12	4 ((0.04*300)*(0.325))	5 ((0.04*300)*(0.435))	3 ((0.04*300)*(0.240))
2,640 – 6,336 foot buffer	3	1 ((0.01*300)*(0.244))	1 ((0.01*300)*(0.428))	1 ((0.01*300)*(0.328))
Total CTS	300	94	150	56

*Assuming five Ponds with 60 Individuals per Pond; 95% CTS within 2,100 feet; and 99% within 2,640 feet of a breeding pond. The calculations in parenthesis of each table cell provide mathematical formula of how the number of individual CTS impacted was calculated.

Indirect Impacts

Construction of the Action may also result in indirect impacts to CTS. Increased noise and ground vibration may displace adults from occupied burrows, thus making them more vulnerable to exposure and predation. These impacts would be localized and temporary.

It is unknown how the presence of a large-scale solar generation facility will impact small mammal communities that create burrows used by CTS for estivation. A decline in small mammal communities could result in fewer burrows available for adult and juvenile CTS. Additionally, the presence of significant overhead cover from solar arrays could alter the microclimate of remaining small mammal burrows, thus making them unsuitable for CTS estivation.

Six potential locations for the creation of new CTS breeding ponds on Conservation Lands were identified in the field and plotted on a map. Hydrologists further assessed three of these ponds, two on Valadeao Conservation Lands (Valadeao Ranch Pond Sites 3 and 4) and one on Silver Creek Conservation Lands (Silver Creek Pond Site 1; **Figures 34 and 35**). These three ponds were identified as the best fit for all goals for a successful CTS pond, which include:

- Mitigation ponds will be ephemeral, filling in late fall, winter, and spring, and drying out by early June. Critical months of inundation are March–May.
- Mitigation ponds will be approximately three feet deep.
- Mitigation ponds ideal footprints will be equal to that of Pond #12 (the known breeding pond located on the VRCL).
- Mitigation ponds are desired to be inundated for five out of every ten years, with a minimum of three out of every ten years.

Valadeao Pond Site 3 is approximately 2,300 feet west-northwest of Pond #12, has a drainage area of approximately 0.44 square miles, and has 70 percent of the surface area of Pond #12, however, a higher rainfall as runoff capture ratio is expected for Valadeao Pond Site 3 than for Pond #12, and is expected to fill to 0.14 acre with a bypass spillway required for excess water to leave the pond and continue downhill. Valadeao Pond Site 3 is not expected to capture water on its way downhill to the known CTS breeding pond (Pond #12). This is the preferred pond location, as this will create a breeding complex, which may support genetic diversity and will provide multiple breeding pond options for CTS in the vicinity.

Valadeao Pond Site 4 is approximately 2,000 feet south-southwest of Pond #12, has a drainage area approximately half the size of Pond #12, and would support a pond of approximately 0.1 acre, with a maximum depth of just over one foot occurring in February. This pond would potentially need either an incised channel or diversion dam(s) in order to collect enough sheetflow into the pond. Currently, a piped spring fills a water trough here, and this piped spring could potentially be used to fill the pond in dry years and would return to watering the trough after the breeding season so it dries out. Valadeao Pond Site 4 is not expected to capture water on its way downhill to the known CTS breeding pond (Pond #12). This would be a secondary location for a pond on the Valadeao Conservation Lands.

Silver Creek Site 1 is located on the Silver Creek Ranch, which is not near Pond #12. Should a mitigation pond be necessary, this location would collect enough water, as the site is at the bottom of an incised channel and the drainage basin for this pond would be 0.2 square mile with a runoff capture rate just over twice the value for Pond #12. The pond would be 0.06 acre (32 percent of Pond #12), would have a depth of approximately two feet in February and would go dry in June. This pond would only be constructed should CTS be located on the SCRCL.

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BR
10/16/2013

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- Potential Mitigation Pond Location
- Surveyed Breeding Pond
- Surveyed Pond
- 100-year Floodplain

N

0 1,000 2,000 4,000
Feet

Panoche Valley Solar Project

Valadeao Ranch Conservation Lands
California Tiger Salamander Potential Mitigation Ponds

Figure 34

Energy Renewal PARTNERS, LLC

BR
10/16/2013

Legend

Silver Creek Ranch Conservation Lands
Valadeao Ranch Conservation Lands
Valley Floor Conservation Lands
Potential Mitigation Pond Location
100-year Floodplain

N
0 1,500 3,000
Feet

Panoche Valley Solar Project

Silver Creek Ranch Conservation Lands
California Tiger Salamander Potential Mitigation Ponds

Figure 35

A relocation program (**Appendix H**) for individuals detected during preconstruction surveys and construction monitoring will be followed for Project build-out, with the approval of the regulatory agencies, which can be used to help populate the areas of newly created breeding habitat.

The Project site development represents considerably less than one percent (1%) of the statewide habitat; the Proposed Action may adversely affect (both directly and indirectly) up to approximately 94 individual CTS and approximately 2,371 acres of suitable estivation habitat; however, the Proposed Action also includes significant beneficial effects to the species including the permanent conservation of four occupied or potentially occupied CTS breeding ponds, the protection of up to 150 individual CTS in perpetuity, and the creation of 1 to 3 new breeding ponds on Conservation Lands that could increase the local population by 60 to 180 individuals. The effects of the Proposed Action taken as a whole represent a net conservation benefit for the species.

Mitigation

The following mitigation measures will be implemented in order to avoid and minimize adverse impacts to CTS to the maximum extent practicable and are located in **Appendix H** CTS Mitigation Plan:

- All activities that will result in permanent or temporary ground disturbance shall be preceded by a preconstruction survey conducted by a qualified biologist.

- CTS found during preconstruction surveys will be relocated to suitable small mammal burrows on areas of the project that will remain undisturbed.

- To prevent inadvertent entrapment of CTS, all open holes, steep-walled holes, or trenches more than two feet deep shall be covered at the close of each working day by plywood or similar materials or provided with one or more escape ramps constructed of earth fill or wooden planks (wooden planks should be more no less than 10 inches in width and should reach to bottom of trench). Before such holes or trenches are filled, they should be thoroughly inspected for trapped animals.

- One to three potential breeding ponds will be created on Conservation Lands depending upon mitigation needs. If possible, the pond(s) will be created without impacts to federal or state waters. However, if the pond(s) cannot be built without impacting federal or state waters, all necessary permits will be obtained prior to the construction. The Project will be creating new breeding habitat on the Conservation Lands, which will be preserved and managed in perpetuity. Using an adaptive management approach for the Conservation Lands and creation of additional ponds will potentially increase the population in the Panoche Valley by 60 to 180 individual CTS, depending on how many new breeding ponds are created (assumes 60 new breeding adults per pond).

Determination

After the Applicant's reduction in project size by over 75 percent and avoidance of highest suitability habitat for the CTS, the Project site represents considerably less than one percent of the statewide habitat (CDFW 2010) and an extremely small percent of the East Bay Region Distinct Population Segment habitat (less than one percent). The Project has been reduced in size to avoid directly affecting breeding ponds (known, historic, and potential), and upland estivation habitat will not be affected on adjacent mitigation lands. The Project may potentially affect up to 2,371.0 acres (**Table 24**) of estivation habitat (1.2 miles from known or historic breeding ponds). However, only approximately 410.7 acres will be impacted within 2,100 feet (640 meters) of these ponds – the area within which the vast majority of CTS

(95 percent) are expected to estivate (Trenham and Shaffer 2005). Assuming each pond can support up to 60 adults, and each pond also supports estivation habitat on Conservation Lands and private lands, the Project Footprint may impact up to 89 individual adult CTS within 2,100 feet of the ponds; up to 4 between 2,100 and 2,640 feet of the ponds; and up to 1 between 2,640 and 6,336 feet of the ponds, for a total of 94 individual adult CTS potentially impacted (**Table 25**).

Four of the five ponds and 4,028.1 acres of potential estivation habitat (including 669.7 acres within 0 to 2,100 feet of breeding habitat; 287.2 acres between 2,100 to 2,640 feet from breeding habitat; and 3,071.2 acres between 2,640 to 6,336 feet from breeding habitat) will be permanently protected on Conservation Lands (**Table 24**). These Conservation Lands (including the VRCL and the VFCL) could protect up to 144 individual adult CTS within 2,100 feet of the ponds, up to 5 between 2,100 and 2,640 feet of the ponds, and up to 1 between 2,640 and 6,336 feet of the ponds, for a total of 150 individual adult CTS potentially protected (**Table 25**). In addition, the Project will be creating new breeding habitat on the Conservation Lands, which will be preserved and managed in perpetuity. Using an adaptive management approach for the Conservation Lands and creation of additional ponds will potentially increase the population in the Panoche Valley by 60 to 180 individual CTS, depending on how many new breeding ponds are created (assumes 60 new breeding adults per pond). This mitigation provides a net benefit to the conservation of the species and has the potential to increase the genetic diversity of the local population. As stated previously, the impacts from the first phase of construction of the Project will be offset by the acquisition high quality mitigation lands (the VFCL and the SCRCL) before the start of construction. And lastly, the impacts from the second phase of construction will be offset by the acquisition of the VRCL.

For the reasons discussed above, the Action **"may effect, and is likely to adversely affect"** the CTS. This determination is based on the fact that the Action may adversely affect (both directly and indirectly) up to approximately 94 individual CTS and approximately 2,371.0 acres of suitable estivation habitat. It should be noted that the Action also includes significant beneficial effects to the species including the permanent conservation of 4 occupied or potentially occupied CTS breeding ponds, the protection of up to 150 individual CTS in perpetuity, and the creation of 1 to 3 new breeding ponds on Conservation Lands that could increase the local population by 60 to 180 individuals. The effects of the Action taken as a whole represent a net benefit for the species.

5.5 California Condor

Direct Impacts

No CACOs were observed in or near the Action Area during any surveys, though USFWS radio-tracking efforts have recorded CACO over the Action Area in the past.

The Project Footprint contains 2,492 acres of potential foraging habitat for the CACO. There would be 2,492 acres of permanent impacts to CACO foraging habitat as the result of project implementation. The Project Footprint is surrounded by potential foraging habitat; the loss of this foraging habitat is so small compared to the remaining available habitat that it would not noticeably have an impact on the CACO. The Project Footprint does not contain suitable nesting habitat for CACO.

The Conservation Lands (including the VFCL, VRCL and SCRCL) represent 24,185 acres of potential foraging habitat for the CACO that would be preserved in perpetuity. There is no suitable nesting habitat on any of the Conservation Lands.

Indirect Impacts

Construction-related impacts will include increased noise, traffic, or other human activities that would potentially disturb CACO prey and reduce foraging efficacy for the CACO. These impacts would be localized and temporary in nature.

Mitigation

No mitigation is required for this species. Any project-related electric distribution and substation structures will be constructed using APLIC-based avian protection guidelines and a Bird and Bat Conservation Strategy will be prepared for the Project. The APLIC-based avian protection guidelines are designed to reduce the operational and avian risks that result from avian interactions with electric utility facilities. The goals of the Bird and Bat Conservation Strategy are to develop measures that, when implemented for the Project, will avoid and reduce potential impacts to birds and bats during construction, O&M, and decommissioning of the Project; develop if necessary, effective post-construction monitoring and adaptive management procedures to guide management actions for the life of the Project; and develop a protocol for communication and reporting to the appropriate state and federal agencies.

Determination

For the reasons discussed above, the Action **"may effect, is not likely to adversely affect"** the CACO. The Action is not expected to adversely affect any individual CACO. Additionally, the loss of 2,492 acres of potentially suitable foraging habitat is negligible in the context of the amount of habitat available in the surrounding vicinity. The Action also includes significant beneficial effects to the species including the permanent conservation of 24,185 acres of potentially suitable CACO foraging habitat.

5.6 Vernal Pool Fairy Shrimp

Direct Impacts

VPFS were identified on site in one vernal pool during the winter 2010 Protocol Vernal Pool Branchiopod Surveys. The Project Footprint contains approximately 977 m^2 (0.24 acres) of occupied habitat in the form of a single VPFS pool and hydrologically connected pool. The occupied pool is approximately 255 m^2, and the hydrologically connected pool is approximately 722 m^2. These pools are located along a small drainage in the northwestern portion of the Project Footprint. These pools do not fall within a major wash or stream or within a 100-year floodplain of a major wash or stream. These pools do not fall within the current project design and will not be filled or otherwise impacted as a result of the Action. The pools do not occur within 220 feet of any solar arrays or access roads. A 100-foot buffer will be placed around these occupied seasonal pools to prevent equipment from entering these areas.

Potential direct impacts to VPFS resulting from project construction and maintenance activities would include direct habitat loss from construction, siltation of suitable habitat, altered vegetation from altered grazing patterns, altered hydrology of vernal pools from an increase in impenetrable surfaces, and increase in the potential for chemical runoff from vehicles to enter vernal pools during construction and maintenance. There is little risk of direct mortality to VPFS from construction activities; however currently unoccupied vernal pools could be directly drained or filled as a result of the Action.

Potential siltation of suitable habitat could result in shallower vernal pool habitat, a shorter hydroperiod, and increased water temperatures. A decrease in hydroperiod would have less effect on VPFS than other vernal pool branchiopods because VPFS have one of the shortest maturation periods of vernal pool branchiopods. Helm (1998) found VPFS were able to reach maturity in as little as 12 days, and able to reproduce at 18 days. A potential increase in water temperatures could have a greater effect on VPFS. Young and adult VPFS began dying when water temperatures reached 24˚C in field and controlled observations (Helm 1998). BMPs such as silt fencing would ensure that siltation of vernal pools left undisturbed by the project design does not occur.

An increase in impenetrable surfaces within the watershed of a vernal pool may increase the amount of runoff entering a pool. An increase in water depth or increase in inundation period may change seasonal wetland functions (change to permanent or perennial wetland), which may in turn change the floral and faunal composition of vernal pools. If a wetland becomes permanent from increased runoff, invasive predatory species such as bullfrogs and mosquito fish may occupy the pool and feed on VPFS. The presence of solar panels would create impermeable surfaces which would cause run-off rain and panel washing to accrue at the lower edge of the panel. An increase in impermeable surfaces is not expected to alter the hydrology of wetlands on site because of the amount of permeable surface that will be retained under the panels. The Action will not alter the slope of the Project Footprint, thus allowing run-off to enter wetland habitat as it naturally would. While the presence of solar panels would increase the impenetrable surfaces, it is not expected to influence the hydroperiod of vernal pools. No vernal pools or other ephemeral wetlands would become permanent in nature as a result of the project.

VPFS breathe through external gills and are highly sensitive to the water chemistry of their vernal pool habitats (Belk 1975, Eng et al. 1990, Gonzalez et al. 1996). An increase in chemical runoff from vehicles, such as petroleum products, could reduce the water quality in VPFS habitat. Rodenticides and herbicides will not be used in the Project Footprint, with the exception of applications near buildings/critical facilities, or for use in association with the Noxious Weed and Invasive Plant Control Plan. Use of rodenticides and herbicides will be minimal and is not expected to affect VPFS. Any spill of hazardous material will be cleaned up immediately in accordance with the site-specific Spill Prevention Control Plan.

Water will be used throughout the construction of the project for dust control. Maintenance/operation of the Action water use will be limited to approximately one gallon of water that will be used to clean each panel twice a year. This equates to approximately 26 acre/feet of water used each year to clean the PV panels across the entire site. Panels will be cleaned throughout the year, with each panel requiring approximately one gallon of water for cleaning. The use of approximately one gallon per panel is not expected to alter the hydrology of wetlands within the Project Footprint due to the infrequent cleaning of panels. Wetlands hydrology is not expected to change as a result of water used on the Action.

A moderate amount of grazing or other disturbance is a necessary element of VPFS habitat to control invasive wetland plant species or aggressive natural wetland plant species to prevent the development of a thatch layer. Sheep or other livestock will be grazed throughout the Project Footprint to assist in controlling vegetation in accordance with the Habitat Restoration and Revegetation Plan, Habitat Mitigation and Monitoring Plan, and Weed Control Plan.

Indirect Impacts

Vernal pool branchiopods, including the VPFS, rely heavily on birds coming to vernal pools to act as dispersal agents for cysts. Altered land use around vernal pools may lower the attractiveness to birds, thus lowering the dispersal capabilities of VPFS and limiting its ability to recolonize an area following a localized extinction.

The Project Footprint will be completely fenced with either wildlife permeable fencing (as described above) or three strand barbed wire to limit the potential for the human disturbances to vernal pools such as disposal of waste, off-road vehicle use, and vandalism.

Mitigation

The following mitigation measures will be implemented in order to avoid and minimize any adverse impacts to VPFS:

- All drainages, washes, and stream habitats and 100-year floodplain shall be avoided and excluded from construction designs.
- Project vehicles shall be confined to existing primary or secondary roads, or to specifically delineated project sites. Otherwise, off-road vehicle travel is not permitted.
- Appropriate measures shall be undertaken to prevent unauthorized off-road vehicle use. Signing will be the preferred method to discourage use, as well as a fence surrounding the perimeter of the Project Footprint.
- Sheep or other livestock are planned to be grazed throughout the Project Footprint to assist in controlling vegetation in accordance with the Habitat Restoration and Revegetation Plan, Habitat Mitigation and Monitoring Plan, and Weed Control Plan.
- Any spills of hazardous materials shall be cleaned up immediately in accordance with the Project Spill Prevention Control Plan.
- BMPs (such as use of silt fencing, hay bales, etc.) outlined in the site-specific Stormwater Pollution Prevention Plan shall be implemented to limit erosion and sediments from entering vernal pool habitat.
- A 100-foot buffer shall be placed around occupied seasonal pools to prevent equipment from entering these areas to the extent practicable.
- If unavoidable impacts to ephemeral pools within the Project Footprint that were not previously occupied by VPFS were subsequently found to be occupied by VPFS at a later date, this impact would be mitigated by the preservation and management of two acres of occupied VPFS habitat (2:1 preservation ratio), and the creation, management, and preservation of one acre of vernal pool habitat (1:1 creation ratio) at a location approved and pursuant to authorization received from the USFWS. The applicant may also satisfy this mitigation requirement through the purchase of credits at a USFWS-approved mitigation bank.

Determination

For the reasons discussed above the Action "**may effect, is not likely to adversely affect**" the VPFS. This determination is based on the fact that this species is not known to occur within the Action and no negative impacts are anticipated. If the species were to be discovered on the sites, there would be a slight risk of increased run-off causing a change in hydrology, or siltation and/or contamination of vernal pool habitat, but this risk could be almost entirely mitigated through the use of BMPs and mitigation measures as described above. As stated previously, the impacts from the first phase of construction of the Project will be offset by the acquisition high quality mitigation lands (the VFCL and the SCRCL) before the start of construction. And lastly, the impacts from the second phase of construction will be offset by the acquisition of the VRCL.

5.7 Conservancy Fairy Shrimp

Direct Impacts

The Project Footprint does not contain any occupied CFS habitat. No CFS were identified on-site during winter and spring vernal pool surveys.

Potential direct impacts to CFS, should they occur on-site, resulting from project construction and maintenance activities would include direct habitat loss from construction, habitat fragmentation, siltation of suitable habitat, altered vegetation from altered grazing patterns, altered hydrology of vernal pools from an increase in impenetrable surfaces, and increase in the potential for chemical runoff from vehicles to enter vernal pools during construction and maintenance. There is little risk of direct mortality to CFS from construction activities; however, currently unoccupied vernal pools could be directly drained or filled as a result of the Action.

Potential siltation of suitable habitat could result in shallower vernal pool habitat, a shorter hydroperiod, and increased water temperatures. BMPs such as silt fences would limit the amount of silt entering vernal pools which do not fall within the current project design.

An increase in impenetrable surfaces within the watershed of a vernal pool may increase the amount of runoff entering a pool. Under natural circumstances, a portion of rainwater runoff would seep into the ground water before entering a vernal pool. An increase in impenetrable surfaces could limit the ability for this to occur; however, the ground under the panels will all still be penetrable. Therefore, surface water infiltration should not be affected.

An increase in water depth or increase in inundation period may change seasonal wetland functions (change to permanent or perennial wetland), which may in turn change the floral and faunal composition of vernal pools. While the presence of solar panels would increase the impenetrable surfaces, it is not expected to influence soil permeability or the hydroperiod of vernal pools. No vernal pools or other ephemeral wetlands would become permanent in nature as a result of the project.

CFS breathe through external gills and are highly sensitive to the water chemistry of their vernal pool habitats (Belk 1975, Eng et al. 1990, Gonzalez et al. 1996). An increase in chemical runoff from vehicles, such as petroleum products, could reduce the water quality in CFS habitat. Rodenticides and herbicides will not be used in the Project Footprint, with the exception of applications near buildings/critical facilities, or for use in association with the Noxious Weed and Invasive Plant Control Plan. Use of rodenticides and herbicides will be minimal and is not expected to affect CFS. Any spill of hazardous material will be cleaned up immediately in accordance with the site-specific Spill Prevention Control Plan.

Water will be used throughout the construction of the project for dust control. Maintenance/operation of the Action water use will be limited to approximately one gallon of water will be used to clean each panel twice a year. This equates to approximately 26 acre/feet of water used each year to clean the PV panels across the entire site. Panels will be cleaned throughout the year, with each panel requiring approximately one gallon of water for cleaning. The use of approximately one gallon per panel is not expected to alter the hydrology of wetlands within the Project Footprint due to the infrequent cleaning of panels. Wetlands hydrology is not expected to change as a result of water used on the Action.

A moderate amount of grazing or other disturbance is a necessary element of CFS habitat to control invasive wetland plant species or aggressive natural wetland plant species to prevent the thatch layer discussed above. Sheep or other livestock will be grazed throughout the Project Footprint to assist in controlling vegetation in accordance with the Habitat Restoration and Revegetation Plan, Habitat Mitigation and Monitoring Plan, and Weed Control Plan.

Indirect Impacts

Vernal pool branchiopods, including the CFS, rely heavily on birds coming to vernal pools to act as dispersal agents for cysts. Altered land use around vernal pools may lower the attractiveness to birds, thus lowering the dispersal capabilities of CFS and limiting its ability to recolonize an area following a localized extinction.

The Project Footprint will be completely fenced with either wildlife permeable fencing (as described above) or three strand barbed wire to limit the potential for the human disturbances to vernal pools such as disposal of waste, off-road vehicle use, and vandalism.

Mitigation

The following mitigation measures will be implemented in order to avoid and minimize any adverse impacts to CFS to the maximum extent practicable:

- All drainages, washes, and stream habitats and 100-year floodplain shall be avoided and excluded from construction designs.

- Project vehicles shall be confined to existing primary or secondary roads, or to specifically delineated project sites. Otherwise, off-road vehicle travel is not permitted.

- Appropriate measures shall be undertaken to prevent unauthorized off-road vehicle use. Signing will be the preferred method to discourage use.

- Sheep or other livestock are planned to be grazed throughout the Project Footprint to assist in controlling vegetation in accordance with the Habitat Restoration and Revegetation Plan, Habitat Mitigation and Monitoring Plan, and Weed Control Plan.

- Any spills of hazardous materials shall be cleaned up immediately in accordance with the Spill Prevention Control Plan.

- BMPs (such as use of silt fencing, hay bales, etc.) outlined in the site-specific Stormwater Pollution Prevention Plan shall be implemented to limit erosion and sediments from entering vernal pool habitat.

- If unavoidable impacts to ephemeral pools within the Project Footprint that were not previously occupied by CFS, were subsequently found to be occupied by CFS at a later date, this impact would be mitigated by the preservation and management of two acres of occupied CFS habitat (2:1 preservation ratio) and the creation, management, and preservation of one acre of vernal pool habitat (1:1 creation ratio) at a location approved and pursuant to authorization received from the USFWS. The applicant may also satisfy this mitigation requirement through the purchase of credits at a USFWS-approved mitigation bank.

Determination

For the reasons discussed above the Action "**may effect, is not likely to adversely affect**" the CFS. This determination is based on the fact that this species is not known to occur within the Action and no negative impacts are anticipated. If the species were to be discovered on the sites, there would be a slight risk of increased run-off causing a change in hydrology, or siltation and/or contamination of vernal pool habitat, but this risk could be almost entirely mitigated through the use of BMPs and mitigation measures as described above. As stated previously, the impacts from the first phase of construction of the Project will be offset by the acquisition high quality mitigation lands (the VFCL and the SCRCL) before the start of construction. And lastly, the impacts from the second phase of construction will be offset by the acquisition of the VRCL.

5.8 Longhorn Fairy Shrimp

Direct Impacts

The Project Footprint does not contain any occupied LHFS habitat. No LHFS were identified on-site during winter and spring vernal pool surveys.

Potential direct impacts to LHFS, should they occur on site, resulting from project construction and maintenance activities would include direct habitat loss from construction, habitat fragmentation, siltation of suitable habitat, potential vegetation changes from altered grazing patterns, altered hydrology of vernal pools from an increase in impenetrable surfaces, and increase in the potential for chemical runoff from vehicles to enter vernal pools during construction and maintenance. There is little risk of direct mortality to LHFS from construction activities; however currently unoccupied vernal pools could be directly drained or filled as a result of the Action.

Potential siltation of suitable habitat could result in shallower vernal pool habitat, a shorter hydroperiod, and increased water temperatures. BMPs such as silt fences would limit the amount of silt entering vernal pools which do not fall within the current project design.

An increase in impenetrable surfaces within the watershed of a vernal pool may increase the amount of runoff entering a pool. Under natural circumstances, a portion of rainwater runoff would seep into the ground water before entering a vernal pool. An increase in impenetrable surfaces could limit the ability for this to occur; however, the ground under the panels will all still be penetrable. Therefore, surface water infiltration should not be affected.

An increase in water depth or increase in inundation period may change seasonal wetland functions (change to permanent or perennial wetland), which may in turn change the floral and faunal composition of vernal pools. While the presence of solar panels would increase the impenetrable surfaces, it is not expected to influence soil permeability or the hydroperiod of vernal pools. No vernal pools or other ephemeral wetlands would become permanent in nature as a result of the project.

LHFS breathe through external gills and are highly sensitive to the water chemistry of their vernal pool habitats (Belk 1975, Eng et al. 1990, Gonzalez et al. 1996). An increase in chemical runoff from vehicles, such as petroleum products, could reduce the water quality in LHFS habitat. Rodenticides and herbicides will not be used in the Project Footprint, with the exception of applications near buildings/critical facilities. Use of rodenticides and herbicides will be minimal and is not expected to affect LHFS. Any spill of hazardous material will be cleaned up immediately in accordance with the site-specific Spill Prevention Control Plan.

Water will be used throughout the construction of the project for dust control. Maintenance/operation of the Action water use will be limited to approximately one gallon of water will be used to clean each panel twice a year. This equates to approximately 26 acre/feet of water used each year to clean the PV panels across the entire site. Panels will be cleaned throughout the year, with each panel requiring approximately one gallon of water for cleaning. The use of approximately one gallon per panel is not expected to alter the hydrology of wetlands within the Project Footprint due to the infrequent cleaning of panels. Wetlands hydrology is not expected to change as a result of water used on the Action.

A moderate amount of grazing or other disturbance is a necessary element of LHFS habitat to control invasive wetland plant species or aggressive natural wetland plant species to prevent the thatch layer discussed above. Sheep or other livestock will be grazed throughout the Project Footprint to assist in controlling vegetation in accordance with the Habitat Restoration and Revegetation Plan, Habitat Mitigation and Monitoring Plan, and Weed Control Plan.

Indirect Impacts

Vernal pool branchiopods, including the LHFS, rely heavily on birds coming to vernal pools to act as dispersal agents for cysts. Altered land use around vernal pools may lower the attractiveness to birds, thus lowering the dispersal capabilities of LHFS and limiting its ability to recolonize an area following a localized extinction.

The Project Footprint will be completely fenced with either wildlife permeable fencing (as described above) or three strand barbed wire to limit the potential for the human disturbances to vernal pools such as disposal of waste, off-road vehicle use, and vandalism.

Mitigation

The following mitigation measures would be implemented in order to avoid and minimize any adverse impacts to LHFS to the maximum extent practicable:

- All drainages, washes, and stream habitats and the 100-year floodplain shall be avoided and excluded from construction designs.
- Project vehicles shall be confined to existing primary or secondary roads, or to specifically delineated project sites. Otherwise, off-road vehicle travel is not permitted.
- Appropriate measures shall be undertaken to prevent unauthorized off-road vehicle use. Signing will be the preferred method to discourage use.
- Sheep or other livestock are planned to be grazed throughout the Project Footprint to assist in controlling vegetation in accordance with the Habitat Restoration and Revegetation Plan, Habitat Mitigation and Monitoring Plan, and Weed Control Plan.
- Any spills of hazardous materials shall be cleaned up immediately in accordance with the Spill Prevention Control Plan.
- BMPs (such as use of silt fencing, hay bales, etc.) outlined in the site-specific Stormwater Pollution Prevention Plan shall be implemented to limit erosion and sediments from entering vernal pool habitat.

- If unavoidable impacts to ephemeral pools within the Project Footprint that were not previously occupied by LHFS, were subsequently found to be occupied by LHFS at a later date, this impact would be mitigated by the preservation and management of two acres of occupied LHFS habitat (2:1 preservation ratio) and the creation, management, and preservation of one acre of vernal pool habitat (1:1 creation ratio) at a location approved and pursuant to authorization received from the USFWS. The applicant may also satisfy this mitigation requirement through the purchase of credits at a USFWS-approved mitigation bank.

Determination

For the reasons discussed above the Action "**may effect, is not likely to adversely affect**" the LHFS. This determination is based on the fact that this species is not known to occur within the Action and negative impacts are anticipated. If the species were to be discovered on the sites, there would be a slight risk of increased run-off causing a change in hydrology, or siltation and/or contamination of vernal pool habitat, but this risk could be almost entirely mitigated through the use of BMPs and mitigation measures as described above. As stated previously, the impacts from the first phase of construction of the Project will be offset by the acquisition high quality mitigation lands (the VFCL and the SCRCL) before the start of construction. And lastly, the impacts from the second phase of construction will be offset by the acquisition of the VRCL.

5.9 Vernal Pool Tadpole Shrimp

Direct Impacts

The Project Footprint does not contain any occupied VPTS habitat. No VPTS were identified on site during winter and spring vernal pool surveys.

VPTS were identified in one pool located within the VRCL and would not experience any effects as a result of the Action. This pool would be preserved in perpetuity as part of the VRCL.

Potential direct impacts to VPTS, should they be found in the Project Footprint, resulting from project construction and maintenance activities could include direct habitat loss from construction, habitat fragmentation, siltation of suitable habitat, introduction of invasive wetland plant species, potential vegetation changes from altered grazing patterns, altered hydrology of vernal pools from an increase in impenetrable surfaces, and increase in the potential for chemical runoff from vehicles to enter vernal pools during construction and maintenance. There is little risk of direct mortality to VPTS from construction activities; however currently unoccupied vernal pools could be directly drained or filled as a result of the Action.

Potential siltation of suitable habitat could result in shallower vernal pool habitat, a shorter hydroperiod, and increased water temperatures. BMPs such as silt fences would limit the amount of silt entering vernal pools that do not fall within the current project design.

An increase in impenetrable surfaces within the watershed of a vernal pool may increase the amount of runoff entering a pool. Under natural circumstances, a portion of rainwater runoff would seep into the ground water before entering a vernal pool. An increase in impenetrable surfaces could limit the ability for this to occur; however, the ground under the panels will all still be penetrable. Therefore, surface water infiltration should not be affected.

An increase in water depth or increase in inundation period may change seasonal wetland functions (change to permanent or perennial wetland), which may in turn change the floral and faunal composition of vernal pools. While the presence of solar panels would increase the impenetrable surfaces, it is not expected to influence soil permeability or the hydroperiod of vernal pools. No vernal pools or other ephemeral wetlands would become permanent in nature as a result of the project.

VPTS breathe through external gills and are highly sensitive to the water chemistry of their vernal pool habitats (Belk 1975, Eng et al. 1990, Gonzalez et al. 1996). An increase in chemical runoff from vehicles, such as petroleum products, could reduce the water quality in VPTS habitat. Rodenticides and herbicides will not be used in the Project Footprint, with the exception of applications near buildings/critical facilities, or for use in association with the Noxious Weed and Invasive Plant Control Plan. Use of rodenticides and herbicides will be minimal and is not expected to affect VPTS. Any spill of hazardous material will be cleaned up immediately in accordance with the site-specific Spill Prevention Control Plan.

Water will be used throughout the construction of the project for dust control. Maintenance/operation of the Action water use will be limited to approximately one gallon of water will be used to clean each panel twice a year. This equates to approximately 26 acre/feet of water used each year to clean the PV panels across the entire site. Panels will be cleaned throughout the year, with each panel requiring approximately one gallon of water for cleaning. The use of approximately one gallon per panel is not expected to alter the hydrology of wetlands within the Project Footprint due to the infrequent cleaning of panels. Wetlands hydrology is not expected to change as a result of water used on the Action.

A moderate amount of grazing or other disturbance is a necessary element of VPTS habitat to control invasive wetland plant species or aggressive natural wetland plant species to prevent the thatch layer discussed above. Sheep or other livestock are planned to be grazed throughout the Project Footprint to assist in controlling vegetation in accordance with the Habitat Restoration and Revegetation Plan, Habitat Mitigation and Monitoring Plan, and Weed Control Plan.

Indirect Impacts

Vernal pool branchiopods, including the VPTS, rely heavily on birds coming to vernal pools to act as dispersal agents for cysts. Altered land use around vernal pools may lower the attractiveness to birds, thus lowering the dispersal capabilities of VPTS and limiting its ability to recolonize an area following a localized extinction.

The Project Footprint will be completely fenced with either wildlife permeable fencing (as described above) or three strand barbed wire to limit the potential for the human disturbances to vernal pools such as disposal of waste, off-road vehicle use, and vandalism.

Mitigation

The following mitigation measures would be implemented in order to avoid and minimize any adverse impacts to VPTS to the maximum extent practicable:

- All drainages, washes, and stream habitats and 100-year floodplain shall be avoided and excluded from construction designs.

- Project vehicles shall be confined to existing primary or secondary roads, or to specifically delineated project sites. Otherwise, off-road vehicle travel is not permitted.

- Appropriate measures shall be undertaken to prevent unauthorized off-road vehicle use. Signing will be the preferred method to discourage use.

- Sheep or other livestock are planned to be grazed throughout the Project Footprint to assist in controlling vegetation in accordance with the Habitat Restoration and Revegetation Plan, Habitat Mitigation and Monitoring Plan, and Weed Control Plan.

- Any spills of hazardous materials shall be cleaned up immediately in accordance with the Spill Prevention Control Plan.

- BMPs (such as use of silt fencing, hay bales, etc.) outlined in the site-specific Stormwater Pollution Prevention Plan shall be implemented to limit erosion and sediments from entering vernal pool habitat.

- If unavoidable impacts to ephemeral pools within the Project Footprint that were not previously occupied by VPTS, were subsequently found to be occupied by VPTS at a later date, this impact would be mitigated by the preservation and management of two acres of occupied VPTS habitat (2:1 preservation ratio) and the creation, management, and preservation of one acre of vernal pool habitat (1:1 creation ratio) at a location approved and pursuant to authorization received from the USFWS. The applicant may also satisfy this mitigation requirement through the purchase of credits at a USFWS-approved mitigation bank.

Determination

For the reasons discussed above the Action **"may effect, is not likely to adversely affect"** the VPTS. This determination is based on the fact that this species is not known to occur within the Action and no negative impacts are anticipated. If the species were to be discovered on the sites, there would be a slight risk of increased run-off causing a change in hydrology, or siltation and/or contamination of vernal pool habitat, but this risk could be almost entirely mitigated through the use of BMPs and mitigation measures as described above. There is a single known occupied vernal pool located on the VRCL that would be preserved in perpetuity.

As stated previously, the impacts from the first phase of construction of the Project will be offset by the acquisition high quality mitigation lands (the VFCL and the SCRCL) before the start of construction. And lastly, the impacts from the second phase of construction will be offset by the acquisition of the VRCL.

6.0 CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the Action are not considered in this section because they require separate consultation pursuant to Section 7 of the Endangered Species Act.

The grassland habitats that dominate the Project Footprint support a unique and tightly linked ecological community that once occurred throughout the vast grassland habitats of the San Joaquin valley floor. Species central to this community include the SJKF, GKR, and BNLL. These species occur almost exclusively within the very low-slope and low-relief landscapes typical of arid valley floors, and rely solely on underground burrows for protection from low and high temperatures, extended dry periods, and predation. This ecological community is also comprised of a number of plant and animal species that face significant risk of extinction due to the conversion of vast areas of former habitat to agriculture, urban development, energy development, highways, and canals (USFWS 1998).

The GKR is central to this community and is considered a keystone species within the habitats in which they occur (Goldingay et al. 1997). Their burrows can be locally abundant, and they provide critical refuge for BNLL, which use GKR burrows for cover and avoid burrows occupied by potential predators or other leopard lizards (Montanucci, 1965). In fact, BNLL may survive periods of drought or harsh conditions by remaining underground in GKR burrows for extended periods (Germano and Williams, 2005). Each of these species are in turn preyed upon by SJKF, which occupy these same low-relief open grasslands and which also rely on underground burrows for protection from extreme temperatures and predation.

Because these species are so reliant on open flat grasslands and shallow underground burrows for cover, they are particularly vulnerable to any type of large-scale ground disturbance or large-scale changes in vegetation, particularly the conversion of grasslands to any type of agriculture or the succession of grasslands to habitats dominated by larger shrubs and trees. The scale at which such land use changes are relevant is directly proportional to the amount and condition of the remaining available habitat. Due to the extent of preceding alteration of habitats utilized by these species, relatively minor changes within remaining habitat, particularly when considered cumulatively, may have profound and lasting effects.

Historically, GKR may have occupied more than 1.5 million acres throughout the species' range (Williams, 1992), yet currently they are found within less than five percent of the historic range (USFWS, 2010b). Habitat modeling suggests there may still be up to 900,000 acres of highly suitable SJKF habitat within the species' range (USFWS, 2010a), although it is clear that substantial portions of what is considered suitable habitat are no longer occupied, and there is considerable evidence that this habitat is becoming increasingly fragmented (USFWS, 2010a). Likewise, Germano and Williams (1992) and Jennings (1995) estimated that BNLL were restricted to 15 percent of the historic range, and the amount of available and occupied habitat continues to decline.

Projects that the USFWS consulted on between 1988 and 2007 have resulted in permanent alteration of over 118,000 acres of SJKF habitat (with an additional 20,000 acres affected by temporary disturbance) for large-scale water storage and conveyance, urban development, agriculture, oil and gas development, and other developments (USFWS 2010a). Between 1987 and 2008, the USFWS authorized permanent alteration of more than 6,300 acres and temporary disturbance of nearly 3,000 acres of GKR habitat (USFWS 2010b). During essentially the same period (1987-2006) the USFWS permitted projects that resulted in impacts to over 21,000 acres of BNLL habitat (USFWS 2010c). This loss of habitat is substantial and yet only includes the loss of habitat to large projects that required and received environmental review by federal and state resource agencies. The *Recovery Plan for Upland Species of* *the San Joaquin Valley* is intended to protect, at regional scales, many of the T&E Species that occur in the Panoche Valley and throughout the remaining range of the species covered by the Plan; however, because land within the Panoche Valley is privately held, the primary implementing tool of the Recovery Plan in the Panoche Valley is the Endangered Species Act. No public land acquisition has been carried out in the Panoche Valley, and no land management tools specific to the Panoche Valley have been adopted by federal agencies to achieve the goals of the Recovery Plan.

There is considerable potential for substantial additional loss of important habitats for these species, and large-scale solar developments currently represent a significant potential source of habitat loss. Foreseeable future projects, proposed in just the past few years, include a total of eight medium to large-scale solar projects (including the Panoche Valley Solar Facility) that would be sited within the known extant range of BNLL, GKR, and SJKF. Implementation of all of these projects could result in the permanent alteration of more than 21,000 acres of occupied and/or potential habitat for these species (USFWS 2010a; 2010b; 2010c).

The continued incremental loss of habitat to smaller-scale land conversion is more difficult to quantify, and yet may be as substantial or even more substantial. It is apparent that a significant portion of the remaining occupied habitat for these species is on private land and is highly vulnerable to incompatible land use, which, although typically smaller-scale, collectively may result in significant and often undetermined cumulative effects. For example, over 60 percent of CNDDB records of SJKF list the landowner as “unknown,” indicative of sighting locations on private lands or at best on fragments of public land interspersed among privately held land (USFWS 2010a). This suggests a significant portion of remaining occupied SJKF habitat is vulnerable to incompatible land use and increasing fragmentation.

Conversion of private land for agriculture is still considered to be the most significant threat to the BNLL (USFWS 2010c). USFWS (2010b) no longer considers conversion to agriculture a threat to GKR habitat. Cessation of grazing, significant changes in grazing regimes, or conversion of rangelands to vineyards in the Panoche Valley would have devastating effects on local populations of BNLL, GKR, and SJKF. Other types of development continue to threaten the habitat for these species on private lands. In Panoche Valley alone there are several ranches for sale as recently as 2008, including nearly 5,000 acres advertised as suitable for housing (USFWS 2010a).

Substantial land conversion resulting from the sale and subdivision of large tracts of land and changing use of private lands continues to be a serious threat to the integrity of habitats for these species. Furthermore, the environmental impacts associated with many of these types of actions may never be fully reviewed under the existing regulatory framework (e.g., disking of habitats, conversion of grazing lands to agriculture, subdivision of ranches).

The Recovery Plan for SJKF, GKR, and BNLL emphasizes the need to protect habitats that are critical to ensuring the survival of these species. The plan identifies specific locations and tracts of land that are of the highest priority, yet few mechanisms have been identified to achieve these recovery goals. Implementation of the proposed large-scale solar development projects that have been identified to date could result in significant direct, indirect, and cumulative impacts resulting from permanent alteration and/or degradation of as much as 21,000 acres of occupied and potential habitat within the range of the species described here and numerous additional, more common, species. Nonetheless, impacts associated with these projects could be at least partially offset, if not completely outweighed, through the permanent protection of between 60,000 and 80,000 acres of habitat as mitigation for impacts to habitat affected by the development of these projects.

The cumulative effect of mitigation measures coordinated and focused on identifying, acquiring, restoring when necessary, managing, and permanently protecting between 60,000 and 80,000 acres of high-quality habitat currently under private ownership would be expected to result in a substantial amount of additional habitat permanently protected for these species. If a land conservation strategy were carefully planned and strategically implemented to maximize the mitigation value of these lands, this could contribute substantially to the long-term conservation and recovery of these species and numerous additional plant and animal species that co-occur in these habitats.

Mitigation for the loss of habitat resulting from the Action, focused on protecting and restoring approximately 24,185 acres of the highest quality habitats within this critical area identified by the Recovery Plan for this suite of species, will provide substantial conservation benefit for the species, and would be congruent with the Recovery Plan. It should also be noted that the Action impact acreage is only 6.7 percent of the proposed 21,000 acres that could be impacted by the Actions, yet the Project is proposing to preserve 24,185 acres, which is more than 40 percent of the target 60,000 preserved acres. The cumulative permanent protection and long term management of a substantial amount of occupied, highly suitable and yet highly vulnerable habitat would have important conservation value, contributing to the recovery of these species by substantially decreasing the incremental loss and degradation of habitat that these lands may otherwise be subject to, which could reduce the cumulative impacts of this and other projects.

The Action's conservation strategy, which would result in the permanent conservation of over 24,185 acres of off-site habitat, including the Silver Creek Ranch (a critical component of the Recovery Plan), would effectively remove some of the private ownership barriers that have prevented widespread species conservation in the Panoche Valley. These conservation efforts significantly outweigh the potentially negative impacts associated with the Action and provide an overall net benefit for this suite of species. This substantial conservation effort would be consistent with conservation efforts set forth in the Recovery Plan. This conservation strategy, combined with the general avoidance and minimization measure and the species-specific mitigation measures, would greatly reduce the Action's contribution to cumulative biological resources impacts. In fact, the Action's contribution to ongoing cumulative impacts will reduce the ongoing regional trend of habitat loss and will contribute a net benefit to several of the species discussed in this document.

7.0 CONCLUSIONS

During the construction and O&M activities mitigation measures will be implemented in order to avoid and minimize adverse impacts to all protected species to the maximum extent practicable. Furthermore, the conservation lands (Valley Floor, Valadeao Ranch and the Silver Creek Ranch) are a significant source of in-kind mitigation due to the protection of the approximately 24,185-acre tracts, the special status species habitats found on the conservation lands, and the development of the Conservation Management Plan which will provide measures to manage and restore, and enhance those lands. Furthermore, the preservation/protection of the conservation lands that are currently privately owned and available for any type of development, agriculture conversion, or unmanaged grazing, will benefit the listed species and meet key steps in the Core Recovery Plan for the San Joaquin Valley especially with the protection of the SCRCL which is specifically identified in the Recovery Plan.

Table 26 summarizes the effects determinations for the nine species discussed in this document.

TABLE 26 SUMMARY OF DETERMINATIONS

Species	"May Effect, Not Likely to Adversely Affect"	"May Effect, and is Likely to Adversely Affect"
Giant Kangaroo Rat		X
San Joaquin Kit Fox		X
Blunt-nosed Leopard Lizard		X
California Tiger Salamander		X
California Condor	X	
Vernal Pool Fairy Shrimp	X	
Conservancy Fairy Shrimp	X	
Longhorn Fairy Shrimp	X	
Vernal Pool Tadpole Shrimp	X	

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APPENDICES

Appendix A – California Tiger Salamander and Vernal Pool Fairy Shrimp Project Specific Impact Avoidance and Minimization Measure Review

CALIFORNIA TIGER SALAMANDER
PROJECT SPECIFIC IMPACT AVOIDANCE AND
MINIMIZATION MEASURE REVIEW

1.0 Introduction

The following information provides a review of impact avoidance and minimization measures, associated with the federal and state Threatened California tiger salamander (*Ambystoma californiense;* CTS), within the Panoche Valley Solar (PVS) project area and includes brief distribution information and habitat preference, the scientific basis for avoidance and minimization of impacts, and other industry species requirements in California.

Impact evaluation and proposed conservation measures, associated with the CTS, will be addressed in the upcoming PVS Biological Assessment. The CTS will also be addressed in the California Endangered Species Act (CESA) section 2081 Incidental Take Permit (ITP) application.

This information is based on existing project team correspondence and analysis, scientific literature review, and site-based surveys. Listed species avoidance and minimization measures are a significant permitting issue for projects in California including several solar energy projects such as the proposed Panoche Valley Solar Farm.

2.0 Background

Distribution and Range

The CTS originally inhabited most of central California, and remains in remnant populations throughout much of its original range. The California Natural Diversity Database (CNDDB) records for CTS show its distribution encompasses portions on Alameda, Amador, Calaveras, Contra Costa, Fresno, Kern, Kings, Madera, Mariposa, Merced, Monterey, Sacramento, San Benito, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Tulare, Tuolumne, and Yolo Counties (NatureServe 2009). About 80 percent of all extant occurrences are in Alameda, Contra Costa, Madera, Merced, Monterey, San Benito, and Santa Clara counties, with 30 percent of all occurrences in Alameda County (NatureServe 2009). There are CNDDB (2010) records of occurrence of the species at the north end of the project site; one was detected in a bermed pool of a tributary of Las Aquilas Creek, and another was observed north of the project site in a bermed pool of a tributary of the south fork of Little Panoche Creek.

CTS larvae were observed in two off-site ponds (Ponds #3 and #12) during the 2009-2010 rainy season while conducting protocol-level vernal pool branchiopod surveys. Pond #3 is a large stock pond that still contained sufficient water level for complete metamorphosis of CTS larvae by May 21st. Seven large CTS larvae were netted at this location. Pond #12 is a vernal pool where small CTS larvae were first observed in February during branchiopod surveys. During the May 21 sampling event, there were several dozen larvae in the pond attempting to metamorphose (due to the drying of the pond). Some may have metamorphosed successfully, though 10 were observed desiccated in the shallow and muddy portions of the pond. Such conditions make these larvae susceptible to avian predation. Protocol CTS Larval Surveys, performed in March, April and May of 2010, also noted larval CTS in these two ponds. CTS were not observed in the two historic ponds (Ponds #8 and #9) during these protocol larval surveys.

No CTS breeding were observed in the project area during the 2009-2010 rainy season. However breeding was confirmed in the two nearby but off-site ponds discussed above. CTS breeding in those ponds could aestivate on portions of the Project site. While aquatic life was devoid in Ponds #8 and #9 during that same rainy season (2009 to 2010), these two pond areas supported historic breeding for CTS in 1992, and thus will be treated as known breeding ponds for this analysis.

Habitat

The use of vernal pools and other temporary bodies of water for breeding limits the CTS to areas of low elevation and low topographic relief throughout their range (Stokes et al. 2008). Ephemeral vernal pools which refill with water on a yearly basis, are 40 – 80 cm (15.7 – 31.4 inches) in depth, and have a surface area of 0.2 hectares or more are optimal for breeding CTS, although small, shallower pools will also house breeding CTS (Stokes et al. 2008). Depth of the breeding pool was highly correlated with breeding CTS. Stokes et al. (2008) found no CTS larvae in pools with an average depth of less than 22 cm (8.6 inches). Deep pools with permanent water may not be optimal for breeding populations of CTS because they often house predatory fish, crayfish, or bullfrogs that prey upon larval CTS. This creates a narrow window of pool depth where the pool will not completely dry out before CTS have metamorphosed, but also not contain water year round and house predators. Metamorphosed CTS move out of the vernal pools and into upland habitats. Small mammal burrows are important features of upland habitat. Adult CTS occupy small mammal burrows in grassland, savanna, or open woodland habitats (Trenham and Shaffer 2005).

Activity patterns of adult CTS are not well understood. Adult CTS live their entire lives in the burrows of small mammals such as the California ground squirrel. Adults begin moving toward breeding pools when the first fall rains begin to inundate pools. Breeding adults will continue moving to pools through the winter and spring. Adults can generally be found at breeding pools from October through May, although breeding is highly dependent on the amount of precipitation (Trenham et al. 2001; Trenham and Shaffer 2005).

Adult CTS leave the breeding pools in late spring and return to upland habitats. Trenham and Shaffer (2005) used pitfall traps at various intervals away from a pool to determine the extent of upland use. They found that the numbers of adult CTS declined as distance from the pool increased out to 620 meters (2,034 feet). Subadults also moved up to 600 meters (1,968 feet) away from the pools, but most were concentrated between 200 and 600 meters (656 – 1,968 feet) from the pool. This has led managers to suggest preserving upland habitats with suitable small mammal burrows out to 600 meters (1,968 feet) from breeding pools (Trenham and Shaffer 2005).

3.0 Discussion

Upon review of the literature and agency correspondence, there is information available concerning site-specific avoidance, minimization, mitigation, and monitoring plans for the CTS. The conservation strategy developed for this Project relies on preservation and enhancement of suitable habitat for the CTS (i.e., Conservation Lands). In addition, to preserving the most important habitat for the species in the region, the Project will employ avoidance and minimization measures to reduce harm, injury or death (i.e., take) to individuals. The following discussion describes the conservation approach proposed by the PVS project.

Avoidance and Minimization Measures

Four known CTS breeding ponds and one potential CTS breeding pond are located within 1.2 miles of the Project Area (none are located within the Project Area). The objective of these measures is to provide for any CTS found on the Project site to be relocated to a suitable burrow adjacent to the existing breeding pond on the Valadeao Conservation Lands. Below are reasonable and prudent measures that will be implemented to protect CTS during construction activities.

- CTS Surveys. The Designated Biologist shall survey the work site before any ground disturbing activities begin. If the Designated Biologist finds any life stages of CTS (adults, eggs, or larvae) the Designated Biologist shall relocate the life form to suitable habitat that is being preserved. The Designated Biologist shall hold the appropriate state and federal Scientific Collecting Permits (SCPs) for amphibians to be authorized to capture and handle CTS. The Designated Biologist may be assisted by approved biologists that do not have an SCP; these biologists shall be identified as Designated Monitors.

- CTS Exclusion Fencing. PVS shall place CTS exclusion fencing around the construction footprint for any construction activity taking place within 1.2 miles of potential or known CTS breeding sites prior to the rainy season before construction begins. PVS shall maintain the CTS exclusion fencing throughout the first rainy season prior to construction activities and throughout all construction activities. PVS shall use wildlife fencing, which consists of a fine (less than 1.0 cm (0.4 inch) mesh, smooth polymer matrix, or aluminum flashing equipped with one-way exits every 76 - 152.4 meter (250 to 500 feet) to avoid entrapment of amphibians inside the fence. PVS shall bury fencing to a depth of at least 15.2 cm (6 inch) and fencing shall be a minimum of 76.2 cm (30 inches) tall following installation. CTS exclusion fencing can be designed to work to exclude other species as well. Care should be taken in exclusion fencing design should cattle or sheep be expected to be adjacent to the fencing. Entranceways to construction areas shall be minimized as much as possible and shall be equipped with a gate that can be placed across the entranceway at the end of each working day, which would prevent CTS from entering the site. PVS shall also avoid small mammal burrows to the maximum extent possible during installation of the exclusion fencing. The exclusion fencing will be removed after the completion of construction or may be removed at the end of the rainy season if the project or section of the project within 1.2 miles of a known or potential breeding pond will be completed prior to the following rainy season.

- CTS Relocation Plan. If a CTS is observed, the permitted Designated Biologist(s) will place the CTS into a suitable bucket or insulated cooler in the shade with a wetted sponge and an ice pack wrapped in a clean cloth (if required) to mimic subterranean conditions. The biologist will then immediately record the biologist's name, date, time, and CTS location using a handheld GPS and digital camera. The sex, age, condition, diagnostic markings, and the general condition and health of each CTS observed will also be recorded and photographed. The CTS will be released into a suitable burrow as close to a suitable pond as possible (most likely Pond #12 on the Valadeao Ranch Conservation Lands; and as quickly as possible with a time out of the ground not to exceed one hour. If a dead or injured CTS is located during the burrow excavations or construction activities, the USFWS and CDFW will be contacted immediately and PVS and Designated Biologist will follow direction from these agencies for the next steps to take. Finally, the actions undertaken and the habitat description and location of where the CTS were found and where the CTS were relocated will also be recorded and photographed. All of the above information and any field notes will be submitted to the USFWS and the CDFW. In addition, this information will be recorded in a CNDDB report and the Monthly Compliance Report and submitted to the CDFW.

- CTS in Project Footprint. If a CTS is found by any person in areas affected by the Project before or during construction activities, PVS shall immediately stop all work that could potentially harm the CTS until the Designated Biologist can relocate the CTS to an active rodent burrow system in accordance with the approved relocation plan. Prior to surface disturbance or other covered activity, a Designated Biologist shall conduct a listed species education program (tailgate briefing) for all project personnel that will include an explanation of how to identify CTS, and applicable reporting procedures.

- Open Trenches and Holes. The Designated Biologist(s) shall inspect all open holes, sumps, and trenches within the areas impacted by the Project at the beginning, middle, and end of each day for trapped animals only during the rainy season. PVS shall provide earthen escape ramps of no more than 3:1 slope every 76 – 152 meter (250 to 500 feet).

  In general, all open holes, steep-walled holes, or trenches more than two feet deep shall be covered at the close of each work day by plywood or similar materials. Before such holes and trenches are filled, they should be thoroughly inspected for trapped animals.

- Rain Forecast. The Designated Biologist(s) and PVS shall monitor the National Weather Service 72-hour forecast for areas impacted by the Project. A rain gauge shall be installed at the Project site and monitored and refreshed every morning. If rain exceeds 0.6 cm (0.25 inch) during a 24-hour period, PVS shall cease work (including construction-related traffic moving though areas within 1.2 miles of potential or known CTS breeding sites except on public roads) within 1.2 miles of potential or known breeding ponds until no further rain is forecast. In areas within 1.2

miles of potential or known breeding ponds that have been encircled with CTS exclusion fencing (can include structures to permit one-way movement of CTS off the work site), construction may continue during rain events. If work must be completed at night, in the rain, within the exclusion fencing, the Designated Biologist shall monitor all construction activities for CTS.

- Night Work. PVS shall restrict night work in areas within 1.2 miles of potential or known CTS breeding sites when a 70 percent or greater chance of rainfall is predicted within 72 hours of Covered Activities that have not been encircled with exclusion fencing until no further rain is forecast. However, even after salamander exclusion fencing is installed, this condition still applies to construction-related traffic moving though areas within 1.2 miles of potential or known CTS breeding sites but outside of the CTS exclusion fencing (e.g., on roads). If work must be completed at night, in the rain, within the exclusion fencing, the Designated Biologist shall monitor all construction activities for CTS.

- Soil Stockpiles. PVS shall ensure that soil stockpiles are placed where soil will not pass into potential CTS breeding pools or into any other "Waters of the State," in accordance with Fish and Game Code 5650. PVS shall appropriately protect stockpiles to prevent soil erosion.

- Barriers to CTS Movement. Any roadways that the PVS needs to construct within 1.2 miles of known or potential CTS breeding sites shall be constructed without steep curbs, berms, or dikes, which could prevent CTS from exiting the roadway. If curbs are necessary for safety and/or surface runoff, PVS shall design and construct them to allow CTS to walk over them. If steep dikes are required, PVS shall design and construct them to include over-side drains or curb/dike breaks spaced at intervals of 7.6 meters (25 feet) to allow CTS passage.

- Fieldwork Code of Practice. To ensure that disease is not conveyed between work sites, all Biologists shall follow the fieldwork code of practice developed by the Declining Amphibian Populations Task Force Fieldwork Code of Practice; the Designated Biologist(s) may substitute a bleach solution (0.5 to 1.0 cup of bleach to 1.0 gallon of water) for the ethanol solution. Care shall be taken so that all traces of the disinfectant are removed before entering the next aquatic habitat.

PVS will also construct up to three new mitigation CTS breeding ponds meeting the following criteria:

- Mitigation ponds will be ephemeral, filling in late fall, winter, and spring, and drying out by early June. Critical months of inundation are March–May.
- Mitigation ponds will be approximately one meter (three feet) deep.
- Mitigation ponds ideal footprints will be equal to that of Pond #12 (the known breeding pond located on the VRCL).
- Mitigation ponds are desired to be inundated for five out of every ten years, with a minimum of three out of every ten years.

Valadeao Pond Site 3 is approximately 701 meters (2,300 feet) west-northwest of Pond #12, has a drainage area of approximately 0.44 square miles, and has 70 percent of the surface area of Pond #12, however, a higher rainfall as runoff capture ratio is expected for Valadeao Pond Site 3 than for Pond #12, and is expected to fill to 0.14 acre with a bypass spillway required for excess water to leave the pond and continue downhill. Valadeao Pond Site 3 is not expected to capture water on its way downhill to the known CTS breeding pond (Pond #12). This is the preferred pond location, as this will create a breeding complex, which may support genetic diversity and will provide multiple breeding pond options for CTS in the vicinity.

Valadeao Pond Site 4 is approximately 610 meters (2,000 feet) south-southwest of Pond #12, has a drainage area approximately half the size of Pond #12, and would support a pond of approximately 0.1 acre, with a maximum depth of just over one foot occurring in February. This pond would potentially need either an incised channel or diversion dam(s) in order to collect enough sheetflow into the pond. Currently, a piped spring fills a water trough here, and this piped spring may potentially be used to fill the pond in dry years and would return to watering the trough after the breeding season so it dries out. Valadeao Pond Site 4 is not expected to capture water on its way downhill to the known CTS breeding pond (Pond #12). This would be a secondary location for a pond on the Valadeao Conservation Lands.

Silver Creek Site 1 is located on the SCRCL, which is not near Pond #12. Should a mitigation pond be necessary, this location would collect enough water, as the site is at the bottom of an incised channel and the drainage basin for this pond would be 0.2 square mile with a runoff capture rate just over twice the value for Pond #12. The pond would be 0.06 acre (32 percent of Pond #12), would have a depth of approximately two feet in February and would go dry in June. This pond would only be constructed should CTS be located on the SCRCL.

A relocation program for individuals detected during preconstruction surveys and construction monitoring will be followed for Project build-out, with the approval of the regulatory agencies, which can be used to help populate the areas of newly created breeding habitat.

As stated in the FEIR, impacts to the CTS shall be mitigated by providing habitat preservation, enhancement, and management in perpetuity at graduated ratios for upland aestivation habitat. Breeding habitats and suitable upland aestivation habitat impacted within 640 meters (2,100 feet) of a known or potential breeding pond will be mitigated at a ratio of 3:1, suitable upland habitat located between 2,100 feet and 804.6 meters (2,640 feet) of a breeding pond will be mitigated at a ratio of 2:1, and suitable upland habitat located between 804.6 meters (2,640 feet) and 2,023 meters (6,636 feet) of a breeding pond will be mitigated at a ratio of 1:1. Preserved and permanently protected CTS aestivation habitat shall be the same quality or better quality than the habitat disturbed and will be located on the VFCL, VRCL, and SCRCL. In addition, the PVS will be creating new breeding habitat on the Conservation Lands (primarily VRCL), which will be preserved and managed in perpetuity.

Temporary impacts to suitable upland and potential breeding habitat shall be mitigated at a ratio of 0.5:1. A suitable breeding pond is a depression with the potential to contain water for 12 weeks of the year; the depression need not pond for this duration every year to meet the definition of a potential breeding pond. Preserved habitat shall be the same quality or better quality after any restoration activity such as new pond creation compared to the impacted habitat, shall consist of no more than three non-contiguous areas of land, and shall include high-quality breeding habitat at a ratio equal to or greater than the potential breeding habitat present within the fenceline of the project site (measured by acreage, not by number of breeding ponds). This mitigation may occur on lands used simultaneously as mitigation for impacts to other species. Based on the above mitigation ratios, this would require the proposed project to conserve approximately 3,900 acres of CTS habitat.

Post-construction monitoring consisting of CTS larval surveys, at all suitable breeding ponds (including the constructed ponds) on the Conservation Lands will be conducted the first five years and then once every five years in perpetuity.

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VERNAL POOL FAIRY SHRIMP
PROJECT SPECIFIC IMPACT AVOIDANCE AND
MINIMIZATION MEASURE REVIEW

1.0 Introduction

The following information provides a review of impact avoidance and minimization measures, associated with the federally threatened vernal pool fairy shrimp (*Brachinecta lynchi;* VPFS), within the Panoche Valley Solar (PVS) project area and includes brief distribution information and habitat preference, the scientific basis for avoidance and minimization of impacts, and other industry species requirements in California. Impact evaluation and proposed conservation measures, associated with the federally-listed species including the vernal pool fairy shrimp, will be addressed in the forthcoming PVS Biological Assessment.

This information is based on existing project team correspondence and analysis, scientific literature review, and site-based surveys. Listed species avoidance and minimization measures are a significant permitting issue for projects in California including several solar energy projects such as the proposed Panoche Valley Solar Farm.

2.0 Background

Distribution and Range

The VPFS is currently known to occur in a wide range of vernal pool habitats (i.e., ephemeral or temporary pools of water with distinct aquatic organisms) in the southern and Central Valley regions and coastal ranges of California and in two vernal pool habitats in the Agate Desert region of southern Oregon (USFWS 2005). The historical range of the VPFS most likely was similar to the historical distribution of vernal pools across California. As such, the historical distribution was likely similar to the current distribution, although less habitat is available than historical levels. The VPFS is one of the most widely distributed fairy shrimps in California, but is uncommon throughout its range and rarely abundant when it does occur (Eng et al. 1990).

Earlier PVS studies identified 121 ephemeral pools within the Project Area, which were classified as ephemeral drainages within seasonal drainages, road puddle or roadside ditch, stock pond, trough puddles that were created by livestock around leaky troughs, and vernal pools (County of San Benito 2010).

A winter 2010 Protocol Vernal Pool Branchiopod Surveys identified VPFS within the Project footprint in one pool, a small berm pond located along the boundary of Sections 4 and 9 (i.e., northwestern section of the project footprint). One other pool, created by excavated dirt used for the berm around the occupied pool, was identified as hydrologically connected with the VPFS occupied pool. VPFS were not found in any other potential habitat throughout the project site or the Valadeao Ranch Conservation Lands (VRCL).

Habitat

Helm (1998) found VPFS in 21 different types of habitat, including vernal pools, vernal swales, alkaline pools, and road-side ditches. Optimal pools tend to be a neutral to slightly alkaline pH, have low dissolved salts, and are dominated by native vernal pool plants. VPFS can occur in pools as large as 10 hectares (25 acres), but most occur in much smaller pools measuring less than 0.02 hectares (0.05 acres; Gallagher 1996, Helm 1998). Helms (1998) found the average depth of pools containing VPFS to be 15 cm, with an average maximum depth of 22 cm. Optimal pools tend to be a neutral to slightly alkaline pH, have low dissolved salts, and are dominated by native vernal pool plants. The common thread between all types of habitat is that they dry out during the summer and fall. The eggs, or cysts, of VPFS require a drying and inundation cycle to trigger hatching. If the cysts do not dry out, a fungal infection can occur, killing the cyst.

3.0 Discussion

Upon review of the literature and agency correspondence, there is information available concerning site-specific avoidance, minimization, mitigation, and monitoring plans for the VPFS. The conservation strategy developed for this Project relies on preservation and enhancement of suitable habitat for these species (i.e., Conservation Lands). In addition, to preserving the most important habitat for the species in the region, the Project will employ avoidance and minimization measures to reduce harm, injury or death (i.e., take) to individuals. The following discussion describes the conservation approach proposed by the PVS project.

Avoidance and Minimization Measures

- One vernal pool and one hydrologically connected vernal pool within the proposed Project footprint are occupied by VPFS (i.e., located west of the VFCL and Las Aquilas Creek). Prior to construction activities, BMPs (such as use of silt fencing, hay bales, etc.) outlined in a forthcoming Stormwater Pollution Prevention Plan, will be implemented to limit erosion and sediments from entering vernal pool habitat. Additionally, a 30.5 meter (100 ft.) buffer will be placed around all occupied vernal pools to prevent equipment and array placement from inadvertently entering these pools. There are no direct project-related impacts to this species.

- All drainages, washes, and stream habitats and the 100-year floodplain will be avoided and excluded from construction activities.

- Appropriate measures will be undertaken to prevent unauthorized off-road vehicle use. Signing will be the preferred method to discourage use, as well as fence surrounding the perimeter of the project area.

- Sheep may be grazed periodically throughout the Project footprint to limit vegetation growth.

- Project-related motorized vehicles are prohibited (with the exception of emergency vehicles on designated roads) within occupied VPFS habitat and established 100 ft. buffers.

- Any spills of hazardous materials will be carefully cleaned up immediately in accordance with the Project Spill Prevention Control Plan.

To the extent that the fill or disturbance of ephemeral pools occupied by VPFS, which may be identified at a later date, cannot be avoided, each acre, or fraction thereof, of occupied vernal pool habitat which is filled or disturbed will be compensated by the preservation and management of two acres of occupied VPFS habitat (2:1 preservation ratio) and the creation, management, and preservation of one acre of vernal pool habitat (1:1 creation ratio) at a location approved and pursuant to authorization received by the USFWS. The PVS may also satisfy this mitigation requirement through the purchase of credits at a USFWS-approved mitigation bank.

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Appendix B – Giant Kangaroo Rat Project Specific Impact Avoidance and Minimization Measure Review

PANOCHE VALLEY SOLAR PROJECT

GIANT KANGAROO RAT
PROJECT SPECIFIC IMPACT AVOIDANCE AND
MINIMIZATION MEASURE REVIEW
NOVEMBER 14, 2013

1.0 Introduction

The following information provides a review of impact avoidance and minimization measures associated with the giant kangaroo rat (GKR) (*Dipodomys ingens*) including brief distribution information and habitat preference, the scientific basis for avoidance and minimization of impacts, and other industry GKR requirements in California. This information is based on existing project team correspondence and analysis, scientific literature review, and additional science-based information. Detailed site specific biological survey data can be found in the 2013 GKR Survey Report prepared by Energy Renewal Partners, Inc. GKR avoidance and minimization measures are a significant permitting issue for projects in California including several solar energy projects such as the proposed Panoche Valley Solar Farm (PVS).

Impact evaluation and proposed conservation measures, associated with the federally and stated listed GKR, will be addressed in the upcoming PVS Biological Assessment and the California Endangered Species Act (CESA) section 2081 Incidental Take Permit (ITP) application.

2.0 Background

Distribution and Range

The GKR historically inhabited a narrow band of gently sloping and flat ground in western San Joaquin Valley, Carrizo Plain, and Cuyuma Valley (USFWS 1998). Scattered colonies were also found on steeper slopes and ridge tops in the Ciervo, Kettleman, Panoche, Tumey Hills, and Panoche Valley (USFWS 1998; USFWS 2010). The species population is currently fragmented into six major geographic units (i.e., 2 percent of the original habitat). These major units are fragmented into more than 100 smaller populations with many isolated by steep terrain barriers and unsuitable habitats (USFWS 1998; USFWS 2010).

- The Panoche Region in western Fresno and eastern San Benito counties
- Kettleman Hills in Kings County
- San Juan Creek Valley in San Luis Obispo County
- Western Kern County in the Lokern, Elk Hills, and upland areas near McKittrick, Taft, and Maricopa
- Carrizo Plain Natural Area in eastern San Luis Obispo County
- Cuyuma Valley in Santa Barbara and San Luis Obispo counties

Connectivity and genetic flow between these sup-populations is important in maintaining genetic diversity in GKR throughout the northern populations. Loew et al. (2005) used microsatellite DNA loci to analyze the amount of gene flow taking place between the northern sub-populations using samples from the various Tumey Hills, Ciervo Hills, Monocline Ridge, and Panoche Valley colonies. Results of these analyses suggested current or relatively recent connectivity between sub-populations in the northern population section (Loew et al. 2005). Results suggested that colonies in the Tumey Hills and Monocline Ridge sub-populations had recent connectivity, most likely via a corridor along Panoche Creek after its confluence with Silver Creek. Results also suggested that colonies in the Ciervo Ridge and Tumey Hills populations had been connected with the Panoche Valley population via long distance migrants or the use of smaller stepping-stone populations (Loew et al. 2005). Panoche Valley appears to be at the northwestern extent of the GKR subpopulations (USFWS 1998).

The Bureau of Land Management's (BLM) Panoche Hills are bounded to the east by the proposed Valadeao Ranch Conservation Lands (VRCL) and to the south by the proposed Silver Creek Ranch Conservation Lands (SCRCL). The BLM holdings of the Tumey Hills are bounded to the east by the SCRCL. The SCRCL also bounds the BLM's Griswold Hills to the north.

USFWS (1998) states that GKR populations, within these areas of current occupied habitat, have expanded and declined with changing weather patterns (e.g., abundant precipitation, drought) since 1979. For instance, in 1992-1993 there were probably 6 to 10 times more GKR than at their low point in 1991.

Habitat

Historically, this keystone species (i.e., a species that plays a unique and critical role in how an ecosystem functions) was believed to inhabit annual grassland communities with few or no shrubs, well-drained, sandy-loam soils located on gentle slopes (less than 11 percent) in areas with about 16 cm (6.3 inches) of precipitation, and free from winter flooding (USFWS 1998). More recent studies have shown that GKR inhabit both native/annual grassland and shrub communities on a variety of soil types and on slopes up to 22 percent and 868 meters (2,850 feet) above sea level. However, these studies reiterated that the preferred habitat is still annual grassland communities on gentle slopes of less than 10 percent, with friable sandy-loam soils. These grasslands are dominated by red brome, annual fescues, largeleaf filaree (*Erodium macrophyllum*), and shining peppergrass (*Lepidium nitidum*) (USFWS 1998).

In these habitats, the GKR form colonies of burrows called precincts in which multiple individuals reside (Braun 1985; Randall 1997). They are primarily nocturnal and are active all year in all types of weather and do not migrate or become dormant (USFWS 1998). Recent studies have supported early observations that San Joaquin kit foxes (SJKF) appear to be strongly linked ecologically to GKR and other kangaroo rat species (both for prey and burrows). In natural areas, SJKF density and population stability are highest in areas with abundant kangaroo rats (Cypher 2006; USFWS 2010).

The known GKR habitat, within the PVS project area, consists of native/non-native grassland and associated wash/terrace habitat concentrated along the Panoche and Las Aquilas creeks and associated Valley Floor Conservation Lands (VFCL) (Figure 1). GKR are also known to occur and have been documented on the VRCL and are in abundance in SCRCL (Figure 2). The majority of the PVS area GKR habitat is associated with the well-drained and alluvium Panoche loam soil series (0-9 percent slopes)

(Natural Resources Conservation Service 2013). Detailed site specific survey data can be found in the 2013 GKR Survey Report prepared by Energy Renewal Partners, LLC.

Figure 1. Panoche Creek and VFCL travel corridor

Figure 2. View north over Silver Creek Ranch. Circular areas in mid-photo are active GKR precincts.

The existing natural lands in western Fresno and eastern San Benito counties are listed as one of the important areas for continued existence and recovery of the GKR (USFWS 1998; USFWS 2010). The stated recovery goal is to protect all existing natural land on the Silver Creek Ranch, and existing habitat along the eastern bases of the Monocline Ridge and the Tumey Hills, between Arroyo Ciervo on the south and Panoche Creek on the north. According to the USFWS (1998) and USFWS (2010), the total GKR source population area in the Panoche Valley consists of 2,288.4 acres. The Silver Creek Ranch supports 90.3 percent (2,065.8 acres) of the source population area defined in the Recovery Plan and 5-year Review. USFWS 2010 also states that securing and protecting the Ciervo-Panoche Natural Area is an important element in GKR downlisting and recovery criteria. Panoche Creek and Silver Creek were identified as important dispersal corridors within the northern range of the GKR (Loew et al. 2005); however, the majority of these areas are currently unprotected. No critical habitat (i.e., habitat essential for species conservation) has been designated for the GKR by the USFWS.

3.0 Discussion

Upon review of the literature and agency correspondence, there is information available concerning site-specific GKR avoidance, minimization, mitigation, and monitoring plans. The recent solar energy projects within the San Joaquin Valley also have specific plans associated with this species. The conservation strategy developed for this Project relies on preservation and enhancement of nearly 90 percent of the core populations of the Panoche Valley GKR as defined by the USFWS (2010) (i.e., Conservation Lands). In addition, to preserving the most important habitat for the species in the region, the Project will employ avoidance and minimization measures to reduce take to individuals. The following discussion reflects this information.

GKR Avoidance

Based on feedback and concerns expressed by the California Department of Fish and Wildlife (CDFW) and the USFWS, PVS conducted a 100 percent coverage survey of the project footprint for GKR and a systematic stratified sampling effort on the Conservation Lands in February and March 2013 (PVS 2013). A total of 15,749 survey grid cells (30m x 30m) were evaluated within the Project Area study area (13,398 within the project area boundaries and 2,351 within the 500-foot buffer). A total of 197 of these cells were within the project boundaries and considered active (1.3% of evaluated cells), while 99 cells within the 500-foot buffer were considered to be active (PVS 2013). Another 88 cells were considered inactive in the project area and 183 inactive in the 500-foot buffer. Based on CDFW recommendations, a follow-up verification survey, concerning inactive grid cells, was conducted in mid-July 2013. The information above reflects this verification survey.

Potential GKR burrow precincts were identified by presence of characteristic large horizontal (50-120 mm) and vertical (45-75mm) burrows. Potential GKR burrow precincts were visually inspected for sign and considered occupied based on presence of scat, tracks, tail-drags, pit caches, fresh excavations, and/or cropped vegetation around suitably sized horizontal and vertical burrow openings.

Precincts were considered unoccupied when characteristic horizontal and vertical burrow openings were present but the surrounding area was devoid of all other diagnostic sign (fresh scat, tracks, fresh digging, and cropped vegetation). Evidence of other congeneric species was also noted and recorded as "other kangaroo rat". Areas with mounding characteristic of GKR precincts but with no burrows or other GKR sign were classified as potentially relict evidence of GKR (PVS 2013).

Based on this 2013 survey information, a map of the active and inactive GKR cells was prepared and larger colonial concentrations were delineated. Four of the larger colony concentrations (i.e., approximately 212 acres), within the project footprint, were deemed as GKR avoidance areas (approximately 58% of total active and inactive GKR blocks). These areas were selected and removed from the Project footprint due to the large numbers of concentrated active and inactive GKR precincts, presence of high quality habitat, and direct connectivity to protected lands such as the VFCL, San Joaquin kit fox (SJKF) corridor, VRCL, and adjacent BLM landholdings. These areas are as follows:

- Las Aquilas Creek and northern VFCL (includes the SJKF corridor) - 46 acres
- Las Aquilas Creek and central VFCL (includes the SJKF corridor) – 47 acres
- Panoche Creek and western VFCL – 38 acres
- eastern VFCL - 85 acres

Based on CDFW recommendation, another strip of active and inactive GKR burrows will be protected along the existing Little Panoche Road fence line.

As reference for avoiding GKR, approximately 90% of the GKR precincts associated with the California Valley Solar Ranch Project (CVSR) site were avoided due to extensive redesign of the Project (High Plains Ranch II, LLC 2010). A number of giant kangaroo rats precincts occurred within the proposed CVSR footprint and were directly affected by assembly of the solar arrays, trenching, all-weather roads, buildings, and other infrastructure. Giant kangaroo rats occupying burrow precincts that could not be avoided through design were relocated to suitable unoccupied onsite locations.

GKR Minimization

There are 63.8 acres of GKR habitat within the project footprint. A GKR Relocation Plan has been prepared (to be included in the upcoming Biological Assessment) and will implement methodology consistent with other successful kangaroo rat relocations (Bender et al. 2010; Germano 2001, 2010; Germano and Saslaw 2007; Germano et al. 2009; Hall 2010; H.T. Harvey and Associates, Inc. 2010) and includes guidance with local knowledge of the GKR. The relocation methodology will include hand and mechanical excavation of the precincts after depletion trapping to remove GKR from the remaining areas of the site, once they have been surrounded by protective enclosure fencing. The GKR will be translocated to suitable areas adjacent to the project footprint including unoccupied areas within the VFCL and potentially the VRCL and SCRCL. Specific relocation sites are to be determined in the near future and will be subject to agency review.

While the ultimate goal and objective of relocating GKRs is to preserve and minimize harm, injury, or death of individual GKR during Project build-out and to possibly recolonize nearby locations where GKR are no longer supported or within suitable habitat near occupied colonies, the conservation strategy is built largely on the conservation principle that 90 percent of the source population of GKR as defined in the USFWS Recovery Plan (1998) are preserved into perpetuity. Recolonization of suitable habitat that is no longer occupied by GKR will create opportunities to grow the population beyond its current levels and occupancy. These translocated populations should be monitored for five years to determine success of the translocation. A successful translocation is when persistence of the translocated population is detected in the relocation areas after the monitoring period during population cycles that are considered moderate to high for the region.

Conducting successful translocations requires careful consideration for each animal's well-being during capture, transport, release, and successive monitoring. Risk to the animal should be minimized and acclimation and survival at the release site should be maximized. Specific details will be provided in the GKR Relocation Plan that is associated with the Biological Assessment for the project.

Giant Kangaroo Rat Specific Conservation Measures

The following GKR conservation measures were provided in the FEIR (County of San Benito 2010) for the project:

- Prior to surface disturbance or other covered activity, a Designated Biologist(s) shall conduct a GKR education program for all Project personnel, which familiarizes the Applicant's employees and contractors with occurrence and distribution of the species in areas impacted by the Project; take avoidance measures being implemented during the Project; BMPs; reporting requirements if incidental take occurs; and applicable definitions and prohibitions under the California Endangered Species Act and other measures regarding federal and state listed species.

- All activities that will result in permanent or temporary ground disturbances shall be preceded by a pre-construction survey for GKR will occur in the area of work. If GKR sign is observed within the area of work, exclusion fencing will be erected around the area of work and saturated with traps to capture GKR and relocate them off-site per the Giant Kangaroo Rat Relocation Plan. Exclusion fencing will be buried deep enough in the ground to prevent GKR from digging under and high enough to prevent them from jumping over. Exclusion fencing may be designed to exclude multiple species. Special care should be taken in exclusion fence design if cattle or sheep are adjacent to the site. Construction will not commence in the area of exclusion fencing until that area has been completely trapped and no more GKR are expected to use the area as determined by the Designated Biologist. These areas can be fenced and trapped in smaller sections within the larger Project area. At the end of trapping, no GKR should remain within the fenced area.

- Appropriate buffers will be established with highly visible markers. All active GKR burrows shall be identified by flagging and avoided by a buffer with a radius of 15.24 meters (50 feet).

- All open holes, steep-walled holes, or trenches more than two feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks (wooden planks should be no less than 10 inches in width and should reach to bottom of trench, and placed at an appropriate angle to allow GKR to exit).

- Unless biological monitors allow alterations to routes, all Project vehicles shall be confined to defined access routes that will be staked and/or flagged. All Project-related flagging shall be collected and removed after completion of the Project.

- In an effort to reduce the likelihood of GKR mortality due to construction related vehicles, a day-time speed limit of 15 mph and a night-time speed limit of 10 mph will be adhered to on the Project site and will not exceed 25 mph on public roads in the vicinity of the Project site.

- Use of rodenticides and herbicides in areas affected by the Project will be restricted to use within the Noxious Weed and Invasive Plant Control Plan. Herbicides used for noxious weed control would be applied in accordance with BLM-approved procedures and other federal and state regulations. Applications will be applied by licensed applicators in accordance with label directions and other restrictions mandated by U.S. Environmental Protection Agency, County Agricultural Commissioner, regional label prescriptions on use, California Department of Food and Agriculture, and other state and federal legislation.

- As required by the FEIR, suitable GKR habitat permanently impacted by the Proposed Project will be mitigated at a 3:1 acreage ratio.

Based on the above mitigation ratios, this would require the proposed project to conserve approximately 8,439 acres of GKR habitat. Project Conservation Lands (including the VFCL, VRCL and SCRCL) would result in the permanent conservation of 16,125.3 acres of GKR habitat including 3,507.8 acres of highly suitable and 12,260 acres of moderately suitable habitat.

These Conservation Lands would result in the permanent protection of more than 52,746 individual GKR and provide suitable areas for GKR relocation. Based on USFWS (1998), the SCRCL supports the majority (83.6 percent) of the source population of GKR in the Panoche Valley; the VFCL supports 5.9 percent; and the VRCL supports 0.8 percent. BLM lands, that are contiguous to the VRCL, support 5.8 percent of the source GKR population. Thus, PVS is proposing to conserve nearly 90 percent of the GKR source populations that occur in the Panoche Valley.

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Appendix C – Giant Kangaroo Rat Relocation Plan

Panoche Valley Solar

Giant Kangaroo Rat Relocation Plan

Panoche Valley Solar Project
San Benito County, California

April 24, 2014

Giant Kangaroo Rat Relocation Plan
Panoche Valley Solar Project

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TABLE OF CONTENTS

1.0 Introduction 1
2.0 Species Description 2
2.1 Historical Distribution of GKR 2
2.2 Characteristics of GKR 2
2.3 Site Survey Background - GKR 4
3.0 GKR Occurrence Results 6
3.1 GKR Results within Project Area 6
3.2 GKR Results within VFCL 7
3.3 GKR Results within SCRCL 7
3.1 GKR Results within VRCL 8
4.0 Discussion of Results 9
5.0 GKR Relocation 11
5.1 Relocation Procedures 12
6.0 References 17

LIST OF FIGURES

Figure 1 **Site Location**
Figure 2 **Project Area**
Figure 3 **Project Area and Conservation Lands**
Figure 4 **GKR Survey Data and Project Area**
Figure 5 **GKR Survey Data and Valley Floor Conservation Lands**
Figure 6 **GKR Survey Data and Silver Creek Ranch**
Figure 7 **GKR Survey Data and Valadeao Ranch**
Figure 8 **GKR Relocation Cover Photo**

LIST OF TABLES

Table 1 GKR Survey Results within the Project Footprint

Table 2 GKR Survey Results within the VFCL

Table 3 GKR Survey Results within the SCRCL

Table 4 GKR Survey Results within the VRCL

DEFINITIONS

Biological Monitor	Observers that work on-site to perform biological surveys or provide oversight of ground disturbing activities as needed and receive instruction from and reports to the Designated Biologist(s).
Conservation Lands	Three large parcels of land to offset potential impacts as part of a conservation package consisting of the permanent preservation and management of those parcels (Valley Floor Conservation Lands, Valadeao Ranch Conservation Lands, and Silver Creek Ranch Conservation Lands).
Designated Biologist	Biologist knowledgeable and experienced in the biology and natural history of the special-status species on the Project and shall be responsible for monitoring construction activities to help minimize and fully mitigate or avoid the incidental take of individual species and to minimize disturbance of special-status species' habitat. This biologist may appoint biological monitors to perform biological surveys or provide oversight of ground disturbing activities as needed in their place.
Project Footprint	The portion of the project that includes the solar arrays and associated roads and equipment, totaling 2,492 acres.
PVS	Panoche Valley Solar Facility; name of the proposed project.
Study Area	Project Footprint and Conservation Lands are collectively referred to for this relocation plan.

ACRONYMS

BNLL	Blunt-nosed Leopard Lizard
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
DNA	Deoxyribonucleic Acid
ESA	Endangered Species Act
˚F	Fahrenheit
FEIR	Final Environmental Impact Report
GPS	Global Positioning System
GKR	Giant Kangaroo Rat
m	meters
MW	megawatt
PV	photovoltaic
PVC	Polyvinyl chloride
SCRCL	Silver Creek Ranch Conservation Lands
SJKF	San Joaquin Kit Fox
USFWS	U.S. Fish and Wildlife Service
VFCL	Valley Floor Conservation Lands
VRCL	Valadeao Ranch Conservation Lands

1.0 Introduction

Panoche Valley Solar, LLC proposes to construct and operate a solar photovoltaic (PV) energy generating facility located in San Benito County, California that will generate approximately 399-megawatts (MW) (Figure 1). This project is called the Panoche Valley Solar Facility (PVS) Project (Proposed Project). The Proposed Project will include some unavoidable impacts on giant kangaroo rats (*Dipodomys ingens*; GKR) located within the boundaries of the Proposed Project Footprint. This relocation plan has been developed to minimize the unavoidable impacts due to the construction of the Proposed Project on recommendations from the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW).

The proposed solar site construction footprint (Project Footprint) contains approximately 2,492 acres of presently grazed (cattle and sheep) land in the Panoche Valley of eastern San Benito County, California (Figure 2). The Proposed Project would also include approximately 24,185 acres of high quality Conservation Lands that are contiguous with the approximately 2,492-acre Project Footprint (Figure 3). These high quality lands are the Valley Floor Conservation Lands (VFCL), Valadeao Ranch Conservation Lands (VRCL), and Silver Creek Ranch Conservation Lands (SCRCL). The Project Footprint and Conservation Lands are collectively referred to for this relocation plan as the "Study Area".

2.0 Species Description

The GKR is currently listed as endangered by the federal Endangered Species Act (ESA) and endangered by the California Endangered Species Act (CESA [Fish and Game Code §§ 2050 et seq]). The GKR was proposed for listing on August 13, 1985 (50 FR 32585 32587) and finalized on January 5, 1987 (52 FR 283 288). No critical habitat has been established for the GKR. The species does not have its own recovery plan, but is included in the Recovery Plan of Upland Species of San Joaquin Valley, California (USFWS 1998).

2.1 Historical Distribution of GKR

Historically, the GKR was known to occur over vast stretches of the western San Joaquin Valley, Carrizo Plain, and Cuyama Valley with scattered colonies located on steeper slopes and ridge tops in the Ciervo, Kettleman, Tumey, Panoche Hills, and Panoche Valley in California (Grinnell 1932, Shaw 1934, Hawbecker 1944, USFWS 1998). The Panoche Region located in western Fresno and eastern San Benito Counties is currently identified as one of the six major geographical units for remaining GKR populations. The other five remaining major geographical units are: 1) Kettlemen Hills in Kings County; 2) San Juan Creek Valley in San Luis Obispo County; 3) western Kern County in the area of the Lokern, Elk Hills, and other uplands; 4) Carrizo Plain Natural Area in eastern San Luis Obispo County; and 5) Cuyama Valley in Santa Barbara and San Luis Obispo Counties (USFWS 1998, USFWS 2005).

2.2 Characteristics of GKR

The GKR, compared to other kangaroo rat species found in the Study Area, is very large, brownish in color, with a light brown tail tip. An adult male GKR can weigh up to 157 grams, nearly double the weight of other coexisting kangaroo rats (Grinnell 1932), and can have a total length of approximately 31.1 centimeters (cm). In comparison, the San Joaquin kangaroo rat (*Dipodomys nitratoides*) has four toes on the hind feet while GKR has five toes which are longer than 4.7 cm (Best 1993).

The GKR is primarily a seed-eater, but will occasionally consume green plants and insects. Foraging takes place year round in all types of weather from around sunset to near sunrise, with most activity taking place within two hours of sunset. GKR cut ripening heads of grasses and forbs and places them in small surface pits or pit caches located near the GKR's burrow system. These pits have full sun exposure, ensuring the seeds become fully dried/cured. After the seeds have sufficiently dried, they are moved into underground storage for consumption at a later date. The purpose of this curing process is believed to prevent mold growth after the seeds are moved below ground (Shaw 1934). Largeleaf filaree (*Erodium* spp.) and shining peppergrass (*Lepidium nitidum*) are two important seed producing plants utilized by GKR. Peppergrass species ripen earlier in the year and may be one of the more important seed sources for GKR (Williams et al. 1993). The ability to transport large quantities of seeds in cheek pouches, coupled with the highly developed seed curing and caching behaviors, probably allows GKR to endure prolonged droughts of one or two years, without major regional population effects (Williams et al. 1993).

GKR live in burrow systems referred to as precincts, which are the most intensely used portion of their home range. Precincts consist of one to five separate burrow openings within one to eight meters (m) of one another. A typical precinct has three burrows that are independent of one another and not interconnected, and as Grinnell (1932) and Shaw (1934) purport, precincts are occupied by a single animal. Precincts of individuals are arranged in colonies with other precincts, and colonies are generally separated by several hundred meters (Williams and Kilburn 1991). These GKR precincts are easily spotted in spring due to the denser, lush vegetation compared to the intervening areas. Plants on a precinct are the first to turn green after autumn rains and the last to ripen and turn brown in the spring (Grinnell 1932, USFWS 1998). When sufficient annual vegetation is present, population density of GKR can be estimated by counting precincts within a colony. Using this method of estimating density, Grinnell (1932) found that colonies contained between 18 and 69 precincts, with a mean of 52 GKR individuals per hectare.

Female GKR have displayed an adaptable reproductive pattern that reflects surrounding population densities and food availability. During times of high population density, females have a short reproductive season. In times of low population densities, females may continue to breed well into the summer (December to September; USFWS 1998). This ability to extend the breeding season can potentially lead to population irruptions during favorable climatic conditions. For example, populations in the northern reaches of the GKR range went from an estimated 2,000 individuals between 1980 and 1985, to an estimated 37,125 individuals between 1992 and 1993, following the end of a prolonged drought (Williams et al. 1995). During the post-drought January – May breeding season, approximately 44% of counted litters contained two young; however, one female had a litter of three and the remaining 39% had a litter of one (USFWS 1998).

Young GKR begin to disperse at approximately 11 to 12 weeks after birth, but may remain in their natal precinct after the 12th week during times of high population densities. The young tend to remain in the precinct until there is an opportunity to disperse or they are driven off by the mother or a sibling. At this point, they typically disperse into existing burrows of other adults that have died or dispersed. When abundant, GKR out-compete other rodents within the colony area, becoming the only rodent species present (Grinnell 1932).

When abundant, GKR are a major prey item for numerous predators, including: great horned owl (*Bubo virginianus*), western burrowing owl (*Athene cunicularia hypugaea*), short-eared owl (*Asio flammeus*), coyote (*Canis latrans*), San Joaquin kit fox (*Vulpes macrotis mutica)*, and American badger (*Taxidea taxus*). Snakes that might prey on GKR include: coachwhip (*Coluber flagellum*), gopher snake (*Pituophis catenifer*), king snake (*Lampropeltis* spp.), and western rattlesnake (*Crotalus oreganus oreganus*). GKR are apparently more aggressive than other co-occurring rodents and tend to be the dominant small mammal where they are present (Grinnell 1932).

Presently, the GKR population in the northern portion of the species' range is divided into three main population sections: Tumey Hills, Ciervo Hills, and Monocline Ridge. Each main population is divided into several sub-populations. The population within the Project Footprint, VFCL, VRCL, and SCRCL are all within the same subpopulation of the Tumey Hills portion of the northern population (Loew et al. 2005, USFWS 1998). Connectivity and genetic flow between these sub-populations are key to maintaining genetic diversity in GKR throughout the northern populations. Loew et al. (2005) used microsatellite

DNA loci to analyze the amount of gene flow taking place between the northern sub-populations using samples from the various Tumey Hills, Ciervo Hills, Monocline Ridge, and Panoche Valley colonies. Results of these analyses suggest current or relatively recent connectivity between sub-populations in the northern population section (Loew et al. 2005). Results propose that colonies in the Tumey Hills and Monocline Ridge sub-populations had recent connectivity, most likely via a corridor along Panoche Creek after its confluence with Silver Creek. Results also suggest that colonies in the Ciervo Ridge and Tumey Hills populations had been connected with the Panoche Valley population via long distance migrants or the use of smaller stepping-stone populations (Loew et al. 2005). Panoche Valley appears to be at the northwestern extent of the GKR sub-populations (USFWS 1998).

2.3 Site Survey Background - GKR

Reconnaissance surveys conducted in April 2009 found evidence of GKR precincts and scat throughout the Study Area. Multiple focused biological surveys performed in the Study Area between 2009 and 2012 (total of over 20,000 survey hours) documented the presence of GKR in multiple locations. These surveys included: protocol-level rare plant surveys, abridged 2009 protocol-level blunt-nosed leopard lizard (*Gambelia sila*; BNLL) surveys, distance sampling, occupancy sampling, and surveys specific to GKR for the purpose of documenting precinct locations.

Based on feedback and concerns expressed by the CDFW and the USFWS about the previous studies, a 100 % coverage survey of the Study Area (Figure 4) for GKR was conducted, and a systematic stratified sampling effort was completed on the Conservation Lands in February and March 2013. The survey methodology that was implemented was approved by CDFW.

Field surveyors with experience in GKR surveys used a grid sampling system whereby 30m x 30m grid squares were evaluated for the presence of GKR sign. Grid squares were arranged along north-south running parallel transects. Surveyors visually inspected each grid square for evidence of GKR precincts. Burrow precincts were considered occupied based on presence of scat, tracks, tail-drags, pit caches, fresh excavations, and cropped vegetation around a series of suitably sized horizontal and vertical burrow openings.

Precincts that did not appear to be occupied were also identified and mapped as inactive. Precincts were considered unoccupied when characteristic horizontal and vertical burrow openings and the surrounding area were devoid of other diagnostic sign (e.g. fresh scat, tracks, fresh digging, and cropped vegetation). Evidence of other congeneric species was also noted and recorded as "other kangaroo rat species".

Within the Project Footprint, the survey grid accounted for 100 % coverage, plus a 500 foot buffer (in areas where landowner access was granted). The VFCL are interlaced within the Project Footprint. For this reason, the VFCL was surveyed using the same grid system as the Project Footprint and was subject to 100% coverage. The data were post-stratified following collection in the field, and the results were treated separately.

The SCRCL and VRCL were surveyed using the same methodology described above, but with wider transects. No buffers were surveyed for the Conservation Lands since surveyors did not have landowner access outside these areas. Transects were systematically distributed across the Project Footprint and included areas previously identified as high and low suitability habitats in past studies. The SCRCL and VRCL surveys were designed to cover approximately 20-30 % of the Conservation Lands; therefore, transect spacing was approximately 148 meters (485 feet).

3.0 GKR Occurrence Results

Based on feedback and concerns expressed by CDFW and USFWS, a 100% coverage survey of the Project Footprint for GKR was conducted, and a systematic stratified sampling effort was completed on the Conservation Lands in February and March 2013. Follow-up surveys on the Project Footprint were conducted from July 13 to July 15, 2013, to verify and/or update the status of inactive sites. The survey methodology that was implemented was approved by CDFW and was provided to USFWS prior to the start of the survey.

Field surveys used a grid sampling system whereby 30m x 30m grid squares were evaluated for the presence of GKR signs. Grid squares were arranged along north-south running parallel transects. Surveyors visually inspected each grid square for evidence of GKR precincts. Burrow precincts were considered occupied based on presence of scat, tracks, tail-drags, pit caches, fresh excavations, and cropped vegetation around a series of suitably sized horizontal and vertical burrow openings.

Precincts that did not appear to be occupied were also identified and mapped as inactive. Precincts were considered unoccupied when characteristic horizontal and vertical burrow openings and the surrounding area are devoid of all signs (fresh scat, tracks, fresh digging, and cropped vegetation). Evidence of other congeneric species was also noted and recorded as “other kangaroo rat”.

A total of 48,446 survey grid cells were evaluated (Figures 4-7) for GKR presence; 9,430 grid cells were not evaluated due to lack of landowner access, terrain that was too steep to be safely accessed, presence of bulls or other reasons precluding surveyors from entering the grid cell, or data equipment error. These areas are combined within the cells that are highlighted as “No Data”. Results are presented according to the various project/conservation land components in the sections below.

3.1 GKR Results within Project Area

Of the 16,775 total survey grid cells located within the Project Footprint and the 500-foot buffer study area, approximately 13,825 survey grid cells were able to be evaluated (11,858 within the project area boundaries and 1,967 within the 500-foot buffer). A total of 296 of these grid cells were observed to be active at the time of the survey (1.8% of evaluated cells). A total of 197 cells within the Project Footprint are considered active (1.7% of evaluated cells in the project footprint), while 99 cells within the 500-foot buffer were considered to be active (0.5% of evaluated cells in 500 foot buffer). The remaining 2,950 grid cells were not evaluated primarily due to lack of landowner access. These areas are combined within the cells that are noted as “No Data”. Table 1 describes the results of the GKR survey within the Project Footprint.

Table 1 GKR survey results within the Project Footprint

	GKR Grid Cell Status					
	Active	**Inactive**	**No GKR**	**Relict GKR**	**No Data**	**TOTAL**
Project Footprint	197	88	11,572	1	99*	11,957
500-foot Buffer	99	183	1,685	0	2,851	4,818
TOTAL	**296**	**271**	**13,257**	**1**	**2,950**	**16,775**

*No data areas in the project footprint were located along fence line locations along the 500-foot buffer and Valley Floor Conservation Lands. None are wholly within the project area. The entire Project Footprint area was surveyed during the GKR survey.

3.2 GKR Results within VFCL

Of the 11,190 total survey grid cells located within the VFCL study area, approximately 10,001 survey grid cells were evaluated. A total of 896 of these grid cells were observed to be active at the time of the survey (9.0% of the cells evaluated). The 1,189 grid cells were not evaluated primarily due to lack of landowner access based on grazing operations or other restrictions. **Table 2** describes the results of the GKR survey on the VFCL.

Table 2 GKR survey results within the VFCL

	GKR Grid Cell Status					
	Active	**Inactive**	**No GKR**	**Relict GKR**	**No Data**	**TOTAL**
VFCL	896	740	8,364	1	1,189	11,190

VFCL = Valley Floor Conservation Lands

3.3 GKR Results within SCRCL

Of the 10,309 total survey grid cells located within the SCRCL study area, approximately 8,211 survey grid cells were evaluated. A total of 1,883 of these grid cells were observed to be active at the time of the survey (23.0% of the cells evaluated). The 2,098 grid cells were not evaluated due to lack of landowner access, terrain that was too steep to be safely accessed, or other reasons precluding surveyors from entering the grid cell. **Table 3** describes the results of the GKR survey on the SCRCL within the study area.

Table 3 GKR survey results within the SCRCL

	GKR Grid Cell Status					
	Active	Inactive	No GKR	Relict GKR	No Data	TOTAL
SCRCL	1,883	1,414	4,914	0	2,098	10,309

SCRCL=Silver Creek Ranch Conservation Lands.

3.1 GKR Results within VRCL

Of the 10,166 total survey grid cells located within the VRCL, approximately 6,973 survey grid cells were evaluated. A total of 58 of these grid cells were observed to be active at the time of the survey (1.0% of the cells evaluated). The 3,193 grid cells were not evaluated due to lack of landowner access, terrain that was too steep to be safely accessed, presence of bulls, or other reasons precluding surveyors from entering the grid cell. **Table 4** presents the results of the GKR survey.

Table 4 GKR survey results within the VRCL

	GKR Grid Cell Status					
	Active	Inactive	No GKR	Relict GKR	No Data	TOTAL
VRCL	58	48	6,866	1	3,193	10,166

VRCL = Valadeao Ranch Conservation Lands

4.0 Discussion of Results

GKR distribution generally matched the results of past studies in the region with the highest densities occurring on SCRCL followed by the VFCL, Project Footprint, and VRCL. The low GKR densities observed on the VRCL in many areas was likely due to the generally steeper topography. In the Little Panoche Valley area, near the northern extent of the VRCL, habitats appeared to be suitable for GKR occupancy, yet there were very few observations. Potential candidate relocation sites could include areas where past GKR occupancy was observed, but that were not active during surveys or that represent suitable habitat in all other respects. Pockets of occupied habitat are present, indicating general suitability.

GKR occupancy within the Project Footprint was relatively low, with most of the high occupancy areas matching the Williams (1992) core area polygons that are excluded from the Project Footprint and are part of the VFCL.

The results of the 100% survey were used to generate estimates of the total number of GKR potentially supported in the Project Footprint. It was conservatively assumed that all 197 active cells were located in high quality GKR habitat, even though habitat quality in the Project Footprint appears to be compromised over much of the occupied area due to past land use practices. An attempt was made to field verify the density of GKR per active cell; however, based on field conditions (heavy grazing), it was not possible to identify individually clipped precincts within the grid cells. Without performing a systematic grid trapping study, it is assumed that each active cell within the Project Footprint is occupied with at least one individual GKR. This resulting assumed minimum density is within the range provided by Williams, and above the density is predicted by the Habitat Suitability Model for the Project.

Using this density estimate for GKR within the Project Footprint, a minimum of 197 GKR are expected to occur within the Project Footprint currently. Typically GKR populations can fluctuate significantly from year to year and within years, potentially leading to a population increase across the Project Footprint outside of the cells identified as active during the survey. A population increase would likely result in occupancy of at least the currently inactive GKR cells found within the Project Footprint. Therefore, a minimum reasonably expected estimate of the population potentially supported within the Project Footprint is 285 individual GKR.

To account for possible increases in density from one year to the next, a potentially higher density should be assumed. Project Footprint densities of GKR are not available in literature. The only colony evaluated in Williams (1992) from the Valley Floor was not trapped, and no density estimate specifically for that GKR colony was calculated. In the Panoche region, other density estimates are available for Silver Creek Ranch, the vicinity of Valadeao Ranch, and on the east side of the Panoche Region in the vicinity of Panoche Creek alluvial fan. Of these, the Project Footprint is most likely more similar to Valadeao Ranch than Silver Creek Ranch or Panoche Creek, given the very high quality habitat conditions present on the latter two. Therefore, using the maximum measured density for the Valadeao Ranch area (7.90 GKR/acre), up to 506 GKR may be present within the Project Footprint.

GKR are a species that has periodic population irruptions, resulting in large increases in numbers of individuals and potentially large areas of adjacent habitat becoming occupied over very short time periods. Although these population increases may follow years of favorable precipitation, a direct causative link has not been determined. When these events occur, existing populations can increase greatly. While this type of population increase is an observed phenomenon, predicting the resulting population on a particular area (e.g. Project Footprint) is problematic and not the typical condition.

5.0 GKR Relocation

The following GKR conservation measures are pertinent to this plan and are consistent with those required in the Final Environmental Impact report (FEIR) (San Benito County 2010) for the Project:

- All activities that will result in permanent or temporary ground disturbances shall be preceded by a pre-construction survey for GKR by the Designated Biologist (or their representative) in the area of work no more than 30 days prior to commencement of ground disturbing activities. The Designated Biologist(s) will be a County approved individual that specializes in GKR. If GKR sign is observed within the area of work, the area of work will be saturated with traps to capture GKR and relocate them off-site. If the Designated Biologist deems exclusion fencing necessary, it will be buried deep enough in the ground to deter GKR from digging under and high enough to deter them from jumping over. Exclusion fencing may be designed to exclude multiple species. Special care will be taken in exclusion fence design if cattle or sheep are adjacent to the site and to ensure that the fencing does not enclose or trap the fully protected BNLL. Construction will not commence in the area of exclusion fencing until that area has been completely trapped, and no more GKR are expected to use the area as determined by the Designated Biologist. These areas may be fenced and trapped in smaller sections within the larger Project Area. At the end of trapping, no GKR should remain within a proposed construction area.
- Appropriate buffers will be established with highly visible markers. All active GKR burrows shall be identified by flagging and avoided by a buffer with a radius of at least 15.24m (50 feet).

Relocation procedures to implement these measures are described in Section 5.1. All individuals detected will be relocated to suitable nearby habitat as described below. This GKR Relocation Plan will implement methodology consistent with other successful kangaroo rat relocations (Bender et al. 2010; Germano 2001, 2010; Germano and Saslaw 2007; Germano et al. 2009; Tennant et.al. 2013) and includes guidance with local knowledge of the GKR. The relocation methodology includes trapping to remove GKR from the Project Footprint that will be impacted by construction activities and hand or mechanical excavation (as appropriate) of burrows/precincts. The GKR will be relocated to suitable areas adjacent to the project footprint including unoccupied areas within the VFCL, and potentially in the VRCL and SCRCL. Specific relocation site criteria are detailed herein.

The ultimate goal and objective of relocating GKR is to preserve and minimize harm, injury, or death of individual GKR during project build-out and to possibly recolonize nearby locations where GKR are no longer colonized or within suitable habitat near occupied colonies. The conservation strategy is built largely on the conservation principle that 90% of the source population of GKR as defined in the USFWS Recovery Plan (1998) is preserved in perpetuity.

Recolonization of suitable habitat that is not occupied by GKR will create opportunities to grow the population beyond its current levels and occupancy. The relocated individuals and/or populations will be monitored for five years to determine success of the relocation and inform future relocation efforts through post-project reporting.

Conducting successful relocations requires careful consideration for each animal's well-being during capture, transport, release, and successive monitoring. Risk to the animal should be minimized, and acclimation and survival at the release site will be maximized by implementing accepted practices. At a minimum, the following procedures will be implemented:

5.1 Relocation Procedures

Relocation Procedures will be implemented subsequent to preconstruction surveys and will be based on survey results and any incidental observations during Project Site preparation.

I. Project Site Preparation
   A. PVS or their contractor will mark work area limits with stakes and flagging.
   B. All potential GKR burrows within the Project Footprint and a 50-foot buffer will be documented (size, location and aspect), mapped, and staked and/or flagged.
   C. Prior to any excavation, trenching, or digging associated with this Relocation Plan, the party or parties responsible for such activities will contact the project safety personnel to ensure all safety requirements are followed (e.g. location of underground utilities).
   D. A Biological Monitor, under the direct supervision of a Designated Biologist and that has been trained, will be present for the installation of buried wildlife exclusion fencing along the marked work area boundary intended to exclude GKR from the Project Footprint. Fence installation will be overseen by the Designated Biologist who does not need to be present during all installation activities, but should inspect fence locations prior to trenching. At the discretion of the Designated Biologist, temporary exclusion fencing that is not buried may be used to enclose areas targeted for trapping that are in the direct path of construction phase exclusion fence installation (e.g., from trenching).
   E. Exclusion fencing will consist of smooth material (such as aluminum flashing or polyvinyl chloride [PVC] jacket material) or of a design that prevents wildlife from climbing. Construction-phase exclusion fence will be buried at least 24 inches deep with at least 36 inches above ground level. The buried wildlife exclusion fence will avoid all remaining covered species burrow entrances by a buffer of at least 50 feet.
   F. If determined to be necessary to minimize impacts to GKR outside of the project perimeter, wildlife exclusion fencing will be installed along the project boundary adjacent to GKR precincts (either existing active or newly relocated) and for a distance extending for approximately 500 feet from the nearest active precinct (additional exclusion fencing may be required beyond GKR fencing to exclude other covered species).
   G. If burrows potentially occupied by GKR or other listed species cannot be avoided by at least 50 feet, the following measures to remove GKR from such burrows prior to installation of wildlife exclusion fencing requiring trenching will be implemented.
      1. For GKR burrows/precincts, trapping following GKR trapping methods (below in Section II) will be conducted prior to exclusion fence installation

requiring trenching. Methods to detect all individuals will be implemented, or such burrows may be excavated following excavation procedures.

2. For other covered species, avoidance and minimization measures specific to that species will be implemented prior to fence installation requiring trenching.

H. Release locations will be identified subsequent to preconstruction surveys and prior to trapping and removal activities subject to the following criteria:
   1. Captured GKR will be relocated in neighbor groups. A GKR will be considered within a “neighbor group” if they are within 65 feet (approximately 20m) of the nearest neighbor.
   2. Release locations must be able to accommodate all GKR potentially captured that are within each neighbor group.
   3. Release locations will be chosen based on the following, in order:
      a. The nearest high quality habitat in the VFCL that is unoccupied or has abandoned GKR precincts such that the relocated group will be at least 100 feet (approximately 30m) from the nearest suspected active precinct. Former agricultural land will be targeted.
      b. If there are no candidate release locations on the VFCL within one mile of the capture location, unoccupied high quality habitat in former agricultural land within SCRCL will be utilized first, then lands within VRCL will be used as relocation sites.
      c. Subject to approval by CDFW and USFWS, captured GKR may be used to further recovery efforts for this species at locations in the greater Panoche-Ciervo Core GKR area (USFWS 1998). If individual GKR are relocated outside of PVS Conservation Lands, monitoring of relocation success would be the responsibility of the wildlife agencies.

II. GKR Detection and Removal

The following methods are intended to result in as close to 100% depletion rates as possible, with the goal of avoiding mortality of GKR.

A. The Designated Biologist, Biological Monitor under the direction of the Designated Biologist, or a supervised trapping crew will conduct six consecutive nights of trapping with live traps (e.g. Sherman live traps or similar live traps) to capture GKR at precincts/burrows identified during preconstruction surveys using 20% more traps then the number of identified precincts in the enclosed trapping area.

B. Data to be collected on all GKR captured will include: (1) the locations (Global Positioning System [GPS] coordinates and maps) and the time of capture and/or observation, as well as release; (2) sex; (3) approximate age (adult/juvenile); (4) weight; (5) general condition and health, noting all visible conditions including gait and behavior, diarrhea, emaciation, salivation, hair loss, ectoparasites, and injuries; and (6) ambient temperature when handled and released. Any non-listed small mammals that are captured will be documented and released outside of the Project Footprint boundary.

C. If a lactating female GKR is captured (potentially December – April), one of two procedures below will be implemented:
    1. The female will be released with follow-up trapping conducted within approximately 30 days (or less at the discretion of the Designated Biologist and depending on the condition of the female). The purpose of follow-up trapping will be to capture the female and any of her pups that are venturing aboveground. If she still appears to lactating and pups are not captured, it may be necessary to release her with additional follow-up trapping conducted.
    2. As an alternative, excavation of GKR burrows within 100 feet (approximately 30m) of the capture location will be commenced immediately, and trapping in that location will continue until completion of the six night session. If dependent young are encountered during burrow excavation, they will be placed with the female and held until the Designated Biologist determines that the young are capable of surviving either with or independent of the adult female.

D. Project minimization and avoidance measures will be implemented during all GKR trapping and relocation activities.

E. Captured GKR will be released into pre-identified release locations identified in Section I.H.3 above, following the procedure in Section IV, below. If new evidence of GKR (individuals/burrows) is found in an active construction area, construction will be halted within a 100-foot avoidance area or greater if deemed necessary. Procedures A through D (above) will then be implemented.

III. Burrow excavation

Upon completion of six consecutive nights of live trapping, the following will be implemented:

A. Small mammal burrows suitable for GKR that are present within the trapping grid will be excavated using hand tools, if possible. If soil conditions or burrow depths make manual excavation impractical or unsafe, hand-held power tools may be used to assist in direct excavation of burrows. At no time will the hand-held power tool be used without a protective barrier (such as PVC tube, or similar) to prevent injury/mortality to small mammals that may attempt to escape burrows during excavation procedures. With the Designated Biologist and/or Biological Monitor present, additional mechanized equipment (e.g., backhoe) may be used to expand, slope, and/or terrace excavations for safety; however, this type of equipment will not be used for direct burrow excavation.

B. If any GKR are detected during burrow excavation, they will be captured (either through additional trapping or by hand), and release procedures (see below in Section IV) shall be followed.

C. No GKR burrow excavation will occur within any BNLL buffer avoidance area.
D. The Designated Biologist will document all GKR rat burrows/precincts abandoned or destroyed and provide a written report to the County of San Benito, prior to final County inspection that allows operation of each project phase.

IV. GKR Release

A. Subject to the direction of a Designated Biologist or Biological Monitor, captured GKR will be released into the designated release location.
B. Relocation sites with both high quality habitat and the presence of abandoned precincts (refugia) in the vicinity will be given higher priority than sites with no abandoned burrows (Tennant et.al. 2013). GKR will not be relocated to burrows that are occupied by other kangaroo rat species.
C. The high quality habitat for the relocation sites will typically lack dense, non-native grass cover, or will be managed to reduce dense, non-native grass cover that occurs during years when herbaceous growth is high.
D. If necessary due to weather, time, or site preparation at release locations, captured GKR will be held in captivity by a properly permitted small mammal trapping specialist. Captive GKR would be subject to holding for no more than 30 days.
E. GKR in captivity would be held in separate plastic, glass, or other rigid non-toxic container measuring at least five gallons in size in an on-site climate controlled room (between 60°F and 85°F). Individual GKR will be provided with non-tinted, unbleached paper towels and enough suitable substrate (soil, sand, or similar) to cover the bottom of the container. Each GKR will be provided with approximately one cup of bird seed mix (mixture of approximately 75% proso white millet and 25% oats groats) initially that will be maintained until release.
F. Individuals will be released into artificial burrows constructed within the designated release location using the map created under Section I.B as a base map and actual arrangement of individuals captured during trapping. Spatial arrangement of released individuals will account for territoriality, appropriate neighbor spacing, and arrangement.
G. No GKR will be relocated within 100 feet of small mammal burrows that may be occupied by BNLL in BNLL buffer avoidance areas in the VFCL. GKR relocation in the VRCL and SCRCL will be located at least 100 feet from small mammal burrows that may be occupied by BNLL at all relocation sites, unless protocol BNLL surveys have been conducted with no detections of BNLL.
H. Artificial burrows will consist of a suitably sized tube made of cardboard or other biodegradable material with one end buried or excavated with an approximately three inch diameter soil auger. Regardless of method, a hole at least three feet in length extending at least two feet in depth shall be created.
I. Each artificial burrow relocation site in which a GKR is released will be provisioned with four cups of seed (mixture of approximately 75% proso white millet and 25% oats groats) upon release. The approximate precinct of each individual will be

provisioned with four cups of seed once per week continuing until green-up of vegetation or until provisioning is deemed to be unnecessary by the Designated Biologist.

J. Relocation sites will be protected using covers (Figure 8) anchored to the ground. This predator exclusion fencing will be maintained for 10 days after the relocation in order to enable the animals to acclimate to their new location. Anchoring will be adequate to hold covers in place, depending on conditions (wind, cattle, etc.).

K. With the artificial burrows, unless evidence indicates that temporary covers anchored to the ground are not providing adequate protection, covers will be set on the ground surface (not buried). Dimensions will be at least 6 feet x 6 feet and will cover release burrows at a sufficient height to allow free movement of individuals within the shelter. By installing at the surface of the ground, GKR will be allowed and expected to dig out of the shelters.

V. Long Term Monitoring

A. Released individuals will be permanently marked with ear tags, pit tags, or other form at discretion of a Designated Biologist. A Designated Biologist will monitor release locations and sufficient occupied control areas by conducting trapping approximately 30 to 60 days following release and an annual trapping program for five years after the release date. The details of the monitoring/trapping program are being developed as part of the Habitat Mitigation and Monitoring Plan.

B. Data to be collected on all GKR recaptured will include: (1) the locations (GPS coordinates and maps) and the time of capture and/or observation, as well as release; (2) sex; (3) approximate age (adult/juvenile); (4) weight; (5) general condition and health, noting all visible conditions including gait and behavior, diarrhea, emaciation, salivation, hair loss, ectoparasites, and injuries; and (6) ambient temperature when handled and released.

C. The monitoring of population trends and population estimates of the monitored locations will be produced for inclusion in annual reports. The details of the monitoring program will be developed as part of the Habitat Mitigation and Monitoring Plan as stated in Section V.A.

D. The results of the annual trapping program will be reported in a standalone report submitted to CDFW and USFWS.

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FIGURES

Energy Renewal PARTNERS, LLC

BR
10/15/2013

Legend

- County Line
- City Limit
- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands

N

0 2 4
Miles

Panoche Valley Solar Project

Site Location

Figure

1

Energy Renewal PARTNERS, LLC

BR
11/26/2013

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Proposed Panel Block (Phase I Shaded)
- Existing Transmission Line
- Project Substation
- Laydown Yard
- Project Road (O&M/Emergency Use)
- Project Road (Emergency Use)

N

0 625 1,250 2,500
Feet

Panoche Valley Solar Project

Project Area

Figure 2

Energy Renewal PARTNERS, LLC

BR
10/15/2013

Legend

Project Footprint

Valley Floor Conservation Lands

Valadeao Ranch Conservation Lands

Silver Creek Ranch Conservation Lands

N

0 3,500 7,000
Feet

Panoche Valley Solar Project

Project Area and Conservation Lands

Figure 3

Energy Renewal PARTNERS, LLC

BR
10/16/2013

Panoche Valley Solar Project

GKR Survey Data and Project Area

Figure 4

Legend

Project Footprint

Valley Floor Conservation Lands

No Data

No Activity

GKR Evidence, Active

GKR Evidence, Inactive

Relict GKR Sign Present

N

0 1,250 2,500
Feet

Energy Renewal PARTNERS, LLC

BR
10/16/2013

Panoche Valley Solar Project

GKR Survey Data and
Valley Floor Conservation Lands

Figure
5

Legend

- Silver Creek Ranch Conservation Lands
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands
- No Data
- No Activity
- GKR Evidence, Active
- GKR Evidence, Inactive

N

0 1,500 3,000
Feet

BR
10/16/2013

Panoche Valley Solar Project

GKR Survey Data and
Silver Creek Ranch

Figure
6

Energy Renewal PARTNERS, LLC

Energy Renewal PARTNERS, LLC

BR
10/16/2013

Legend

- Valadeao Ranch Conservation Lands
- Project Footprint
- Valley Floor Conservation Lands
- No Data
- No Activity
- GKR Evidence Active
- GKR Evidence, Inactive
- Relict GKR Sign Present

N

0 2,000 4,000
Feet

Panoche Valley Solar Project

GKR Survey Data and Valadeao Ranch

Figure 7

Appendix D – San Joaquin Kit Fox Project Specific Travel Corridors, Habitat Connectivity, and Conservation Measure Review

PANOCHE VALLEY SOLAR PROJECT

SAN JOAQUIN KIT FOX
PROJECT SPECIFIC TRAVEL CORRIDORS,
HABITAT CONNECTIVITY,
AND CONSERVATION MEASURE REVIEW
NOVEMBER 14, 2013

1.0 Introduction

The following information provides options for San Joaquin kit fox (*Vulpes macrotis mutica*) (SJKF) travel corridors and adjacent habitat connectivity through the Panoche Valley Solar Farm project (PVS), as well additional enhancements and species specific conservation measures proposed by the project. This information is based on existing project team correspondence and analysis, review of potential resource avoidance areas for the project, review of the scientific literature, and discussion with SJKF experts Dr. Brian Cypher and Scott Phillips (California State University). SJKF travel corridors are a significant permitting issue for projects in California including several solar energy projects such as the proposed PVS.

2.0 Background

Distribution and Range

The federally endangered and state threatened SJKF historically inhabited the majority of the San Joaquin Valley from southern Kern County north to San Joaquin County and east to Stanislaus County (USFWS 1998). Currently the SJKF inhabits some areas of suitable habitat on the San Joaquin Valley floor and in the surrounding foothills (i.e., gradual slopes) of the coastal ranges, Sierra Nevada, and Techachapi Mountains from southern Kern County north to Contra Costa, Alameda, San Joaquin County on the west and Stanislaus County on the east side of the valley (USFWS 1998) (Figure 1). The species can also be found in larger scattered natural areas in Kern, Tulare, Kings, Fresno, Madera, and Merced counties. SJKF also occur westward into the interior coastal ranges in Monterey, San Benito and Santa Clara counties, and in San Luis Obispo, Ventura, Santa Barbara counties (USFWS 1998).

Habitat

The primarily crepuscular and nocturnal SJKF is an arid land-adapted species and typically occurs in desert-like habitats in California (Cypher et. al., 2006). Such areas have been characterized by sparse or absent shrub cover, sparse ground cover, and short vegetative structure (USFWS 1998). The SJKF currently inhabits alkali scrub-shrub, Valley sink scrub and arid native and annual grasslands throughout the level terrain of the San Joaquin Valley floor (USFWS 2010). The SJKF are also found in habitats modified by humans including grasslands and scrublands with active gas/oil fields, wind energy farms, and agricultural matrices of row crops, orchards, and grazed annual grasses (USFWS 1998). Areas of rugged terrain (i.e., lands with greater than 10% slope) tend to be of lower suitability for SJKF (Cypher et al., 2009).

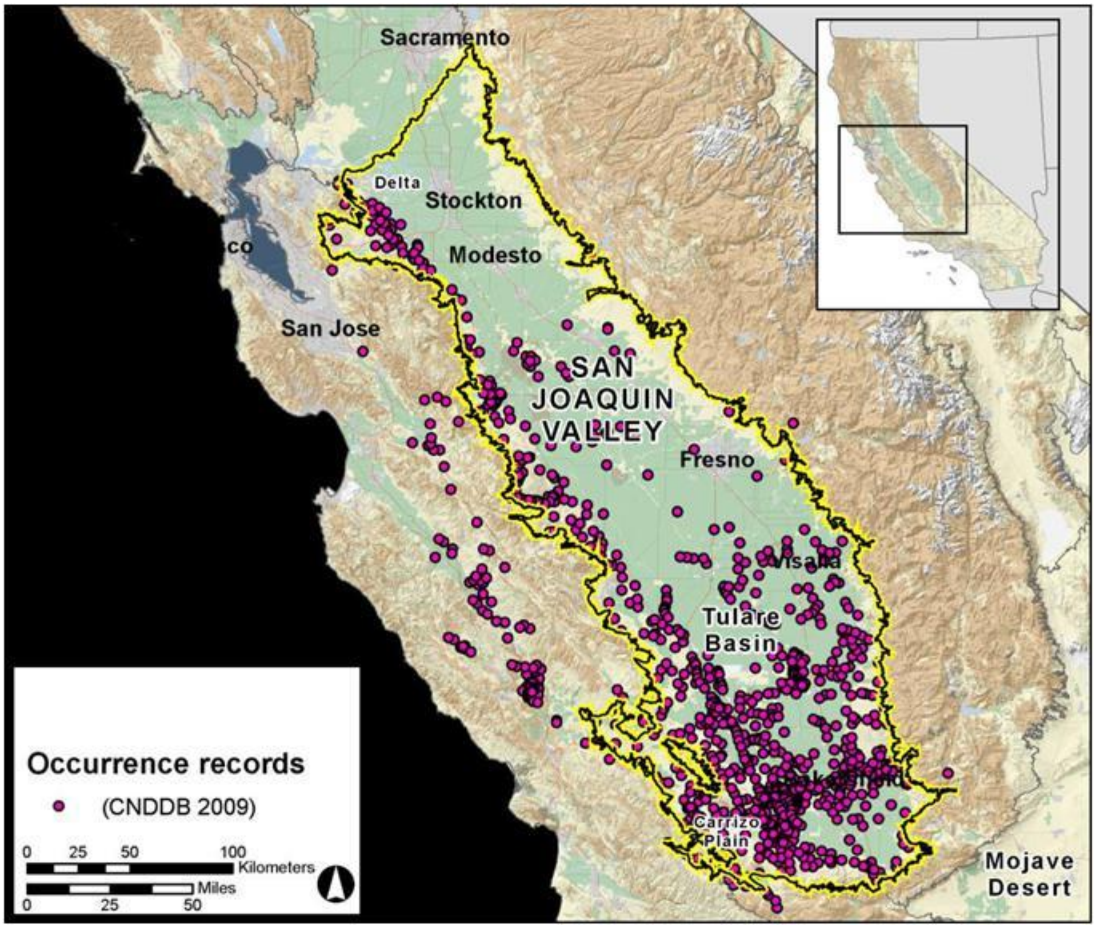

Figure 1. Current Range of the SJKF (Cypher et. al., 2009)

Within this range, the SJKF has been associated with areas having open, level, sandy ground that is relatively stone-free to depths of about 0.9 to 1.4 meters (3.0 to 4.5 feet). The SJKF utilizes subsurface dens (typically existing burrows), which may extend to 1.8 meters (6 feet) or more below ground surface, for shelter and for reproduction (Laughrin 1970). SJKF are absent or scarce in areas where soils are shallow due to high water tables, impenetrable hardpans, or proximity to parent material, such as bedrock (USFWS 1983). The SJKF also does not den in saturated soils or in areas subjected to periodic flooding (USFWS 2010). No Critical Habitat has been designated for the SJKF by the USFWS.

The Ciervo-Panoche Natural Area of western Fresno and eastern San Benito counties is listed as one of the three distinct core SJKF population areas (USFWS 1999). This population is 160 km (100 miles) northeast of the other two core populations (i.e., Carrizo Plain Natural Area and the natural areas of western Kern County). The natural lands, within the Ciervo-Panoche, are listed in the SJKF Recovery Plan (USFWS 1999) as an important habitat protection and recovery area.

Recent studies have supported early observations that SJKF appear to be strongly linked ecologically to kangaroo rats (both for prey and burrows). In natural areas, kit fox density and population stability are highest in areas with abundant kangaroo rats (Cypher 2006; USFWS 2010). Kit fox are also known to consume other small mammal species, including rabbits and hares: *Lepus* and *Sylvilagus* spp.), ground squirrels (*Ammospermophilus* and *Spermophilus* spp.), and insects (Cypher and Brown 2006; USFWS 2010).

The known SJKF habitat, within the PVS project area, consists of native/non-native grassland and associated wash habitat along Panoche and Las Aquilas Creeks. SJKF are known to occur and have been documented on the entire project site, as well as the Valadeao Ranch (VRCL) and Silver Creek Ranch Conservation Lands (SCRCL). Potential SJKF dens were found throughout the Project footprint, SCRCL, and VRCL during recent sampling efforts (2006-2013). These efforts found 37.69 potential dens per km^2 on the Project Area and 45.27 potential dens per km^2 on the VRCL. Reconnaissance level surveys on the SCRCL also identified numerous potential SJKF sign, including tracks, scat, and potential dens, as well as observing five individual SJKF while on site. In addition, results of the 2010 scat-sniffing dog surveys indicated that numerous SJKF inhabited both the Project footprint and the VRCL. Based on this survey, a total of 9 SJKF were documented within the project footprint and another 13 documented on the VFCL and VRCL.

3.0 Discussion

Upon review of the literature, there is little information available concerning site-specific SJKF travel corridors, any associated attributes, and design features. Most of the energy projects within the San Joaquin Valley have specific management (e.g., BMPs), mitigation, and monitoring plans associated with this species but little in the way of the installation of project-related travel corridors and project scale habitat connectivity. In light of this lack of site-specific travel corridor information, SJKF experts Drs. Cypher and Phillips (California State University) were contacted by PVS on June 14, 2013. The following discussion reflects this information and should provide adequate SJKF throughways across the PVS project footprint and into adjacent habitats. Species specific conservation measures are also discussed.

Existing SJKF Travel Corridors

Within the San Joaquin Valley, the Ciervo-Panoche Natural Area (Fresno and San Benito counties) is designated as one of the three core recovery area for the SJKF (USFWS 2010). The other two core areas are the Carrizo Plain and Western Kern County core areas to the south of the Ciervo-Panoche. The Ciervo-Panoche core area, and particularly the Little Panoche Valley, provides important genetic connectivity and travel dispersal corridors to the broader population included the Santa Nella satellite population to the north and the Pleasant Valley and Kettleman Hills satellite populations to the south.

In a review of the existing site data concerning SJKF observations, it appears that this species uses existing features as travel and dispersal corridors (e.g., valley, stream corridors, and drainages) as well as den sites on the project footprint and Conservation Lands. These unimpeded north-south and west-east corridors will be protected with no disturbance, during project construction and operations and maintenance. Existing SJKF travel corridors within the project boundary include:

- Las Aquilas Creek corridor (including northern tributaries) and associated Valley Floor Conservation Lands (VFCL) - bisecting the proposed project footprint in a northwest to southeast direction. This corridor provides connectivity and dispersal to the habitats to the north of the project including the Little Panoche Valley and the VRCL. The creek also provides a travel corridor to the lower Panoche Creek drainage, southern portion of the VFCL (1,683 acres) and eventually through to the large block and high quality, SCRCL and adjacent Tumey Hills BLM landholdings. The Ciervo-Panoche Natural Area has been identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) and the SJKF 5-Year Recovery Plan (USFWS 2010) as an important area for the conservation and recovery of the SJKF.

Figure 2. Panoche Creek and VFCL travel corridor

- Panoche Creek Corridor and associated VFCL - bisecting the southern portion of the VFCL in a west to southeast direction (Figure 2). This corridor provides connectivity to the large block and high quality habitats (e.g., grassland flats) to the west of the project including the Gabilan Range and eventually through to the SCRCL and the BLM lands beyond. The southern portion of the VFCL also provides unimpeded west to east travel ways from the Panoche Creek wash (and adjacent flats) to the Valadeao Ranch Conservation Lands and adjacent Tumey Hills/Panoche Hills BLM landholdings including the Las Aquilas Creek drainage.

- Moss-Panoche 230kV Transmission Line Corridor - bisecting the southwestern portion of the project footprint and associated VFCL in a northwest to southeast direction. This 22.48 meter (75 feet) corridor provides connectivity to the habitats (e.g., grassland flats, Panoche Creek wash) to the west of the project including the Gabilan Range and eventually through to the SCRCL and adjacent BLM landholdings.

Additional SJKF Travel Corridor Enhancements

There are several other travel corridor enhancements available through specific project designs. These design features are as follows:

- Based on the Cypher and Phillips SJKF connectivity discussion, it was determined that a 500 meter (1,640.4 feet) wide and approximately 2,484 meter (8,000 linear feet) long corridor associated with the existing Las Aquilas Creek /VFCL corridor would be beneficial in providing additional undisturbed connectivity and would promote movement through the site and north to the Panoche Hills and BLM landholdings. The undisturbed VFCL along Las Aquilas Creek would be widened to accommodate this SJKF enhancement. This corridor also includes two of the four proposed GKR avoidance areas.

- SJKF permeable perimeter fencing - facility perimeter fencing designed for SJKF movement through the site. A 12.7 to 15.2 cm (5 to 6 inch) gap along the bottom of the fence would allow SJKF to travel through the site and link up with the existing travel corridors including the creek washes and VFCL, as well link up prey base areas such as the giant kangaroo rat (GKR) precinct/colony avoidance areas (Cypher et al., 2009). This fencing design was approved by the CDFW and USFWS for the Topaz Solar project and the adjacent California Sun Valley Ranch project (Figure 3). In an early Solagen report (FEIR), it was stated that the bottom of the perimeter fence would be elevated 61.0 cm (24 inch) above the ground. A 61.0 cm gap is too large and will allow unimpeded entry of predatory coyotes and red fox. Fences surrounding the proposed substation and O&M building would not need to be raised.

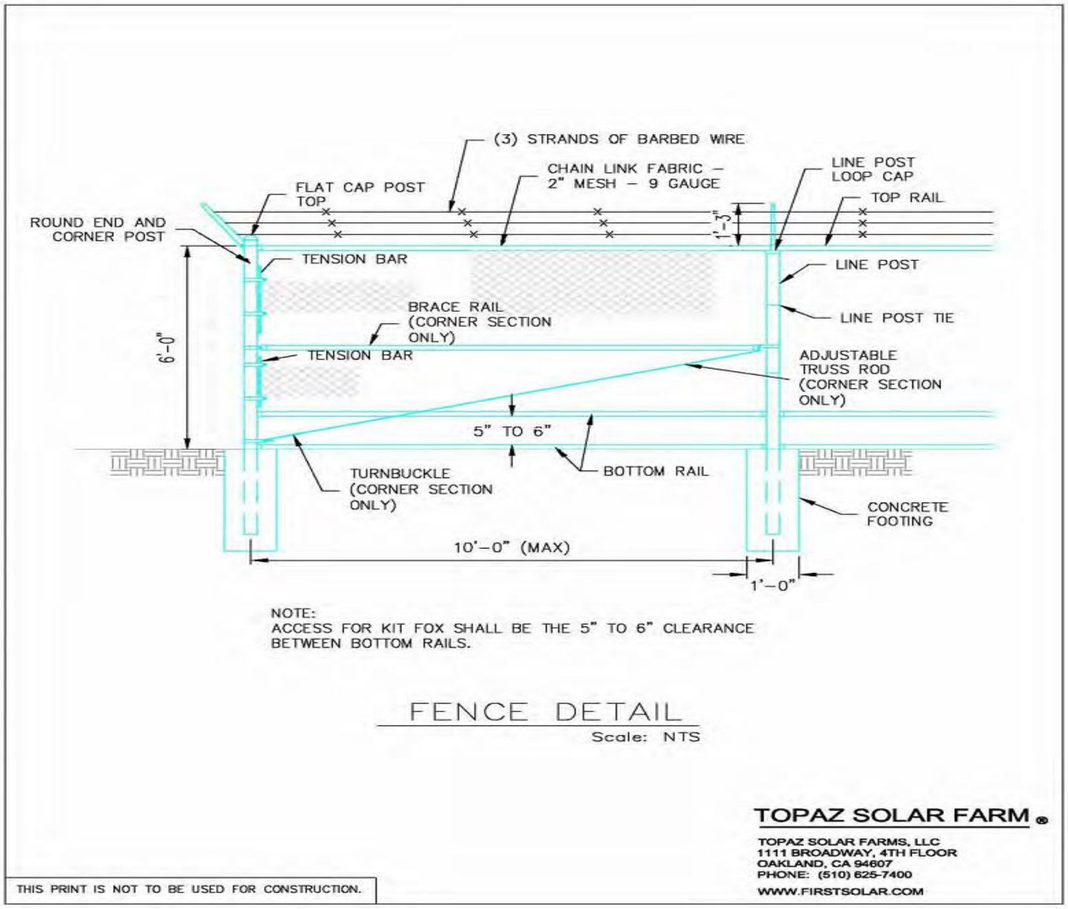

Figure 3. Example SJKF permeable perimeter fence design (Topaz Solar Farm).

- Further enhancement along these roads (including at the fence perimeter and road interfaces) can be accrued through the periodic placement of artificial SJKF escape and subterranean dens Althouse and Meade 2011; Harrison et al. 2011) (Figure 4). These artificial dens could also be installed within the Valley Floor, Valadeao Ranch, and Silver Creek Ranch Conservation Lands as added enhancement. SJKF readily use artificial dens, and the installation of such dens can increase survival, movement, and colonization potential in satellite and linkage areas (Harrison et al. 2011).

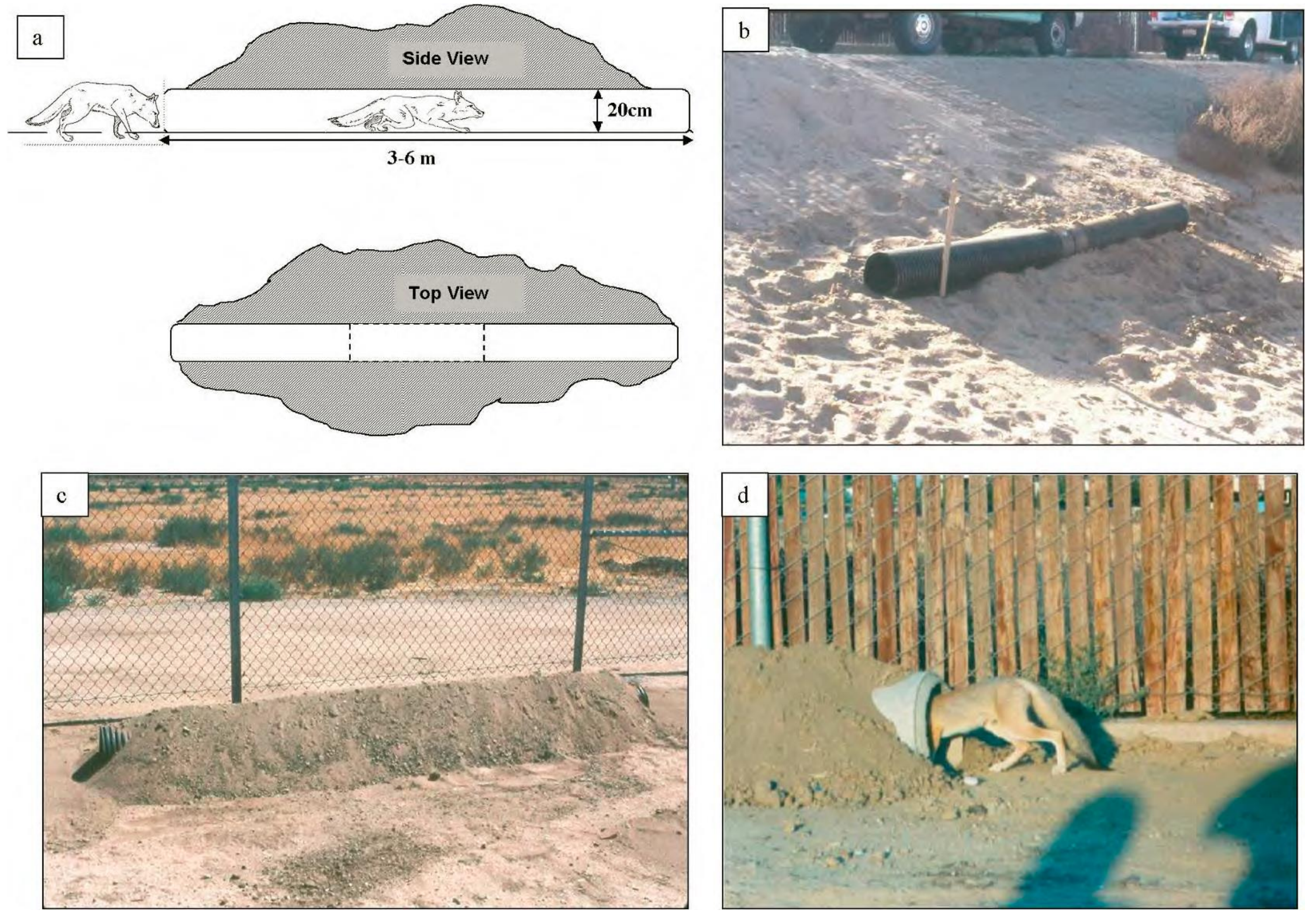

Figure 4. Artificial SJKF escape dens (Althouse and Meade 2011).

San Joaquin Kit Fox Specific Conservation Measures

The following conservation measures were provided in the FEIR (County of San Benito 2010) for the project, are based on the *USFWS Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS 2011), and include recommendations from recent agency conversations.

- Prior to surface disturbance or other covered activity, a Designated Biologist(s) shall conduct a SJKF education program for all project personnel.

- All activities that will result in permanent or temporary ground disturbances shall be preceded by a preconstruction survey conducted by a Designated Biologist(s). The biologist(s) shall identify and clearly mark the location of areas where SJKF individuals, dens (four inches or larger), or burrows was/were identified. Appropriate buffers will be established with highly visible markers. All known or occupied SJKF dens shall be identified by flagging and avoided by a buffer with a radius of 30.5 meters (100 feet) (Table 1).

Table 1. SJKF Buffer Zones

SJKF Resource Area	Radius of Buffer Zone (Feet)
Occupied Den	30.5 meters (100)
Known Den	30.5 meters (100)
Known Natal Den	45.7 meters (150)
Occupied Natal Den	61.0 meters (200) Note: USFWS must be contacted
Potential Den	15.2 meters (50)

- All known SJKF natal dens shall be identified by flagging and buffered by a radius of 45.7 meters (150 Feet) (Table 1).

- All occupied SJKF natal dens shall be identified by flagging and buffered by a radius of 61.0 meters (200 Feet) (Table 1).

- Work around known and occupied dens, if possible. Dens do not need to be blocked or excavated in most cases. Monitoring of dens near work areas and clearly marked dens with a reduced avoidance radius is likely sufficient protection as opposed to den blocking.

- If avoidance of potential or known dens is not possible, the Applicant shall take the following sequential steps when working in such areas:
  1. Allow for three consecutive days of monitoring to determine the occupancy status of each den. Activity at the den shall be monitored by using tracking medium at the entrance to the den or stationary infrared beam cameras, and by spotlighting. If no activity is observed actions described below under Step 3 may be implemented. If SJKF activity is observed the den shall be monitored for an additional five days from the date of observance. Use of the den during this time can be discouraged by partially plugging its entrance(s) with soil in such a manner that any resident animal can escape easily. If SJKF are still present after five days, den excavation, discussed below under Step 3 may proceed when, in the judgment of the qualified/approved biologist, it is determined temporarily vacant.
  2. Once the kit fox has vacated the den, methods (e.g., one way doors) shall be taken to prevent reentry to the burrow by kit fox (and other mammal species) until construction is complete in these areas. Once construction activities are complete access to the burrows shall be restored.
  3. Once it has been confirmed that the dens have been vacated, if construction related impacts would result in the crushing or destruction of a den, then the den shall be excavated. Excavation shall be done only by hand and under the direct supervision of the biologist, removing no more than four inches at a time. If at any time during excavation a SJKF is discovered inside the den, all activity will cease immediately and monitoring described above under Step 1 shall be resumed. As indicated above, natal dens shall not be disturbed at any time.

- Potential SJKF dens that cannot be avoided may be excavated and back-filled pursuant to USFWS guidelines (2011) without prior notification, provided that excavation is approved and supervised by a biological monitor or other qualified biologist.

- All open holes, steep-walled holes, or trenches more than two feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks (wooden planks should be no less than 10 inches in width and should reach to bottom of trench, and placed at an appropriate angle to allow SJKF to exit).

- Construction materials will not be stacked in a manner that allows SJKF to establish den sites within the material.

- In an effort to reduce the likelihood of SJKF mortality due to construction related vehicles, a day-time speed limit of 15 mph and a night-time speed limit of 10 mph will be adhered to on the Project site and will not exceed 25 mph on public roads in the vicinity of the Project site. If a den is located near a project road, speed will be reduced to 10 mph and the den will not be blocked or excavated.

- Unless biological monitors allow alterations to routes, all Project vehicles shall be confined to defined access routes that will be staked and/or flagged. All Project-related flagging shall be collected and removed after completion of the Project.

- Use of rodenticides and herbicides in areas affected by the Project will be restricted to use within the Noxious Weed and Invasive Plant Control Plan. Herbicides used for noxious weed control would be applied in accordance with BLM-approved procedures and other federal and state regulations. Applications will be applied by licensed applicators in accordance with label directions and other restrictions mandated by U.S. Environmental Protection Agency, County Agricultural Commissioner, regional label prescriptions on use, California Department of Food and Agriculture, and other state and federal legislation.

- Pets and firearms will be prohibited at the site.

- Collaring of individual SJKF, for location monitoring, can be used as an impact avoidance measures.

- As required by the FEIR, lands permanently affected by the proposed Project will be mitigated at a 4:1 acreage ratio by conservation lands. This 4:1 ratio will be broken down into high and moderate suitability habitat. A 2:1 acreage ratio will consist of high suitability habitat, and another 2:1 acreage ratio will consist of moderate suitability habitat.

Based on the above mitigation ratios, this would require the proposed project to conserve more than 4,512 acres of high suitability (<5% slope) SJKF, and 5,626 acres of moderate suitability (<15% slope) SJKF habitat. VFCL will conserve more than 2,523 acres of high suitability SJKF habitat. Combined, off-site conservation lands on Valadeao Ranch and Silver Creek Ranch will incorporate approximately 4,057 acres of high suitability SJKF habitat, and 7,898 acres of moderate suitability SJKF habitat. When combined, on-site and off-site conservation lands would total approximately 6,580 acres of high suitability SJKF habitat and 7,898 acres of moderate suitability SJKF habitat.

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Appendix E – Blunt-Nosed Leopard Lizard Proposed Project-Specific Avoidance Buffer Rationale

PANOCHE VALLEY SOLAR PROJECT

BLUNT-NOSED LEOPARD LIZARD
PROPOSED PROJECT-SPECIFIC
AVOIDANCE BUFFER RATIONALE
April 23, 2014

1.0 Introduction

In association with the Panoche Valley Solar Project (PVS), several adult and hatchling blunt-nosed leopard lizard (*Gambelia sila;* BNLL) surveys were conducted on the proposed project footprint and portions of the Valley Floor Conservation Lands (VFCL). Surveys methodology was based on the California Department of Fish and Game (CDFG) *Approved Survey Methodology for the Blunt-nosed Leopard Lizard* (CDFG 2004), a PVS letter "Updated Blunt-nosed Leopard Lizard (BNLL) Survey Methodology" dated May 2, 2013 to California Department of Fish and Wildlife (CDFW), a PVS letter "Supplemental Blunt-nosed Leopard Lizard Study Plan Survey Methodology" dated April 2, 2014 to CDFW, verbal conversations with Mr. Dave Hacker of CDFW and Mr. Patrick Golden of Energy Renewal Partners on June 26, 2013, and email correspondence between CDFW and Duke Energy Renewables on June 27, 2013.

It is important to note that the 2004 approved survey methodology (i.e., protocol) supersedes previous versions of the survey methodology due to a heightened concern in the range-wide decline of BNLL population numbers. The 2004 protocols are intended to optimize the detection of the species should they be present on a specific site.

Prior to the 2013 surveys, three previous BNLL surveys were conducted on the project site, as well as portions of the conservation lands. These surveys included an abridged protocol survey on approximately 2,560 acres between April 15 and July 31 for adults and between August 15 to September 15, 2009 for juveniles and hatchlings on portions of the project site and VFCL. These abridged protocol-level BNLL surveys were conducted according to the CDFW BNLL survey protocols, with the exception of having less iterations than the prescribed 12 adult and five juvenile surveys.

A 2010 full protocol BNLL survey on approximately 640 acres was conducted for portions of the project site and VFCL. These 2010 surveys were completed between April 15 and July 31 for adult BNLL and between August 15 and September 15 for juvenile and hatchlings. During the summer of 2012, a focused BNLL survey was completed on approximately 10,889-acres of the Silver Creek Ranch Conservation Lands property. The focused survey followed the time of day and weather protocols, but only targeted potential habitat such as drainages between September 10 and 17, 2012.

Most recently, adult season surveys on the site were conducted between May 9 and July 13, 2013, which is within the approved survey window of April 15 to July 15. The adult BNLL surveys were accomplished by completing 12 iterations of preset 30-meter transects within the proposed project area and portions of the immediate adjacent VFCL. The adult BNLL surveys consisted of 58 days of field work. Surveys were not conducted when weather conditions on-site were out of protocol limits (i.e. 90% cloud cover, sustained wind >10 miles-per-hour). Surveys were also conducted within the protocol's temperature window of 77.0 degrees Fahrenheit (°F) to 95°F or 25° - 35° Celsius with the exception of four times during the entire surveys (July 4 to July 7, 2013). During these four days, the standard temperature protocol was exceeded after verbal discussions with CDFW on June 26, 2013 (followed with email correspondence) to allow surveys to continue to 97°F, as long as a reference BNLL was located by a Level II surveyor and observed between 95°F and 97°F. Survey activities that took place during exceeded temperatures were limited to short time periods (generally less than one hour) on the four days.

Survey crews consisted of between 5 to 30 surveyors per day with an average of 15 surveyors per day throughout the adult survey season. As per the protocol, the surveyors walked preset parallel transects at a width of approximately 30 meters. With the final (12^{th}) iteration completed on July 13, 2013, the survey for adult BNLL resulted in 100% coverage of the proposed project area and a significant portion of the VFCL.

All BNLL observations were recorded using handheld global positioning system (GPS) devices and observations were categorized by sex (male or female) and age class (adult, juvenile, or hatchling). Additional information such as temperature, wind speed, and surrounding habitat descriptions were noted, if available.

No adult BNLL were found within the project footprint during the 2013 adult season surveys. There were a total of 27 observations of BNLL in the VFCL. These observations include incidental observations made during BNLL Level I surveyor training. None of the previous 2009-2010 observations were located in the project footprint, but are fully within the VFCL.

Hatchling surveys were conducted between August 1 and September 10, 2013. These surveys involved a total of five survey iterations of the preset transects and followed the protocols discussed above. One subadult was found in the project footprint immediately north of the Las Aquilas Creek wash and VFCL (i.e., approximately 150 feet north of the VFCL). The remaining observations are within the VFCL. The findings from these surveys will be included in a final 2013 BNLL survey report to be submitted to the agencies by mid-October 2013.

The following information provides the rationale for the proposed impact avoidance buffer associated with the BNLL at the PVS. This rationale includes brief distribution information and habitat preference, the scientific basis for buffer establishment and size, and other industry BNLL buffer requirements in California. This information is based on existing PVS project team analysis, scientific literature review, and additional science-based information. BNLL avoidance buffers are a significant permitting issue for projects in California, including several solar energy projects such as the proposed PVS due to BNLL being listed as a fully protected species (California Fish and Game Code Section 5050).

2.0 Background

Distribution and Range

The federal/state endangered BNLL formerly occurred throughout the floor of the San Joaquin Valley and Sierra Nevada foothills from Stanislaus County southward to the Tehachapi Mountains in Kern County. West of the San Joaquin Valley, the species occurred on the Kettleman and Carrizo Plains, and in southeastern Cuyama Valley in San Luis Obispo, Santa Barbara, and Ventura counties (CDFW 2013). Based on information presented in the 1998 Recovery Plan for Upland Species of the San Joaquin Valley, California (USFWS 1998), the currently known occupied range of the BNLL is in scattered parcels of undeveloped land on the San Joaquin Valley floor, Ciervo, Tumey and Panoche Hills, and in the foothills of the Coast Range. BNLL are also located in the foothills and alluvial fans of the Carrizo Plain and Elkhorn Plains in San Luis Obispo County. The species is still presumed to be present in the upper Cuyama Valley, although there are no recent records for that area (USFWS 1998).

Habitat

The BNLL occurs in the San Joaquin Valley region within arid areas with scattered vegetation at elevations ranging from about 100 feet to 2,600 feet above sea level. They inhabit native and non-native grassland and alkali sink scrub communities characterized by poorly drained, alkaline, and saline soils. They are also found in the chenopod (i.e., goosefoot) community associated with non-alkaline, sandy soils in the alluvial fans and foothills of the southern San Joaquin Valley and Carrizo Plain. Other suitable habitat types on the valley floor for this species include Valley Needlegrass Grassland (Holland 1986), Alkali Playa (Holland 1986), and Atriplex Grassland (Tollestrup 1976). Habitats in order of decreasing favorability include (Warrick et al., 1998):

1) Clump grass and saltbush grassland, with sandy soil;
2) Dry washes with scrub brush, in native/non-native grassland, with sandy soil;
3) Alkali flats, with saltbush in sandy or gravelly soil; and
4) Grassland with hardpan soil.

The BNLL is generally absent from areas of steep slopes and dense vegetation, and areas subject to seasonal flooding (USFWS 2010). No Critical Habitat has been designated for the BNLL by the U.S. Fish and Wildlife Service (USFWS). Target acquisitions stated in the BNLL Recovery Plan include “natural land in the Panoche Valley area of Silver Creek Ranch, San Benito” as well as other lands in the western San Joaquin and Cuyama Valleys (USFWS 2010).

Microhabitat use and home range characteristics of BNLL were compared at two sites near Elk Hills in Buena Vista Valley that differed in ground cover (Warrick et al., 1998). These authors reported that BNLL microhabitat use differed significantly between the two study sites. At the more densely vegetated site, BNLL used dry wash areas significantly more than grassland, floodplain, and road habitats. Conversely, at the more sparsely vegetated site, grassland was used more than wash habitat, and hills were used less than all other habitats (Warrick et al. 1998).

The BNLL use small rodent burrows for shelter from predators and temperature extremes, including winter and long-term drought aestivation (Tollestrup 1979b). Burrows are usually abandoned ground squirrel (often *Otospermophilus beecheyi*) tunnels, or occupied or abandoned kangaroo rat tunnels (*Dipodomys* spp., Montanucci 1965). Each lizard uses several burrows without preference, but will avoid those occupied by predators or other leopard lizards. Montanucci (1965) found that in areas of low mammal burrow density, lizards would construct shallow, simple tunnels in earth berms or under rocks. BNLL feed primarily on insects (mostly grasshoppers, crickets, and moths) and other lizards, although some plant material is rarely eaten or, perhaps, unintentionally consumed with animal prey. They appear to feed opportunistically on animals, eating whatever is available in the size range they can overcome and swallow (USFWS 2010).

The majority of the occupied BNLL habitat, within the PVS project, consists of introduced annual grasslands along Panoche and Las Aquilas creeks, and the associated alluvial terraces that include the area along Yturiarte Road (Figure 1). Based on 2009/2010 survey data and spring/summer 2013 adult and hatchling protocol survey data, the BNLL observations are either within the Panoche Creek and Las Aquilas Creek wash habitat or adjacent to the wash habitat (see Figures 20, 21a, and 21b of the associated Biological Assessment).

In review of the associated soil series, the known BNLL distribution at the PVS site primarily corresponds to young fluvial deposits associated with Panoche Loam 0-2% and 2-9% soil series (NRCS 20013). The Panoche soil series cover >70 percent of the project site. The alluvial fan soils associated with the northwestern portion of the project, and towards the north and west of the known BNLL observations, consist of the Yolo Loam 0-5% and 2-9% soil series. This soil series has much higher angular gravel content throughout the profile, in addition to a stratification of substratum (NRCS 2013).

Figure 1. Panoche Creek native/non-native grassland wash and terrace BNLL habitat

3.0 Discussion

Impact Avoidance Buffers- Other Projects

Based on a review of the scientific literature, there are only a few sources of information concerning BNLL home range estimates and associated avoidance buffer recommendations. Early BNLL home range studies (i.e., Tollestrup 1979), described home ranges of less than 2.4 acres for both males and females. However, that study was based on only three days of lizard assessment on a habitat grid. Later studies provided additional information on home range estimates (Table 1). The following information provides a summary of BNLL impact avoidance buffers on other energy and transportation projects in California.

Table 1. Literature review of BNLL home range estimates

Investigator	Date	Study Location	Findings	Home Range Estimate
Tollestrup	1979	Western San Joaquin Valley	Home range < 2.4 acres for both males and female BNLL. Based on 3 days of data.	<2.4 acres (182-ft)
Warrick et al.	1998	Kern County	16 BNLL radiotagged (8 dense grassland vegetation, 8 sparse grassland vegetation) at 2 sites at Naval Petroleum Reserves.	22 acres (552-ft)
Germano	Unpublished data (2004)	Kern County (western)	Based on the data from 60 BNLL (total of 83 BNLL radiotagged) at >25 locations at Lokern Natural Area Study site (southeast of San Benito County). Habitat included scrub wash, flats with no wash, and scrub flats.	2.96-46.5 acres (male-95% Kernal home range) 1.75-52.4 acres (male - 95% MCP) 1.85-30.4 acres (female - 95% Kernal home range) 1.13-16.5 acres (female - 95% MCP)

A BNLL buffer will minimize the risk of a direct or indirect "take" of BNLL individuals in conjunction with avoidance and exclusion criteria. As provided in Table 2, there is a great deal of inconsistency between the BNLL buffer sizes that have been applied to various projects in California.

Table 2. BNLL impact avoidance buffers associated with other California energy and transportation projects

Project	Project Date	BNLL Buffer	Scientific Basis	Note
Other Solar Energy Projects				
California Valley Solar Ranch (SunPower Corp)	2011	22 acre (552-ft)	Warrick et al. 1998	Carrizo Plain, San Luis Obispo County. No BNLL were documented within the project boundaries. If any BNLL were located in the future, the buffer would be centered on any observation point and greatest habitat suitability (USFWS 2011).
Topaz Solar Farm (Topaz Solar Farms LLC)	2011	Not needed	NA	Carrizo Plain, San Luis Obispo County. No BNLL found on or adjacent to the project
Oil and Gas Projects				
Gunslinger (Occidental of Elk Hills. Inc)	2011	50-ft (minimum)	Unknown	Southern San Joaquin County, Kern County. 10 oil and gas wells at 5 pads. BNLL habitat at all 5 well pads.
Titan Exploratory (Aera Energy LLC)	2012	50-ft (minimum)	Unknown	Existing gas and oil site. Kern County. Buffer includes exclusion fencing around the burrow.
BLM San Joaquin Valley Oil and Gas Programmatic Agreement	2001	50-ft (minimum)	Unknown	Unknown
Transportation Projects				
FHWA Programmatic BO for Minor Transportation projects	2004	50-ft (minimum)	Unknown	Fresno, Kern, Kings, Madera, Mariposa, Stanislaus, San Joaquin, Tulare, Tuolumne counties.

Impact Avoidance Buffers- Panoche Valley Solar Project

The following information provides a discussion of the potential or alternative BNLL impact avoidance buffers associated with the PVS. Throughout on-going planning and permitting processes, the size of the BNLL “take” avoidance buffer has been identified as an important issue.

The BNLL is listed as Endangered under California Endangered Species Act (CESA), but it is also designated as a “fully protected” species under Fish and Game Code Section 5050, and as such, CDFW cannot authorize incidental take of the species. Fully protected reptiles and amphibians, or parts thereof, may not be taken or possessed at any time. Fish and Game Code Section 86 defines take as “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill”. Thus, the impact avoidance buffer must be selected using reasoned scientific judgment that provides the project with reasonable expectation that no take would occur (i.e., “high standards of effectiveness”) during construction, operation, and maintenance.

In addition, BNLL take is prohibited under the federal Endangered Species Act (ESA) unless authorized by permit or through issuance of an incidental take statement in the USFWS’ Biological Opinion following ESA Section 7 consultation. The federal ESA defines take as “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” No take statement can be issued unless the USFWS finds that the project as proposed is not likely to jeopardize the continued existence of the species or result in destruction or adverse modification of critical habitat. The BNLL avoidance buffer must provide sufficient assurances that the USFWS determination and habitat considerations are justified and met.

Potential Impact Avoidance Buffers

22-acre home range based buffer

As provided in Table 2, the 22-acre (552-ft) buffer has been historically applied to other recent solar energy projects (including the California Valley Solar Ranch on the Carrizo Plain) and prescribed in the PVS Final Environmental Impact Report (FEIR) certified by the County of San Benito. This buffer is based on the approximate size of the largest BNLL home range size computed by Warrick et al. 1998. Home range refers to that area traversed by the individual animal in its normal activities of food gathering, mating, and caring for young (Burt 1943). Occasional sallies or excursions outside that area, perhaps exploratory in nature, should not be considered part of the home range (Burt 1943).

The Warrick study focused on 16 BNLL (eight in dense grassland vegetation, eight in sparse grassland vegetation) at two sites at the Naval Petroleum Reserves in Kern County. Based on recent project correspondence, the CDFW and USFWS have raised issues with the future use of the 22-acre buffer due to several perceived technical issues with use of the 22-acre buffer. Relatively recent unpublished research by Dr. David Germano has further elucidated the BNLL home range information provided by Warrick et al. in 1998 (Table 1).

Based on the information provided above including the more recent unpublished Germano analysis and the agency repudiation, there are biological, technical, and statistical issues with further use and application of the 22-acre buffer. A larger-sized buffer is more appropriate in providing further assurances of no BNLL “take” during project construction, operation, and maintenance.

52.4-acre home range based buffer

In Germano's BNLL study, two different home range models were used to draw biological inferences about the species' range and habits. The first method used was the Minimum Convex Polygons (MCP) method. MCPs are simple polygons created by connecting the outermost locations of all the locations of an animal (Mohr 1947). Basically, the MCP provides an outline that encloses all of the animal's locations and does not provide specific information about how the animal used the area. The size of a MCP is positively correlated to the number of animal locations. A MCP increases in size with increasing number of locations and is sensitive to data created by excursions of the animal outside of its home range. To correct this problem, investigators (including Germano in his unpublished study) typically exclude from the polygon those locations farthest from the mean center of all locations. As in Germano's study, the most distant 5% of the locations (i.e., excursions) are excluded from the analysis. Thus, Germano used a 95% MCP method and eliminated potential excursion data from the analysis. In a follow-up discussion, Germano stated that the larger home range numbers were unusual, and he does not believe that they indicate representative use by that group of BNLL (Personal Communication, October 15, 2013, Randi McCormick (Principal Biologist, McCormick Biological, Inc.) to Dr. David Germano (Professor of Biology, California State University, Bakersfield)).

Germano also used the Kernel Home Range (KHR) method to determine BNLL home range in his unpublished study. The KHR method acknowledges the importance of distribution (or density) of the data rather than evaluating each data point in isolation. Thus, the probability model describes the relative amount of time an animal is found in a particular place. The KHR method is also relatively insensitive to the occurrence of range anomalies and typically provides more compact home range estimations. The output of a KHR displays probability shapes that are defined as the "bandwidth" between points. With Germano's BNLL 95% KHR model, the output represents an area with a 95% probability that the animal is inside that area. The 95% area is considered the area of active use.

The 52.4 acre (852-ft.) home range (Table 3) is based on Germano's MCP/KHR derived data where the male BNLL home range estimate ranged from 1.8 acres to 52.4 acres (Table 3). Female home range estimates were from 1.1 to 16.5 acres. These estimates excluded three females that had movements greater than the 98.8 acres (i.e., 104.27 acres, 106.50 acres, and 113.17 acres) and did not seem to represent the animals' home range movements. Possible explanations for a small number of individuals showing movements that are significantly larger than the next largest could include breeding dispersals, extraterritorial movements, or exploratory movements. A "centroid" 52.4 acre avoidance buffer with a radius of 852-ft from each BNLL observation, is based on the 95% MCP method and using the maximum home range value from either males or females. The 52.4 acre male home range estimate was associated with good BNLL conditions in terms of soils, vegetation density, and habitat types.

Table 3. Male vs. female BNLL home range size (acres) 2002-2004 (Germano unpublished data)

	n	Mean	SE	Low	High
Males					
95% KHR	33	20.80	0.82	2.96	46.45
95% MCP	33	14.05	0.66	1.75	52.38
Females					
95% KHR	24	10.65	0.66	1.85	30.39
95% MCP	24	6.79	0.34	1.13	16.53
KHR: p=0.001; MCP: p=0.0002					

<u>Proposed 52.4 acre home range buffer rationale</u>

In association with the PVS project, the proposed centroid buffers associated with each observation (including 2009-2010 survey records, as well as the 2013 adult and hatchling protocol survey records) are merged into one continuous polygon. Thus this provides more of a conservative buffer complex centered on the observations and also encompassing the likely occupied habitat areas associated with the washes and adjacent alluvial terraces. The majority of the adult and hatchling BNLL observations and the associated proposed buffers are found within the Las Aquilas and Panoche Creek washes and adjacent alluvial terrace.

During the September 2013 protocol hatchling survey, an additional subadult BNLL was found north of the Las Aquilas Creek wash (total of nine hatchlings; two adults; and one subadult). However, the proposed buffer encroached on the extreme southern portion of the project footprint. Furthermore, the repeated observations (including the 2010 surveys and observations and the full protocol adult and hatchling surveys in 2013) within the project area provide at least representative distribution of the BNLL. This BNLL distribution is centered on the washes and the adjacent alluvial terraces.

Based on the known scientific research on home range and the site-specific project data gathered through the BNLL surveys (including the 2013 adult and hatchling protocol surveys), this proposed 52.4 acre buffer will offer adequate protection to the BNLL and reasonably assure that the PVS project will not result in the "take" of the BNLL. Risk to the BNLL is further reduced by application of the buffer to all the observations because it is not possible to determine whether observations represent specific individuals or multiple sightings. Risk is further minimized through project-related measures that provide additional BNLL protection as identified below:

- The proposed 2,523 acre Valley Floor Conservation Lands (VFCL) will provide permanent protection to the BNLL and associated high quality wash and terrace habitat.

- Four GKR precinct avoidance areas (approximately 212 acres) were designated and adjoined to the VFCL, BNLL buffers, and known BNLL habitat. These areas were selected due to the large numbers of concentrated active and inactive GKR precincts, presence of high quality habitat, and direct connectivity to protected lands. The GKR avoidance areas will provide additional protection for the BNLL and any potential burrow habitat.

- Recent project-design features, recommended by the CDFW, associated with the removal of several proposed solar arrays due west of the proposed substation and Little Panoche Road. This area is suitable for potential GKR and BNLL use and is immediately adjacent to the VFCL and proposed BNLL buffer area. Another strip of active and inactive GKR burrows will be protected along the existing Little Panoche Road fence line.

- A 1,640.4-foot (500-meter) wide and 8,149.5-foot (2,484-meter) long San Joaquin kit fox travel corridor has also been added along the northern tributary of Las Aquilas Creek and the adjacent VFCL. This corridor will provide additional permanent protection to the BNLL and the suitable habitat.

- At the discretion of the Designated Biologist on-site, an exclusion fence or barrier, installed along a specific project work area/BNLL buffer interface or along likely habitat such as wash terraces (not surrounding specific BNLL), will prevent BNLL (and other species) from entering the site during construction and other ground disturbance activities. This impenetrable barrier can be constructed of smooth polymer matrix such as E-Fence, or aluminum flashing held in place by metal or wooden stakes (Germano et al. 1993). The fencing will be buried a minimum of six-inches (15.2 cm) below grade and extend a minimum of 30-inches (76.2 cm) above grade. The exclusion fencing shall be inspected daily, during the construction period, by a Designated Biologist or biological monitor under the direction of the Designated Biologist. The entrenched barrier fencing will be installed after the pre-construction survey and will be removed once construction activities are complete.

Several BNLL best management practices, some provided in the FEIR (County of San Benito 2010), will also be implemented at the proposed PVS project and will include the following:

- Prior to initiation of construction of a project phase (i.e., any activity that results in surface disturbance), a Designated Biologist(s) shall conduct a BNLL education program (e.g., tailgate briefing) for all project personnel. Topics to be discussed during the briefing shall include: identification of BNLL, occurrence and distribution of BNLL in the project area, take avoidance measures being implemented during the project, reporting requirements if an observation or incident occurs, applicable definitions and prohibitions under the Fish and Game Code for fully protected species, and relevant provisions of the federal and state Endangered Species Act.

- All activities that will result in permanent or temporary ground disturbances shall be preceded by a pre-construction survey within 30 days of construction by a Designated Biologist(s). In addition, an additional pre-construction survey immediately prior to the onset of construction will be conducted. The biologist(s) shall identify and clearly mark the location of areas where any BNLL were observed. If a BNLL is observed on the project Footprint, CDFW and USFWS will be contacted. See Attachment A for additional BNLL protection measure proposals.

- A biological monitor(s) shall be present while ground disturbing activities are occurring. In addition to conducting preconstruction surveys, the biological monitors shall aid crews in satisfying take avoidance criteria for BNLL and implementing project avoidance and mitigation measures. Biological monitors shall accompany vehicles and crews throughout the project area if the Designated Biologist considers it necessary in order to avoid individual BNLL. Biological monitors are empowered to order cessation of activities if an immediate threat of "take" is identified, if take avoidance and/or mitigation measures are violated, or if a BNLL is located within the construction area and will notify the project environmental representative.

- Unless biological monitors allow alterations to routes, all project vehicles shall be confined to defined access routes that will be staked and/or flagged. All observed BNLL shall be avoided by flagged 52.4-acre buffer to alert project personnel to their presence. All project-related flagging shall be collected and removed after completion of the project.

- Project-related motorized vehicles are prohibited (with the exception of emergency vehicles on designated roads) within occupied BNLL habitat and established 52.4-acre buffers.

- To prevent inadvertent entrapment of BNLL, all open holes, steep-walled holes, or trenches more than two feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks (wooden planks should be more no less than 10 inches in width and should reach to bottom of trench). Before such holes or trenches are filled, they should be thoroughly inspected by a biological monitor for trapped animals.

- PVS shall appoint a representative who will be the contact source for any employee or contractor who inadvertently kills or injures a BNLL or who finds a dead, injured, or entrapped individual BNLL. The representative will be identified during the pre-performance educational briefing. PVS will contact CDFW and USFWS immediately in the case of a dead, injured, or entrapped BNLL.

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ATTACHMENT A

ADDITIONAL PROPOSED BNLL PROTECTION MEASURES

In addition to the BNLL avoidance buffer and Best Management Practices (BMPs) mentioned above, the following measures are proposed for agency consideration.

Pre-Construction Survey Enhancement in High Risk BNLL Areas

All activities that will result in permanent or temporary ground disturbances shall be preceded by a pre-construction survey within 30 days of construction by a Designated Biologist or their representative. The Designated Biologist(s) shall identify and clearly mark the location of areas where any BNLL were observed. In potential high BNLL impact risk areas, in the vicinity of Las Aquilas Creek (i.e., within Township 15S, Range 10E, Section 9 and 16), enhanced pre-construction surveys for adult BNLL will be conducted. These enhanced surveys will consist of focused protocol BNLL surveys in the month of May preceding the ground disturbance. The survey methodology will be based on the CDFG *Approved Survey Methodology for the Blunt-nosed Leopard Lizard* (CDFG 2004).

Measures for BNLL Identified During Construction

Exclusion fencing may be installed around areas of construction if deemed necessary by the Designated Biologist. Exclusion fencing will not be installed in a manner that would encircle or trap a BNLL. Upon the completion of construction in the area, the exclusion fencing will be removed. If a BNLL is subsequently identified within the project footprint during construction, the PVS proposes that all work will cease in the area of the sighting. The Designated Biologist will notify and consult with CDFW and USFWS prior to additional activity in the area.

Appendix F – Conservation Management Plan

Conservation Management Plan

Panoche Valley Solar Facility

San Benito County, California

April 27, 2014

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TABLE OF CONTENTS

1.0 Introduction 1
1.1 Purpose of Conservation Management Plan 2
1.2 Setting and Location 2
1.3 Regional Conservation Context 4
1.4 History and Existing Land Use Management 4
1.4.1 Livestock Grazing/Agriculture 5
1.4.2 Fire 5
1.4.3 Security/Trespass/Trash 6
1.4.4 Research, Recreation, and Educational Uses 6
1.4.5 Existing Easements 7
1.4.6 Adjacent Land Uses 7
2.0 Existing Resources 8
2.1 Vegetation and Land Cover Types 8
2.1.1 Biotic Habitats 11
2.1.2 Rare Plant Populations 19
2.1.3 Invasive Plant Species 19
2.2 Covered Species 20
2.2.1 Blunt Nosed Leopard Lizard (BNLL) 20
2.2.2 Giant Kangaroo Rat 21
2.2.3 San Joaquin Kit Fox 26
2.2.4 California Tiger Salamander 29
2.2.5 San Joaquin Antelope Squirrel 29
2.2.6 California Condor 30
2.2.7 Vernal Pool Fairy Shrimp 30
2.2.8 Conservancy Fairy Shrimp 31
2.2.9 Longhorn Fairy Shrimp 31
2.2.10 Vernal Pool Tadpole Shrimp 31
3.0 Conservation Strategy for the Panoche Valley Solar Farm Conservation Lands 33
3.1 Key Elements of Conservation Strategy 33
3.2 Conservation Goals and Objectives 33

3.3 Conservation Lands Management and Enhancement 37
3.3.1 Overview 37
3.3.2 Implementation of Management Goals and Objectives 37
3.3.3 Covered Species Protection 37
3.3.4 Habitat Disturbance 47
3.3.5 Management Strategies 47
3.4 Monitoring and Reporting 50
3.4.1 Overview 50
3.4.2 Monitoring Program 51
3.4.3 Annual Monitoring Report 59
4.0 Adaptive Management 63
4.1 Overview 63
4.2 Management Strategy Adjustment Process 63
5.0 Funding and Implementation 64
5.1 Funding 64
5.2 Task Prioritization 64
5.3 Estimated Cost Calculation 64
5.4 CMP Agency, Transfer, Replacement, Amendments, and Notices 65
6.0 Literature Cited 67

TABLES

Table 1 Biotic Habitat Alliances on the Conservation Lands
Table 2 Covered Species and Conservation Acreage on VFCL, VRCL, and SCRCL
Table 3 Estimated Number of GKR On Valadeao Ranch and Silver Creek Ranch Conservation Lands*
Table 4 GKR survey results within the Project Footprint
Table 5 GKR survey results within the VFCL
Table 6 GKR survey results within the SCRCL
Table 7 GKR survey results within the VRCL
Table 8 San Joaquin Kit Fox Den Observations
Table 9 Slope Classes and SJKF Scat
Table 10 Ponds Surveys during Protocol CTS Larval Surveys, March, April, and May, 2010
Table 11 Monitoring, level of effort and data analysis for annual monitoring of Covered Species for PVS Conservation Lands, San Benito County, California

FIGURES

Figure 1 Project Location
Figure 2 Action Area
Figure 3 Project Footprint and Valley Floor Conservation Lands Biotic Habitats
Figure 4 Valadeao Ranch Conservation Lands Biotic Habitats
Figure 5 Silver Creek Ranch Conservation Lands Biotic Habitats
Figure 6 Ciervo-Panoche Natural Area
Figure 7 Giant Kangaroo Rat Mitigation Lands
Figure 8 San Joaquin Kit Fox Mitigation Lands
Figure 9 Blunt-nosed Leopard Lizard Mitigation Lands
Figure 10 Valadeao Ranch Conservation Lands California Tiger Salamander Potential Mitigation Ponds
Figure 11 Silver Creek Conservation Lands California Tiger Salamander Potential Mitigation Ponds
Figure 12 2013 Blunt-nosed Leopard Lizard Protocol Survey Results
Figure 13 Blunt-nosed Leopard Lizard Observations on Silver Creek Ranch Conservation Lands
Figure 14 2013 Giant Kangaroo Rat Observations – Project Site
Figure 15 2013 Giant Kangaroo Rat Observations – Valley Floor Conservation Lands
Figure 16 2013 Giant Kangaroo Rat Survey Results – Silver Creek Ranch Conservation Lands
Figure 17 2013 Giant Kangaroo Rat Survey Results – Valadeao Ranch Conservation Lands
Figure 18 San Joaquin Kit Fox Den Locations
Figure 19 Known California Tiger Salamander Breeding Ponds Outside Project Footprint and Valley Floor Conservation Lands
Figure 20 2013 San Joaquin Antelope Squirrel Observations
Figure 21 Ephemeral Pool Habitat Locations
Figure 22 Vernal Pool Fairy Shrimp Observations

APPENDICES

APPENDIX A: Additional Special-status Species That Would Benefit from Conservation Lands Management
APPENDIX B: Par Analysis – Panoche Valley Solar Facility

DEFINITIONS

Biological Monitor	Observers that work to perform biological surveys or provide oversight of activities as needed. Receives instruction from and reports to the Designated Biologist(s).
Covered Species	Those animal species for which this CMP is designed to conserve and protect in perpetuity.
CMP Agency	The entity that acts as the holder of the conservation easements of the Conservation Lands.
Conservation Lands	Three large parcels of land to offset potential impacts as part of a conservation package consisting of the permanent preservation and management of those parcels (Valley Floor Conservation Lands, Valadeao Ranch Conservation Lands, and Silver Creek Ranch Conservation Lands).
Designated Biologist	Biologist knowledgeable and experienced in the biology, and natural history of the Covered Species on the Conservation Lands and shall be responsible for monitoring construction activities to help minimize and fully mitigate or avoid the incidental take of individual species and to minimize disturbance of Covered Species' habitat. This biologist may appoint biological monitors to perform biological surveys or provide oversight of ground disturbing activities as needed in their place.
Project Footprint	The portion of the Action that includes the solar arrays and associated roads and equipment, totaling 2,492 acres.
PVS	Panoche Valley Solar; name of the project.

ACRONYMS AND ABBREVIATIONS

ACEC	Areas of Critical Environmental Concern
AMSL	above mean sea level
BA	Biological Assessment
BLM	Bureau of Land Management
BMP	best management practices
BNLL	blunt-nosed leopard lizard
BO	Biological Opinion
°C	Celsius
CACO	California condor
CalFire	California Department of Forestry and Fire Protection
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CFS	Conservancy Fairy Shrimp
CMP	Conservation Management Plan
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CTS	California Tiger Salamander
DNA	Deoxyribonucleic Acid
ESA	Endangered Species Act
FEIR	Final Environmental Impact Report
GKR	Giant Kangaroo Rat
HSM	habitat suitability model
I-5	Interstate 5
ITP	Incidental Take Permit
LOA	Live Oak Associates, Inc.
LHFS	Longhorn Fairy Shrimp
m	meters
mm	millimeter
mph	miles per hour
PIT	Passive Integrated Transponders
PVS	Panoche Valley Solar Facility
RDM	Residual Dry Matter
SBCFD	San Benito County Fire Department
SCP	Scientific Collecting Permits
SCRCL	Silver Creek Ranch Conservation Lands
SJAS	San Joaquin Antelope Squirrel
SJKF	San Joaquin Kit Fox
USACE	U.S. Army Corp of Engineers
USFWS	U.S. Fish and Wildlife Service

USGS	U.S Geologic Service
VFCL	Valley Floor Conservations Lands
VPFS	Vernal Pool Fairy Shrimp
VPTS	Vernal Pool Tadpole Shrimp
VRCL	Valadeao Ranch Conservation Lands

1.0 Introduction

Panoche Valley Solar, LLC proposes to construct and operate an approximately 399 megawatt (MW) solar photovoltaic energy generating facility located in San Benito County, California (Figure 1). The Project is called the Panoche Valley Solar (PVS) Facility. The Project Footprint consists of approximately 2,492 acres in the Panoche Valley of eastern San Benito County, California. The PVS also includes the permanent preservation and management of approximately 24,185 acres of high quality Conservation Lands that are contiguous with the Project Footprint (Figure 2).

The Valley Floor Conservation Lands (VFCL), Valadeao Ranch Conservation Lands (VRCL) and Silver Creek Ranch Conservation Lands (SCRCL) Conservation Management Plan (CMP) is established to compensate and mitigate for unavoidable impacts to federal and state listed species. The Signatory Agencies will be the San Francisco District of the U.S. Army Corps of Engineers (USACE), the Ventura Office of the U.S. Fish and Wildlife Service (USFWS), and the California Department of Fish and Wildlife (CDFW), Central Region.

This CMP is intended to provide direction to landowner and an entity approved by the Applicant and agencies (CMP Agency), as the holder of the conservation easements over the approximately 24,185 acres and provide instruction on protection, maintenance, and, where appropriate, enhancement of the habitat values of the Conservation Lands for the federal and state-listed species. The CMP includes management goals and objectives; specific management and monitoring measures to protect and maintain listed species habitat values; and procedures to measure the success of the goals and objectives intended to be consistent with requirements which will be detailed in the Biological Opinion (BO) issued by the USFWS, and pursuant to Section 7(c)(1) of the federal Endangered Species Act (ESA) of 1973 and the 2081 Incidental Take Permit (ITP) which will be issued by the CDFW pursuant to the California Endangered Species Act (CESA).

The BO and ITP provide for the preservation of approximately 24,185 acres of land in the VFCL, VRCL, and SCRCL. This CMP implements the conservation measures proposed by the Applicant and the Reasonably Prudent Measures listed in the BO by the USFWS. In addition, the CMP also implements the mitigation measures set forth in the ITP issued by CDFW.

1.1 Purpose of Conservation Management Plan

The purpose of this long-term CMP is to ensure the Conservation Lands are managed, monitored, and maintained in perpetuity for the benefit of the Covered Species. Please see Section 2.2 for further details on Covered Species. This CMP establishes objectives, priorities and tasks to monitor, manage, maintain and report on Covered Species and covered habitats on the Conservation Lands. This CMP is considered a binding and enforceable instrument, implemented by the conservation easement covering the Conservation Lands property.

1.2 Setting and Location

The Conservation Lands (Figures 3-5) are located in Panoche Valley, County of San Benito, State of California, within the following sections of the Federal Townships:

<u>Valley Floor mitigation – San Benito County</u>

- Sections 4, 8-10, 13-16, and 19 of Township 15 south, Range 10 east

<u>Valadeao Ranch – San Benito and Fresno Counties</u>

- Sections 19, 30, and 31 of township 14 south, range 11 east;
- Sections 21 - 27 and 32 - 36 of township 14 south, range 10 east;
- Sections 1 - 8 and 10 - 14 of township 15 south, range 10 east; and
- Sections 6, 7, 19, and 20 of township 15 south, range 11 east.

<u>Silver Creek Ranch – San Benito and Fresno Counties</u>

- Sections 20 - 21, 26 - 36 of Township 15 south, Range 11 east
- Sections 1 - 6, and 8 - 12 of Township 16 south, Range 11 east

The Conservation Lands, 24,185 acres in total, include 2,523 acres of the VFCL adjacent to the Project Footprint (see Figure 3); 10,772 acres of the Valadeao Ranch Conservation Lands located contiguous with the Project site (see Figure 4); and 10,890 acres of the Silver Creek Ranch Conservation Lands located immediately to the southeast of the Project Footprint (see Figure 5). The remaining land to be developed is approximately 2,492 acres (Project Footprint). Currently the Conservation Lands are primarily used for cattle ranching. Other surrounding land use in the vicinity of the Project Footprint includes rangeland and U.S. Bureau of Land Management (BLM)-managed recreation area and areas designated as an “Area of Critical Environmental Concern” (ACEC).

The Panoche/Silver Creek Watershed is located upstream and west of Mendota, California, and is approximately 50 miles west of Fresno, California (see Figure 1). The watershed area, as defined for this watershed assessment work, encompasses approximately 300 square miles upstream of Interstate-5 (I-5), and ranges in elevation from approximately 500 feet at I-5, to 5,000 feet near the upper watershed boundary. The Panoche/Silver Creek Watershed is located in Fresno and San Benito counties and lies on the western edge of the San Joaquin Valley in the Diablo Range. Soils in the watershed are derived predominantly from marine sediments (sandstones and shales) of the Moreno, Kreyenhagen, and

Panoche Formations, and Franciscan Assemblage (as stated in County of San Benito FEIR 2010). These soils support a sparse vegetative cover on most hillsides, with more vegetative cover generally associated with flatter valley floor areas and hillslopes at higher elevations. Large areas of unvegetated soils exist where the soil is thin, particularly on steep slopes and near stream channels. Areas of thin soil also occur over rock containing relatively high concentrations of selenium. Within the watershed upstream of I-5, approximately 30 percent of the land is managed by the BLM, primarily for green-season grazing. Other lands are privately held and used for rangeland grazing or irrigated cropland (just upstream of I-5). Downstream of I-5, lands are used primarily as agricultural cropland.

1.3 Regional Conservation Context

The Project and the Conservation Lands are located within a portion of the Ciervo-Panoche Natural Area, an area that has long been a focus of conservation for several of the regional listed species. This natural area is known to support substantial populations of state and/or federal listed species including San Joaquin kit fox (SJKF; *Vulpes macrotis mutica*), giant kangaroo rat (GKR; *Dipodomys ingens*), blunt-nosed leopard lizard (BNLL; *Gambelia silus*), and San Joaquin antelope squirrel (SJAS; *Ammospermophilus nelsoni*), four species that will benefit from implementation of this plan. Additional state and federal listed species that are present in the region in lower numbers and that will benefit from this CMP include California tiger salamander (CTS; *Ambystoma californiense*), California condor (CACO; *Gymnogyps californianus*), and several branchiopods species such as Vernal Pool Fairy Shrimp (VPFS; *Brachinecta lynchi*), Conservancy Fairy Shrimp (CFS; *Brachinecta conservatio*) Longhorn Fairy Shrimp (LHFS; *Brachinecta longiantenna*) and Vernal Pool Tadpole Shrimp (VPTS; *Lepidurus packardi*).

This CMP serves a further purpose of implementing management activities on the Conservation Lands that will contribute to recovery goals for some of the Covered Species for which goals have been established by the USFWS. Specifically, conservation, management and enhancement of these Conservation Lands will contribute towards the following Recovery Tasks in the "Recovery Plan for Upland Species of the San Joaquin Valley" (USFWS 1998):

- *Protect natural lands in the Ciervo-Panoche Natural Area* (Priority 1; Tier 2 – Task 2.1.14);
- *Protect grass and shrubland communities on western Valley edge, Santa Nella to Panoche Creek* (Priority 2; Tier 4 – Task 5.3.4).

Given the goals and objectives contained in this CMP, the permanent conservation and subsequent enhancement, management, and monitoring of Conservation Lands will include gathering of data that could additionally contribute toward several more broad tasks related to species conservation, including the following:

- *Conduct censuses for kit fox and monitoring for multiple animal species in the Ciervo-Panoche area* (Priority 2; Tier 4 – Task 4.38);
- Access for survey, census, demographic, and other studies (Multiple species; various tasks);

1.4 History and Existing Land Use Management

The land in the general area of the Conservation Lands has been grazed historically for over 150 years. The earliest nonnative settlers of the San Benito County mountain ranges, foothills and valleys were Mexican citizens. In 1844, Mexican Governor Manuel Micheltorena granted a 22,000 acre tract of land in this region, but not in the Project Footprint or Conservation lands, called "Panoche de San Juan y los Carrisalitos" to Julian Ursua and Pedro Romero. Panoche Valley has always been sparsely inhabited with few buildings. Since the mid-1800s, the land has been used exclusively for cattle, sheep and horse grazing, and associated cultivation of forage crops, which was primarily alfalfa production. According to evidence gleaned from historic maps and aerial photographs of the area dating from throughout the twentieth century, early landowners established clusters of buildings and structures related to their ranching or farming operations. Each cluster (there were less than 10 total in the valley) typically had a stand of trees, and may have included residences, barns, sheds, water tanks, wells, shelters, corrals, troughs, and related outbuildings. A number of these clusters of buildings and structures have been demolished over the years, and at other clusters buildings have been destroyed and replaced. Evidence suggests that few, if any, new clusters have formed since the early 1900s (JRP 2010).

1.4.1 Livestock Grazing/Agriculture

As stated above, cattle, sheep, and horse grazing has been the primary agricultural use and land use on the VFCL, VRCL, and SCRCL. Rotational grazing which was subject to individual landowner/lessee management has been the practice. None of these practices or management activities has been formalized. The past presumed goals of grazing practices have been to optimize rangeland production oriented towards maximizing the grazing efficiency and livestock (e.g. cattle, sheep, and horse) production through the accumulated experience of the ranchers and operators.

Although the Conservation Lands have primarily been used for cattle grazing for the past 100 years, portions of the VFCL have been used to grow crops. From the 1940s through early 1970s, various irrigated crops were grown on this land including cotton, watermelons, potatoes, turnips, cucumbers, sugar beets, and lettuce. At least some irrigated and dryland crop production extended into the 1990s (San Benito County 2010).

1.4.2 Fire

In rangeland areas such as those present in the Conservation Lands, sources of wildland fire include equipment and vehicles, lightning strikes, and potentially electrical facilities. Although documented fire history specific to the Conservation Lands is not available, it is likely that the lands have been subject to wildland fires on a fairly regular basis in some locations. There appears to have been a large fire on the VRCL within the last decade, as evidenced by numerous burned Ephedra stumps being present. The primary fire prevention method in rangelands, maintenance of a disked fire break along public roads, has been implemented, such as establishment of fire breaks along public roads. Other than San Benito County ordinances and California Department of Forestry and Fire Protection (CalFire) guidelines, no formal fire prevention or management plan exists for the Conservation Lands.

The primary biotic habitats and ecosystems of the Conservation Lands are not fire-adapted. These habitats and ecosystems are highly resilient to infrequent fires, but changes in the fire regime that result in shorter fire intervals can damage the habitats and animal species present. In the types of shrublands, riparian areas, and grasslands found throughout the PVS and Conservation Lands, fire can have a long-lasting and potentially negative impact on the vegetation. Ephedra and common saltbush do not readily recover from fire and unmanaged fire in the region would tend to favor establishment and maintenance of non-native grasses over native grasses, forbs, and shrubs (Sawyer et al. 2009).

CalFire functions as the San Benito County Fire Department (SBCFD)/ Hollister Fire Department under a contract with the County of San Benito in the vicinity of the Conservation Lands. Outside of fire season, the SBCFD located in Hollister, would be the nearest responder to the Project with a response time to the Project site of approximately 45 minutes to one hour (San Benito County 2010). No other year-round responders from Fresno County or any other nearby jurisdictions are closer to the Project Footprint or Conservation Lands.

1.4.3 Security/Trespass/Trash

Security on the Conservation Lands consists of fencing along public roads and locked gates. Ranch operators and staff are present on the lands daily and there is limited traffic on the public roads in the vicinity. Public use of the surrounding BLM lands increases significantly on holiday weekends and with the increased traffic, the potential for trespass is elevated at these times. The primary forms of trespass could include off-highway vehicle access and trespass on foot over gates and fences.

Although public access has been restricted, past land use practices have resulted in the abandonment and/or discarding of items such as tanks, vehicles, equipment, tires, and trash. These items are scattered throughout the Conservation Lands and in some places have built up such that they may be a hazard to wildlife.

1.4.4 Research, Recreation, and Educational Uses

There currently are no authorized research, recreation, or educational uses on the Conservation Lands other than private access by landowners and their guests. Based on distributional records for various Covered Species, it appears that in the past some of the Conservation Lands have been accessed for research activities associated with these species (USFWS 1998).

The Panoche Valley is a recognized "Important Bird Area" by the Audubon Society. The designation includes approximately 36,000 acres of private and public lands in the Panoche Valley and surrounding hills. BLM lands in the surrounding area and CDFW lands on Little Panoche Creek, northeast of the VRCL are frequently visited by birders. Birders also frequent the public roads in the Panoche Valley area.

The western boundary of the BLM administered Panoche Hills Management Area is located immediately adjacent to portions of the Conservation Lands (**Figure 6**). Two Wilderness Study Areas and two ACEC are located in the Panoche Hills BLM-managed properties. These lands are primarily accessed from the north along Little Panoche Road and are managed as a Special Recreation Management Area by the BLM, providing specific, structured recreation opportunities. Recreational opportunities include hiking, nature study, hunting, star-gazing, rockhounding, and camping (BLM, 2009). The Panoche Hills are open all year, with peak use in the winter and spring of approximately 5 to 10 people per day during the weekdays and approximately 20 to 25 people per day during the weekends (San Benito County 2010).

Additional organized recreation activities occur throughout the Panoche Valley, such as the Panoche Valley Road Race. This event is a yearly cycling race which can host hundreds of racers along Panoche Road and Little Panoche Road. The 2013 race reported approximately 130 participants who placed (USA Cycling 2013). Mercey Hot Springs, a private recreation area and retreat with hot mineral baths, is located along Little Panoche Road near the northern boundary of the VRCL in the Panoche Hills. This private campground is often visited by birders using their cabins, campsites and recreational vehicle facilities.

1.4.5 Existing Easements

One 230kV transmission corridor runs from northwest to southeast through the PVS and VFCL with an associated easement. In addition, two pipeline easements cross Conservation Lands: one natural gas pipeline crosses VFCL and SCRCL; and, one petroleum pipeline crosses SCRCL.

1.4.6 Adjacent Land Uses

The Conservation Lands are surrounded by cattle ranches, BLM lands, and rural residences in the Panoche Valley. The surrounding land uses are primarily cattle ranching and open space. There is no urban development on the Conservation Lands or surrounding area. Two ranching communities are located within the Panoche Valley, Panoche and Llanada. Both communities are within two miles of the Project Footprint. The nearest rural community is Firebaugh, approximately 15 miles from the perimeter of the Project Footprint. BLM lands are extensive in the Ciervo-Panoche Natural Area surrounding the site; BLM lands almost completely surround the SCRCL to the south, east, and north, and the VFCL and VRCL to the east (Figure 6). ACEC, a BLM designation, are also extensive throughout this region, including two ACECs mentioned in the five-year review for the BNLL and GKR.

Among the scattered rural residences in the area near the intersection of Panoche Road and Little Panoche Road, there is a small restaurant and inn (Panoche Inn) that is intermittently open and Mercey Hot Springs. The mineral hot springs and private campground, are located along Little Panoche Road in Fresno County.

2.0 Existing Resources

2.1 Vegetation and Land Cover Types

The Conservation Lands are comprised almost entirely of annual, non-native grasslands used mainly to graze cattle. Nine other biotic habitats were identified for the Conservation Lands but make up a relatively small portion of the overall properties (Table 1). The 10 habitats were classified as introduced annual grassland, ephedra subshrub/scrub, barrens, saltbush shrublands, juniper woodlands, oak woodlands, wetlands and associated habitats (riparian), mechanically disturbed and devegetated, ponds, and vernal pools. To the extent practicable, these habitats are based on the Sawyer and Keeler-Wolf (1995) and Sawyer et al. (2009) vegetation classification schemes.

Valley Floor Conservation Lands (approximately 2,523 acres)

In order to avoid detrimental effects to Covered Species, particularly BNLL, SJKF, and GKR and their habitats, the Applicant adjusted and reduced the Project Footprint by greater than 75 percent to avoid the most suitable habitat for these species, and committed to permanently preserve the highly suitable habitat as the VFCL. The VFCL are contiguous with the Project Footprint, and are primarily non-native annual grassland habitat, with some seasonal ponds and vernal and ephemeral pools, as well as segments of seasonally dry Panoche and Las Aquilas Creeks. A full description of the biotic habitats of the Conservation Lands is provided in Section 2.1.1. The VFCL include the entire 100-year floodplain within the previously larger Project Footprint boundary on the valley floor as well as the additional SJKF movement corridor, GKR avoidance areas and BNLL avoidance buffers. These lands are currently grazed, which enhances the habitat for the special-status species, and will continue to be grazed under adaptive management as a tool for further enhancement of habitat for Covered Species.

The VFCLs are contiguous with the Project Footprint (see Figure 3). These lands include several seasonal drainages and all of Panoche Creek that lies within the Project Footprint boundary, which is usually a deep-cut dry wash for most of the year as well as the 100-year floodplain that intersects the Project site in two places, which provides corridors or landscape linkages for all of the Covered Species across the valley floor. Both portions of these lands are comprised of non-native annual grassland habitat and slopes less than 11 percent.

Table 1 Biotic Habitat Alliances on the Conservation Lands

Biotic Habitat Alliances	Valley Floor Conservation Lands (acres)	Valadeao Ranch Conservation Lands (acres)	Silver Creek Ranch Conservation Lands (acres)	Total (acres)
Introduced Annual Grassland	2,366	6,727	8,314	17,407
Ephedra Shrublands	-	2,705	2,259	4,964

Biotic Habitat Alliances	Valley Floor Conservation Lands (acres)	Valadeao Ranch Conservation Lands (acres)	Silver Creek Ranch Conservation Lands (acres)	Total (acres)
Barrens	-	575	-	575
Saltbush Shrublands	-	476	-	476
Juniper Woodlands	-	68	-	68
Oak woodlands	-	16	-	16
Wetlands and Associated Habitats	-	2.1	233	235.1
Mechanically Disturbed & Devegetated	-	3	-	3
Ponds	1.6	2.4	-	4.0
Vernal Pools	2.9	0.2	-	3.1
Wash/Drainage/ Stream	88	-	-	88
No data*	65	197	84	346
TOTAL	**2,523**	**10,772**	**10,890**	**24,185**

*No GIS data was available for these acreages.

Valadeao Ranch Conservation Lands (approximately 10,772 acres)

Based upon initial biological surveys of the Project site and discussions with CDFW and USFWS, PVS identified and acquired rights to permanently preserve and manage the adjacent Valadeao Ranch property, which is located north, east, and west of the Project site (see Figure 4).

The VRCL are contiguous with the Project Footprint directly to the west, east, and northeast of the site. These lands are also contiguous with the VFCL and SCRCL. VRCL include several seasonal drainages. The property is dominated by introduced annual grasslands (approximately 6,700 acres) and ephedra shrubland (approximately 2,700 acres), and also supports atriplex shrubland, and juniper and oak woodlands. A full description of the biotic habitats of the Conservation Lands is provided in Section 2.1.1. Soils on this site are complex and range from sandy to sandy loam to clay loam to badlands. The VRCL contain approximately 2,945 acres with slopes between 0 and 11 percent (preferred slopes for several of the Covered Species discussed in this document). Elevations on the VRCL range from approximately 1,400 feet to 2,100 feet above mean sea level (amsl). These lands are currently grazed, which enhances the habitat for the Covered Species, and will continue to be grazed under adaptive management as a tool for further enhancement of habitat for Covered Species.

Covered Species observed (either directly or by their sign) on the VRCL include CTS, GKR, and SJKF. Portions of the VRCL were found to be suitable for BNLL, GKR, CTS and SJKF in differing acreage amounts. The VRCL also support one known CTS breeding pond and estivation habitat for an additional known CTS breeding pond located on private land. This breeding pond and estivation habitat for both ponds will be preserved in perpetuity and will increase the mitigation value for CTS.

Silver Creek Ranch Conservation Lands (approximately 10,890 acres)

During the DEIR public comment period, the Action consulted with the County, CDFW, USFWS, and various experts on the Covered Species regarding additional possible mitigation for unavoidable impacts to sensitive biological resources. PVS then identified and secured the rights to permanently preserve and manage additional conservation lands in the Panoche Valley known as the Silver Creek Ranch.

The SCRCL are southeast of the Project Footprint (see Figures 2 and 5). The northwestern-most corner of the SCRCL is contiguous with a portion of the VRCL. Elevations on the SCRCL range from 900 to 2,200 feet amsl. California annual grasslands comprise the majority of ground cover on the site (approximately 8,400 acres) and are dominated by non-native species distributed sparsely over the landscape; the site also supports ephedra shrubland (approximately 2,260 acres), riparian areas, seeps, springs, and barrens. An area of tamarisk shrubland occurs along Silver Creek, and small areas of emergent wetlands and marsh occur along Panoche Creek. These lands include several seasonal drainages and upland habitat as well. A full description of the biotic habitats of the Action and associated Conservation Lands is provided in Section 2.1.1. Soils on the SCRCL are less complex than those found on the VRCL and are generally characterized as well drained and moderately permeable. SCRCL contain approximately 5,765 acres with slopes between 0 and 11 percent. These lands are currently grazed, which enhances the habitat for the Covered Species, and will continue to be grazed under adaptive management as a tool for further enhancement of habitat for Covered Species.

The SCRCL is specifically identified in the Recovery Plan for Upland Species of the San Joaquin Valley (USFWS 1998) and the Recovery Plan 5-year Reviews (USFWS 2010a, 2010b, 2010c), as an area with high habitat value for the Covered Species. The Recovery Plan also identifies the BLM's program of acquisition in which the Silver Creek Ranch is one of the two main ranches targeted for purchase. The Recovery Plan, in reference to GKR, also has a goal to "protect all existing natural land on the Silver Creek Ranch…" (Page 95). In reference to BNLL, the Recovery Plan aims to "Protect additional habitat for them in key portions of their range; areas of highest priority to target for protection are: …Natural lands in the Panoche Valley area of Silver Creek Ranch, San Benito County" (Page 122). By preserving the Silver Creek Ranch Conservation Lands, the Action will preserve a "highest priority" area identified in the Recovery Plan for these listed species that is currently unprotected.

Covered Species observed (either directly or by their sign) on the SCRCL include GKR, BNLL, and SJKF. While no CTS have been observed on the SCRCL, no protocol level CTS surveys have taken place to date on this property. Dr. Mark Jennings, a noted California herpetologist, did identify several ephemeral ponds on the SCRCL that would serve as suitable CTS breeding habitat.

2.1.1 Biotic Habitats

2.1.1.1 Annual Grassland

The most widespread and dominant species are annual grasses; non-native herbaceous species are distributed more patchily. Species present in the Introduced Annual Grasslands include ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis*), foxtail barley (*Hordeum murinum* ssp. *leporinum*), and rat-tail fescue (*Vulpia myuros*). Dominant forbs included broad-leaved filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), shining peppergrass (*Lepidium nitidum* var. *nitidum*), and vinegarweed (*Trichostema lanceolatum*). Fiddleneck (*Amsinckia menziesii*), devils lettuce (*Amsinckia tessellata*), shepherds purse (*Capsella bursa-pastoris*), turkey mullien (*Eremocarpus setigerus*), and bur clover (*Medicago polymorpha*) were also common, especially along ranch roads. Native species that maintain a presence must be generally tolerant of grazing and saline clay-rich soils. Areas which have not been previously disturbed by historic cultivation or been subject to heavy grazing also include a variety of native wildflowers such as blow wives (*Achyrachaena mollis*), blue dicks (*Dichelostemma capitatum*), California gold fields (*Lasthenia californica*), yellow daisy tidy-tips (*Layia platyglossa*), and California creamcups (*Platystemon californicus*).

Grasslands dominate the lower slopes and valley bottoms in continuous stands that are interrupted only by a few larger washes. Some grassland patches were entirely comprised of non-native species, though these areas were uncommon. One California Native Plant Society (CNPS) List 4 species, serpentine leptosiphon (*Leptosiphon ambiguous*), was identified in this alliance. The VFCL and PVS are almost completely composed of Introduced Annual Grasslands.

On the SCRCL, grasslands occur primarily on the lower slopes of the Griswold and Panoche Hills and valley bottoms, and are largely composed of non-native annuals. Grassy cover was seldom observed to exceed 20 percent, giving the area a sparsely vegetated, somewhat desert-like appearance. In years where precipitation is not as generous as experienced in 2010, much of the area classified as Grasslands may appear to be relatively barren of plants.

On the Valadeao Ranch Conservation Lands, grasslands dominate the lower slopes and valley bottoms in continuous stands that are interrupted only by a few larger washes. Up to 100 percent of the sward may be non-native, but this situation was patchy and uncommon in 2010. One California Native Plant Society (CNPS) List 4 species, serpentine leptosiphon, was identified in this alliance.

2.1.1.2 Ephedra Shrublands

Plant associations that were noted to occur within the Ephedra Shrublands include *Artemisia californica - Senecio flaccidus* scrub, *Eastwoodia elegans - Ephedra californica* scrub, *Ericameria linearifolia -*

Ephedra californica scrub, *Ericameria linearifolia - Ericameria nauseosa* scrub, *Ericameria linearifolia - Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Artemisia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Ephedra californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Yucca whipplei* scrub, and *Gutierrezia californica - Ephedra californica* scrub. Most shrub species in this alliance were widespread at low frequencies in areas beyond the extent of the assemblage where it dominates. In the understory layer, introduced annual grasses generally attain overwhelming dominance. The understory assemblage is often sparse, and non-diverse cover is typical of all study area shrublands associations that occupy xeric, steep slopes with southern aspect, although some associations in this alliance had dense understory. Other notable plants found within this alliance included introduced grasses, coyote brush (*Baccharis pilularis*), silver lupine (*Lupinus albifrons*), narrow leaf milkweed (*Asclepias fascicularis*), Sandberg bluegrass (*Poa secunda*), crinkled onion (*Allium crispum*), white fiestaflower (*Pholistoma membranaceum*), foothill larkspur (*Delphinium hesperium* ssp. *pallescens*), and wild oats (*Avena* sp.) Native perennial species were generally sparse in this alliance. Of the two plants on the CNPS List, four were observed within this alliance: naked buckwheat (*Eriogonum nudum* var. *indictum*) and Santa Clara thorn mint (*Acanthomintha lanceolata*). The transition zone between the Ephedra alliance of hillsides and the Introduced Annual Grassland alliance typical of lowlands was observed to be extensive and broad. This habitat is not present on the VFCL or PVS.

On the SCRCL, plant associations that were noted to occur within the Ephedra Shrublands include *Eriogonum fasciculatum – Ephedra californica* scrub, *Eastwoodia elegans – Ephedra californica* scrub, *Gutierrezia californica – Ephedra californica* scrub, *Ericameria linearifolia – Ephedra californica* scrub, and *Eriogonum fasciculatum – Hesperoyucca whipplei* scrub. Typically, the upland shrub assemblage at the SCRCL is neither dense nor diverse. Total shrub canopy cover exceeds five percent only in patch-scale stands. The most evenly and widely distributed species, *Ephedra californica*, also forms often expansive, monospecific overstories of less than two percent absolute shrub cover, which were classified within the area mapped as Grasslands.

On the VRCL, Ephedra Shrublands occur in Las Aquilas Creek, an arroyo-like wash at the southwestern edge of the VRCL, in small patches along ridgelines, steep slopes with a northern aspect, lower slopes, along ephemeral drainages, and steep rocky and thin-soiled south-facing slopes. Most shrub species in this alliance were widespread at low frequencies in areas beyond the extent of the assemblage where it dominates. In the understory layer, introduced annual grasses generally attain overwhelming dominance. The understory assemblage is often sparse, and non-diverse cover is typical of all study area shrublands associations that occupy xeric, steep slopes with southern aspect, although some associations in this alliance had dense understory.

Other shrubland association canopy dominants are present in this zone at very low frequencies or in small, highly grazed patches. It is likely the position of this transition is maintained by long-standing patterns of range cattle grazing. Mature *E. californica* are apparently among the least palatable shrubs available to cattle, but recruitment of this species was seen only rarely where the populations occupied lowland areas mapped as Introduced Annual Grasslands. In contrast, diversity is much greater (especially among native species) where Introduced Annual Grasslands occupies shrubland canopy gaps on the more remote, upper slopes of the VRCL.

Ephedra shrublands within the VRCL range from nearly pure California ephedra (*E. californica*) stands to highly diverse associations with typical desert shrubs. Occupied habitats occur from lower slopes and valley bottoms to rocky outcrops and alluvial slopes. This 3 to 15 foot tall shrub rarely achieves greater than 10 percent cover (absolute), but the cover provided varies little with soil type, aspect, or grazing pressure. It is generally the only shrub present in the often very broad transition from Ephedra shrublands to Introduced Annual Grasslands.

The Ephedra alliance is more prevalent to the east of Little Panoche Road. There is evidence that it was more widespread on the western face of the Panoche Hills prior to a widespread fire that swept this area within the last decade, leaving many large *E. californica* stumps. Otherwise, all associations that were mapped in this alliance exhibit relatively undisturbed canopy development, have not been recently burned, and due to landscape ruggedness have not received heavy grazing pressure.

2.1.1.3 Barrens

Barrens are ridgeline and south or (rarely) west-facing very steep slopes that exhibit a precipitous drop-off in vegetative cover. In terms of vegetation, the assembled species diversity is very low, nearly all species are relatively short-lived annuals, shrubs and trees are absent, and introduced annual grasses become minor components of the species mix. Barrens most commonly interrupt Introduced Annual Grasslands, where the transition was often observed to occur over the space of several feet. Barrens that interrupt shrublands alliance vegetation are less common, but were found to support occurrences of rare plant populations more often than any other mapped association. Botanical surveys conducted in the Panoche Valley and Panoche Hills suggest that Barrens habitats, while comparatively lacking in total cover, can support assemblages with greater native character, and can include rare species. Large patches of bare soil were commonly evident within barrens polygons mapped in 2010. Given that barrens are an exclusively annual collection of species, it seems likely that their aerial extent is variable, dependent on local rainfall amounts and the spacing of storm events. In comparatively dry years, it is conceivable that barrens extents could be expressed at up to twice the area mapped in 2010. Aerial photographs dated September, 2008 consistently indicate greater barrens extents, especially on the lower western slope of the Panoche Hills immediately above the PVS. This habitat is not present on the VFCL.

On the SCRCL, areas classifiable as true "Barrens" are commonly embedded within Grasslands on south-facing aspects and on ridge areas, in both the Griswold and Panoche Hills. In relatively dry years, Barrens supporting less than one percent total cover may be expressed across as much as 30 percent of the area mapped as Grasslands on the SCRCL.

On the VRCL, two plant associations were identified within the barrens: *Erodium cicutarium - Plantago erecta* and *Holocarpha obconica - Vulpia macrostachys*. Barrens total cover rarely exceeds one percent on the VRCL. Members of the relatively sparse barrens assemblage are adapted to some of the harshest habitat available within the study area. Low cover may be resultant at least in part from low soil moisture retention, and from erosion and use by rodents. The ridgeline and southern aspects are exposed to intense drying from sun and wind, and are very steep. The soil surface appears to be highly eroded, and ground creep is evident. This habitat appears to be attractive to burrowing rodents, whose grazing and digging further affect plant cover. Finally, transitions to barrens are accompanied by a clear change in soil color; barrens can be grouped into “red”, “blue-grey”, and “white” clay soil types. Adjacent slopes of similar aspect and steepness but lacking these unusually colored soils support typical (dense and tall) stands of Introduced Annual Grasslands or Ephedra alliance vegetation, suggesting a soil toxicity that may be inherent to the bands of red, blue-grey and white clays. Plants occurring in barrens on the VRCL include the introduced annual herb *E. cicutarium*, and natives *P. erecta, Blepharizonia laxa, Monolopia spp., Phacelia tanacetifolia, Salvia columbariae*, and *Camissonia boothii*. Three CNPS List four species, naked buckwheat (*Eriogonum nudum var. indictum*) and benitoa (*Benitoa occidentalis*), and one CNPS List two species, California groundsel (*Senecio aphanactis*) were also identified in this alliance on the VRCL.

2.1.1.4 Saltbush Shrubland Alliance

Saltbush shrubland within the study area consists of nearly pure to species depauperate mixed stands of saltbush (*A. polycarpa*) associations. Occupied habitats range from white clay soils on hills immediately west of Little Panoche Road, to rocky outcrops and alluvial slopes experiencing high ground creep rates near ridgelines east of the road. In all observed occurrences on hills, the aspect of greatest *A. polycarpa* cover is southern. This two to three foot tall shrub also attains dominance within several of the ephemerally flooded washes, where sandier soils are more common. It is always the most common shrub canopy contributor near seasonal springs and seeps that exhibit saline character. This habitat is not present on the VFCL, PVS, or on SCRCL.

Two associations within the saltbush shrubland alliance exist on the VRCL: *Atriplex polycarpa - Eriogonum fasciculatum var. polifolium* and *Atriplex polycarpa - Isocoma acradenia var. bracteosa. Atriplex polycarpa - Eriogonum fasciculatum var. polifolium* occurs on slopes, appearing as mainly open ground with scattered shrubs. Shrub canopy closure averages five to 10 percent, with scattered clumps of 20 percent closure. Canopy density is greatest on south-facing slopes, where *E. fasciculatum* is often more prevalent, and on slopes that are steep or slippery enough to exclude grazing. The herbaceous layer is largely absent, resembling barrens (described below) that are often present on adjacent slopes of similar aspect. Native character is thus relatively high, and undisturbed habitat (i.e., ungrazed) is available for potentially occurring rare plant species that are associated with saline soil. *Atriplex polycarpa - Isocoma acradenia var. bracteosa* occurs in the channel bottoms of ephemerally watered washes and very narrowly along the adjacent slope bases. All channels in which this association occurs also hold one or more ephemeral or seasonal springs that exhibit saline character, and exhibit sandy soils that are somewhat atypical of the clay-dominated hill and valley soils of the study area. Shrub canopies are confined to wash edges due to trampling by range cattle, and average cover rarely exceeds 10 percent. The riparian corridor is thus normally rather indistinct in structure relative to the surrounding scrub, but the shift in species is consistent and sharply bounded. It is likely that this association was once and would become more widespread in ephemeral wash habitat in the absence of cattle use. But *A. polycarpa* appears to be highly palatable, and use by livestock in this steep and xeric landscape is concentrated in wash habitats.

2.1.1.5 Juniper Woodlands Alliance

Juniper Woodlands within the study area occur only on north-facing slopes of moderate steepness. Rocky outcrops and talus, which are commonly prominent in the study area's shrublands alliances, are absent from woodlands habitat. Finally, the area's woodlands are rather sparsely treed, and share a common understory assemblage with shrublands (mainly introduced annual grasses), yet are noticeably devoid of a significant shrub layer.

The ecotones with adjacent shrub associations are often visually distinct, appearing as a sudden loss of the tree canopy. Individual *J. californica* rarely exceed 15 feet in height. Girths of up to 20 inches diameter at breast height suggest that most of the trees in all occurrences have aged enough to be called "mature". The tree population structure, furthermore, appears to be skewed toward older trees, and recruitment was not apparent. It is possible recruitment has been excluded by grazing cattle, as the gentler slopes occupied by this association do not exclude cattle use for grazing and shading. It is apparent from old stumps that trees of narrower girth have been harvested. Both occurrences east of Little Panoche Road were clearly larger in extent prior to harvest, and the older fence posts in these areas appear to be rough juniper. This habitat is not present on the VFCL, PVS, or on SCRCL.

The Juniper woodlands alliance is not common, totaling only 68 acres of the VRCL with all occurrences being less than 16 acres. Two associations within this alliance occur on the VRCL: *Juniperus californica - Ephedra californica* and *Juniperus californica - Ericameria linearifolia*. The *Juniperus californica - Ephedra californica* association occupies middle elevations of north-facing slopes. *J. californicus* canopy cover ranges from 5 to 20 percent. The shrub layer is sparse, and is composed of mainly *E. californica*. Subdominant shrubs include *Ericameria linearifolia, Gutierrezia californica, Eriogonum fasciculatum*, and *Artemisia californica*. The herbaceous layer is never dense. It is composed mainly of introduced annual grasses, the same assemblage as found within the shrublands associations that dominate the surrounding landscape. The contrast in the shrub and herbaceous layers of adjacent shrublands and woodland associations is likely due to the presence of the trees. *Juniperus californica* patches are the only significant provider of shade across much of the study area, and so are gathering places for range cattle during much or all of the year. As such, trampling and intensified herbivory appear to be important limiting factors for plants that have not reached escape height. Roosting habitat for birds is provided, and evidence was seen of use by other large mammals such as coyote (evidences of deer were not observed anywhere within the study area). It is likely that, in the absence of grazing use, the association would provide habitats for native plant species that require additional shading. The *Juniperus californica - Ericameria linearifolia* association occupies middle to upper elevations of north-facing slopes. On average, canopy closure does not exceed ten percent. Both diversity and abundance of the shrub and understory assemblages are increased noticeably relative to the closely similar *Juniperus californica – Ephedra californica* association. In all occurrences, *E. linearifolia* achieves higher abundance and cover than other shrubs, including *Ephedra californica*. Greater understory development may be related to the often higher elevation, along with relatively steep slopes occupied by this association, which would tend to limit use by range cattle.

2.1.1.6 Oak Woodlands Alliance

Oak woodlands occupy lower slopes and wash edges with northern aspect. They transition upslope to *Juniper californica* woodlands. The oak woodlands were found in the hills west of Little Panoche Road only. These Oak woodlands alliance can be associated with acorn-processing cultural resources. The terrain within the oak woodlands can be very rough. Steeply banked, tree-shaded gullies were observed to support a higher diversity of native annual and perennial herbs than any other habitat available in the woodlands, shrublands, or grasslands associations of the study area. This greater diversity likely results from cattle exclusion through rough terrain and fencing. The dependable seasonal shading that is provided by dense canopies of *Q. douglasii* (a winter-deciduous oak) creates additional microhabitats not available elsewhere, and generates considerably greater soil organic matter accumulation. Productivity and nutrient cycling functions, support of diversity (including wildlife), and arrest of ground creep (talus, gullies, and slides are common in shrublands) are enhanced by the presence of trees. Oak woodlands are absent from the VFCL, PVS and SCRCL even though oak woodland alliances occur on nearby slopes at similar or higher elevations than the SCRCL.

The *Quercus douglasii - Juniperus californica* association was the only association in this alliance found on VRCL. This association develops the highest tree canopy cover found within the study area, and is starkly evident in the study area's landscape. The association's distribution is limited to two locations mapped with polygons, but each occurrence is relatively large. The occurrence that was mapped at the study area's southwestern corner appears to extend well off-site to the west, and other large examples are visible on Gabilan Range slopes to the west. This woodlands association likely represents the region's most xeric and lowest elevation plant community in which *Q. douglasii* is dominant in this area. One CNPS List four species, Salinas milkvetch (*Astragalus macrodon*), was identified in this alliance.

2.1.1.7 Wetlands and Associated Habitats

Many wetland types occur on the Conservation Lands. However, most hold water during only part of the year. Wetland and associated habitats include: ephemeral spring or seasonal spring, perennial spring, seasonal stream, wash, drainage, three associations*: Salix laevigata - Sambucus nigra* on perennial springs and *Distichlis spicata* and *Distichlis spicata - Isocoma menziesii var. vernoniodes* on ephemeral/seasonal springs, and riparian habitats consisting of three associations: *Populus fremontii* forest, zonal riparian, and tamarix semi-natural shrublands.

Panoche Creek and Las Aquilas Creek run between portions of the Project Footprint but are contained entirely within the VFCL. They are ephemeral creeks that are dry in the summer. Smaller washes and drainages feed these larger creeks. The Project Footprint supports several seasonally flooded pools and stock ponds, predominantly in the northern portion of the Project Footprint along unnamed washes. Habitat for aquatic species and amphibians within the Project Footprint is limited to the few stock ponds and ephemeral pools. The VFCL support seasonal streams, washes, and drainages, all of which are seasonally wet or wet only during rain events.

On the SCRCL, riparian stands associated with seasonally or perennially moist substrates, including seeps, and springs, appear to be very rare and unevenly distributed within the area. Riparian habitats occur along the Panoche and Silver Creeks. It should be noted that the SCRCL were not surveyed during the wet season, therefore, seasonal seeps and vernal pools onsite may not have been identified during the reconnaissance surveys.

Habitats at springs and seeps would typically support plant species that are dependent on a reliable availability of shallow groundwater to survive the annual drought (May-October), and the vegetation extent would be expected to narrowly adhere to the wetted zone. Plant associations adjacent to these resources, however, would also be subject to heavy grazing and trampling, given the historical and ongoing use of SCRCL for raising livestock. No flowing springs were found in an upland setting during the September 2010 survey. Evidence of seep zones that provide ephemeral flows and sustained root zone moisture in an upland setting were found only within one relatively deeply incised canyon near the southern survey edge. At the floor of this canyon, a small area of well-developed episalic crust was found at a clear shift from shrublands to dominance by saltgrass (*Distichlis spicata*). Although not all incised features could be viewed in the available time, areas outside the Silver Creek and Panoche Creek riparian zones appeared to convey little runoff during the 2010 wet season.

Silver Creek riparian vegetation, where it briefly intersects the SCRCL, indicates a seasonally wet, somewhat saline habitat subject to annual or occasional energetic flows. The riparian corridor has become dominated by invasive tamarisk (*Tamarix* sp.), and is classified as Tamarix Semi-Natural Shrubland. Tamarisk has developed semi-open to impassable stands in a 30 to 100 foot wide corridor. The population extends well off-site both upstream and downstream. In this area, saltgrass appears to be the native species most tolerant of the soil salination and groundwater drawdown effects of heavy tamarisk infestation, and often forms meadow-like swards between the tamarisk thickets.

Panoche Creek is a gaining reach as it crosses through the SCRCL. The streambed upstream off the site for at least three miles was observed to be completely dry and largely devoid of plants. Within the surveyed area, this arroyo-like habitat quickly transitions to zonal wetlands characterized by gaseous springs, highly reduced soils, and marsh or meadow vegetation. The Panoche Creek riparian zone, which ranges from 100 feet to 500 feet in width, may provide the only reliable, naturally occurring surface water for much of the year. The dominant plants are consistently arrayed, with vegetation classified as emergent Typha marsh (*Typha* Herbaceous Alliance) centrally, and *Schoenoplectus americanus* mid-marsh (*Schoenoplectus americanus* Herbaceous Alliance) at the outer saturated edge, and *Distichlis spicata* meadow (*Distichlis spicata* Herbaceous Alliance) extending across the moistened to seasonally drying soils at the riparian edge. All riparian zonal alliances within the survey area are patchy, with one or two species at most attaining dominance. Co-occurring with species such as *Frankenia salina* and *Juncus mexicanus*, dominants in these three alliances indicate a somewhat saline and possibly alkaline soil and shallow groundwater environment. Trees are largely absent, as are species adapted to a floating or submerged habitat. A marsh environment that had developed in response to springs with excellent water quality would be expected to support a more diverse assemblage within each alliance, even with pressure from livestock use.

The small area of riparian woodland located south of Panoche Road is, like the *Distichlis* meadow, confined to the first terrace outside the saturated zone. The woodland canopy, classified as a degraded *Populus fremontii* Forest Alliance, reaches about 30 percent closure and includes a significant presence of red willow (*Salix laevigata*) where it is most dense. The stand currently exhibits many mature and dead trees but essentially no recruitment and no understory due to intense livestock use. It is possible that this occurrence, and the marsh and meadow vegetation associated with the Panoche Creek riparian corridor on the SCRCL, are dependent upon annual inputs of relatively fresh water that originate in the upper Griswold Creek and Panoche Creek drainages and serve to flush salts and toxins that accumulate in the topsoil and the plants as evapotranspiration consumes the perennial spring flows.

The VRCL support ephemeral and seasonal seeps and springs, including the *Distichlis spicata* and *Distichlis spicata - Frankenia salina* associations. Ephemeral springs and seasonal springs occurrences are embedded within or adjacent to occurrences of *the Atriplex polycarpa - Isocoma acradenia var. bracteosa* association, at ephemeral and seasonal seeps and springs. Dominants occur patchily and sometimes very densely. All occurrences are associated with drying soils (wet just beneath the surface in June) and a moderate to strong development of an evaporative saline soil crust. *A. polycarpa* growing in this association are invariably stunted by the habitat or by unrelenting cattle browsing. Seasonally wet habitats are otherwise rare in the study area. It is certain that native species diversity is enhanced and maintained within these polygons. Species such as *Mimulus guttatus, Spergularia marina,* and *Sueada moquinii* were found in this limited association and not elsewhere within the study area.

The VRCL also support perennial springs and the *Salix laevigata – Sambucus nigra* association. Three perennial springs intersect the study area near or at its far western edge. All occur in steep, rocky channels at an elevation of about 1,300 feet. Alignment of these springs and of the less persistent seeps in this area suggests fault control of flows. Given the active seismic environment, it is likely expressions of this association are not long-lived in the study area. This hypothesis would be supported by the observations of shrub dominance and general lack of older trees at study area perennial springs. For example, larger willows (*Salix laevigata*) and trees such as Fremont poplar (*Populus fremontii*) that occur at area streams are absent. Native perennial and shrub diversity, however, is greatly enhanced at these features. Cover is multi-layered and approaches 100 percent, providing excellent habitat for wildlife that rely on the surface water.

Ponds constructed to capture any brief flows that do occur such as the ponds observed throughout the hills and valleys on the VFCL and the VRCL, were largely absent from drainages on the SCRCL; two constructed ponds were identified on the SCRCL. Rather, constructed water tanks and troughs for livestock are more common on the SCRCL, as the area appears to be largely devoid of naturally occurring, fresh surface water during the normal dry season.

Vernal pools were located on the VRCL and the VFCL. Reconnaissance surveys on the SCRCL did not locate any vernal pools, however, these surveys were made during the dry season.

2.1.1.8 Mechanically Disturbed and Unvegetated

Areas that have been repeatedly or recently disturbed with resulting devegetation are uncommon on all three Conservation Lands and PVS. Significant disturbance was found only at a few existing farmland structures and in livestock gathering areas that might otherwise support Annual Grasslands vegetation. Roads cross the area very sparsely, and only Little Panoche Road is completely paved while Panoche Road partly paved. Panoche, Little Panoche, and Ytiarte Roads are open to public use.

2.1.2 Rare Plant Populations

No federal or state listed plant species were located during project-level surveys conducted for the PVS. In addition, no federal or state listed plant species were located during reconnaissance-level surveys of the VFCL, VRCL and SCRCL.

Six different non-listed rare or sensitive plant species were observed during the survey of plant associations on VFCL, VRCL, and SCRCL. These included Santa Clara thorn mint (*Acanthomintha lanceolata*) (CNPS Rank 4.2), Salinas milkvetch (*Astragalus macrodon*) (CNPS Rank 4.3), benitoa (*Benitoa occidentalis*) (CNPS Rank 4.3), naked buckwheat (*Eriogonum nudum* var. *indictum*) (CNPS Rank 4.2), serpentine leptosiphon (*Leptosiphon ambiguus*) (CNPS Rank 4.2) and California groundsel (*Senecio aphanactis*) (CNPS Rank 2B.2). Santa Clara thorn mint was found on one talus slope on the western edge of the VRCL where the *Eriogonum fasciculatum* - *Artemisia californica* association was identified. Salinas milkvetch was found within *Quercus douglasii* – *Juniperus californica* woodlands near the northwest corner of the VRCL. The single population of benitoa was located on barrens in the northeast corner of the VRCL. The rare plant species with the greatest number of occurrences was naked buckwheat with 25 separate populations recorded. Populations of this species were found on grassy, north-facing slopes classified here as *Ericameria linearifolia* - *Ephedra californica* association (18 occurrences), Introduced Annual Grasslands association (four occurrences), or *Eriogonum fasciculatum* - *Artemisia californica* (three occurrences). Some populations of naked buckwheat were observed to number in the thousands. The annual serpentine leptisiphon was detected in grassland on the slopes of northwest Panoche Valley on the VRCL. Two populations of California groundsel were located in barrens habitat classified here either as barrens or as a patchy inclusion in Introduced Annual Grasslands near Little Panoche Road.

2.1.3 Invasive Plant Species

As is common through much of central and southern California, numerous invasive plants can dominate the landscape. Grasses such as red brome are the dominant in the non-native grasslands as well as being a component of the shrub communities in many of the other habitat types on the Project. Other invasives, such as *Erodium cicutarium*, are commonly found but are not as devastating to the historic natural landscape as invasive bromes. Invasive plants out compete native species leading to decreased diversity in the habitat, extirpation of some natives, lower quality forage, and, sometimes, increased risk of range fires which can further damage habitats, especially saltbush which do not recover from fire mortality. Many invasive plants are also quick to successional growth giving them an advantage on disturbed habitats where remediation may be desirable.

Of significance in terms of invasive plants is a stand of tamarisk that has developed semi-open to impassable stands in a 30 to 100 foot wide corridor along Silver Creek in the SCRCL. The population extends well off-site both upstream and downstream. Evidence of effects from groundwater drawdown from this species includes soil salination with the native saltgrass forming meadow-like swards between the tamarisk thickets.

2.2 Covered Species

Covered Species are those species which this CMP is designed to conserve and protect in perpetuity. These species are considered extant on all Conservation Lands; several studies have been completed to identify the suitable habitat for each species for each of the conservation areas (Table 2; Figures 7-11). These areas will be the focus for management and monitoring for specific Covered Species while preserving the entirety of the Conservation Lands for all Covered Species (see Appendix A for Species Descriptions). Habitat suitability for three of the Covered Species, BNLL, GKR, and SJKF, was determined by several decision rules which varied slightly for each species based on literature review, occupancy sampling, habitat suitability modeling, and survey results. The location of the CTS mitigation lands was based on 1.2 mile buffers around pond habitat (see Figures 10 and 11). For the remaining Covered Species, SJAS, and CACO, habitat and open space were the primary criteria as supporting on-going long term conservation efforts for these species.

Table 2 Covered Species and Conservation Acreage on VFCL, VRCL, and SCRCL

Species	Federal	State	Conservation Acreage
Blunt-nosed Leopard Lizard	Endangered	Endangered, Fully Protected	11,432
San Joaquin Kit Fox	Endangered	Threatened	14,863
Giant Kangaroo Rat	Endangered	Endangered	16,576
San Joaquin Antelope Squirrel	None	Threatened	24,185[1]
California Tiger Salamander	Threatened	Threatened	3,694[2]
California Condor	Endangered	Endangered, Fully Protected	24,185[3]

[1] For purposes of this table, San Joaquin antelope squirrel suitable conservation acreage is assumed to include all of the Conservation Lands because this species is not slope-limited.

[2] Suitable aestivation habitat on VFCL and VRCL

[3] Entire Conservation Lands acreage is suitable foraging habitat for this species.

2.2.1 Blunt Nosed Leopard Lizard (BNLL)

No BNLL were found within the Project Footprint during the 2013 adult season surveys (May 9 to July 13, 2013). There were a total of 27 observations of BNLL in the VFCL (Figure 12) with the majority of the observations associated with the wash habitat along Panoche Creek. Also included on Figure 12 are the 105 observations of BNLL from previous surveys in 2009 and 2010 (LOA 2010). None of the previous observations are located in the Project Footprint, but are fully located within the Valley Floor Conservation Lands.

The 2013 hatchling and sub-adult season surveys were completed between May 9 and July 13, 2013. There were a total of 13 observations of BNLL made during the surveys (Figure 12). A majority of the observations made during the hatchling and sub-adult season surveys were associated with the wash habitat along Panoche Creek in the VFCL. However, there was one observation of a BNLL hatchling made outside the Valley Floor Conservation Lands. This BNLL hatchling observation was found just north of the Valley Floor Conservation Lands boundary that encompasses Las Aquilas Creek. The project site boundaries were modified to avoid this observation and the area within the avoidance zone was added to the VFCL.

SCRCL were surveyed in September of 2012. Three teams of three biologists surveyed drainages, with one biologist walking within the drainage and two biologists walking on either side of the drainage. It is important to note that during BNLL focused surveys, juvenile BNLL were observed within drainages and on hill slopes. In addition, BNLL were incidentally observed during GKR focused surveys from September 11th through September 21st, 2012. The majority of these observations were not associated with drainages. Thirty-one BNLL were observed during focused surveys for BNLL and 30 were incidental detections during GKR focused surveys. A total of 61 BNLL detections occurred in a two-week period. All BNLL observed were juveniles except for two subadults (Figure 13).

Suitable soil type and vegetation combinations exist on the Valadeao Ranch Conservation Lands to support BNLL populations; although to date, no BNLL have been observed on the VRCLs. This may be more a factor of sub-optimal survey conditions (cool and wet) than an absence of BNLL. In addition, suitable habitat is contiguous within the western and southeastern edges of the Project site. Additional potential habitat occurs throughout the length of Little Panoche Valley (northern portion of the Valadeao Ranch Conservation Lands).

Consultation with USFWS and CDFW determined that the amount of potentially suitable habitat appropriate for mitigation falls within a larger region, which includes undeveloped areas with slopes between 0 and 11 percent that are roughly contiguous with the Panoche Valley floor and contain well drained soils and non-native grasslands, which includes parts of the VRCL, the VFCL, and a large portion of SCRCL. The Applicant has secured roughly 1,485 acres on the VRCL, 2,523 acres of suitable VFCL (including 389 acres of onsite floodplain), and 7,875 acres on SCRCL that have these characteristics, totaling 11,883 acres of suitable habitat Conservation Lands.

2.2.2 Giant Kangaroo Rat

The GKR source populations on the SCRCLs were surveyed in September of 2012. The source populations were originally mapped by Williams et al. (1995). One hundred 50-meter (m) radius plots were surveyed for GKR and active precincts on the Silver Creek Ranch. GKR presence was verified by the presence of presumed scat (larger than 7 millimeters (mm)) and footprints (larger than 47mm), and further verified by the presence of surface pit caches as well as suitable burrows. Active precincts were identified by the presence of scat, footprints, tail drags and surface pit caches. Ninety-nine of the 100 plots surveyed supported GKR. Average density for these plots was 25.66 GKR precincts per plot, with an average of 13.23 per acre. As population densities of GKR on the Silver Creek Ranch within the source population polygons are high and the suitable habitat of Silver Creek Ranch outside of these polygons is moderate, the average density for GKR plots on the Silver Creek Ranch was used for the source population areas. That density estimate was reduced (proportionally to reductions on the Project site and Valley Floor Conservation Lands form high to moderate) to an estimate of 2.63 GKR per acre for the suitable habitat outside of the source populations. These density estimates were used to estimate a population of up to 44,871 individual GKR (Table 3).

Table 3 Estimated Number of GKR On Valadeao Ranch and Silver Creek Ranch Conservation Lands*

Mitigation Site	Average Density of GKR (GKR/acre)	GKR Habitat (acres)	Estimated Number of individuals	Source for Density Estimates
Total Valadeao Ranch CL	0.31	6,830	2,137	Average density of GKR precincts for transects in moderately suitable habitat on the Project site and Valley Floor CL
Silver Creek Ranch CL† (High Suitability)	13.23	2,441	32,294	Average density of GKR precincts for 100 50-meter plots focused in source population polygons identified in the Recovery Plan (USFWS 1998) on the Silver Creek Ranch CL
Silver Creek Ranch CL† (Moderate Suitability)	2.63	4,782.3	12,577	Average density of GKR precincts for 100 50-meter plots focused in source population polygons identified in the Recovery Plan (USFWS 1998) on the Silver Creek Ranch CL reduced proportional to reductions in estimates on the Project site and Valley Floor CLs.
Silver Creek Ranch CL (Total)		**7,223.3**	**44,871**	**The total of the two rows above.**

*Based on empirical data collected in 2009, 2010 and Historical Data. 1992-1995 (Williams et al. 1995), 2009 and 2010 appeared to be relatively good for GKR. Population densities can be 6.6 times lower in poor years.
†Based on empirical data collected in 2012 on the Silver Creek Ranch Conservation Lands within source population polygons previously defined and previously identified in Figure 41 of the Recovery Plan (USFWS 1998).

In addition, a 100 percent coverage survey of the Project Footprint for GKR was conducted and a systematic stratified sampling effort was completed on the Conservation Lands in February and March 2013. Follow-up surveys on the Action footprint were conducted from July 13 to July 15, 2013, to verify or update the status of inactive sites. The survey methodology that was implemented was approved by CDFW and was provided to USFWS prior to start of the survey.

Field surveys used a grid sampling system whereby 30m x 30m grid squares were evaluated for the presence of GKR sign. Grid squares were arranged along north-south running parallel transects. Surveyors visually inspected each grid square for evidence of GKR precincts. Burrow precincts were considered occupied based on presence of scat, tracks, tail-drags, pit caches, fresh excavations, and cropped vegetation around a series of suitably sized horizontal and vertical burrow openings.

Precincts that did not appear to be occupied were also identified and mapped as inactive. Precincts were considered unoccupied when characteristic horizontal and vertical burrow openings and the surrounding area were devoid of all sign (fresh scat, tracks, fresh digging, and cropped vegetation). Evidence of other congeneric species was also noted and recorded as “other kangaroo rat”.

Within the Project Footprint and Valley Floor Conservation Land, the surveyed grid accounted for 100 percent coverage plus a 500-foot buffer (in areas where landowner access was granted). The Silver Creek Ranch Conservation Lands and Valadeao Ranch Conservation Lands were surveyed using the same methodology described above but with wider transects. No buffers were surveyed for the conservation lands since surveyors did not have landowner access outside these areas. Transects were systematically distributed across the Project Footprint and included areas previously identified as high and low suitability habitats in past studies. The Silver Creek Ranch Conservation Lands and Valadeao Ranch Conservation Lands surveys were designed to cover approximately 20-30 percent of the Conservation Lands, therefore, transect spacing was approximately 148 meters.

A total of 48,446 survey grid cells were evaluated for GKR presence; 9,430 grid cells were not evaluated due to lack of landowner access, terrain that was too steep to be safely accessed, presence of bulls or other reasons precluding surveyors from entering the grid cell, or data equipment error. These areas are combined within the cells that are highlighted as “No Data”.

Of the 16,775 total survey grid cells located within the project footprint and the 500-foot buffer study area, approximately 13,825 survey grid cells were able to be evaluated (11,858 within the Project Footprint boundaries and 1,967 within the 500-foot buffer). A total of 296 of these grid cells were observed to be active at the time of the survey (1.8% of evaluated cells). A total of 197 cells within the project footprint are considered active (1.7% of evaluated cells in the project footprint), while 99 cells within the 500-foot buffer were considered to be active (0.5% of evaluated cells in 500 foot buffer). The remaining 2,950 grid cells were not evaluated primarily due to lack of landowner access. These areas are combined within the cells that are noted as “No Data”. Table 4 describes the results of the GKR survey and Figure 14 depicts the results of the GKR survey in the Project Footprint.

Table 4 GKR survey results within the Project Footprint

	GKR Grid Cell Status					
	Active	Inactive	No GKR	Relict GKR	No Data	TOTAL
Project Footprint	197	88	11,572	1	99*	11,957
500-foot Buffer	99	183	1,685	0	2,851	4,818
TOTAL	**296**	**271**	**13,257**	**1**	**2,950**	**16,775**

*No data areas in the project footprint were located along fence line locations along the 500-foot buffer and Valley Floor Conservation Lands. None are wholly within the Project Footprint. The entire Project Footprint area was surveyed during the GKR survey.

Of the 11,190 total survey grid cells located within the Valley Floor Conservation Land study area, approximately 10,001 survey grid cells were evaluated. A total of 896 of these grid cells were observed to be active at the time of the survey (9.0% of the cells evaluated). The 1,189 grid cells were not evaluated primarily due to lack of landowner access based on grazing operations or other restrictions. Table 5 describes the results of the GKR survey and Figure 15 depicts the results of the GKR survey on the VFCL within the study area.

Table 5 GKR survey results within the VFCL

	GKR Grid Cell Status					
	Active	Inactive	No GKR	Relict GKR	No Data	TOTAL
VFCL	896	740	8,364	1	1,189	11,190

VFCL = Valley Floor Conservation Lands

Of the 10,309 total survey grid cells located within the Silver Creek Ranch Conservation Lands study area; approximately 8,211 survey grid cells were evaluated. A total of 1,883 of these grid cells were observed to be active at the time of the survey (23.0% of the cells evaluated). The 2,098 grid cells were not evaluated due to lack of landowner access, terrain that was too steep to be safely accessed, or other reasons precluding surveyors from entering the grid cell. Table 6 describes the results of the GKR survey and Figure 16 depicts the results of the GKR survey on the Silver Creek Ranch Conservation Lands within the study area.

Table 6 GKR survey results within the SCRCL

	GKR Grid Cell Status					
	Active	Inactive	No GKR	Relict GKR	No Data	TOTAL
SCRCL	1,883	1,414	4,914	0	2,098	10,309

SCRCL=Silver Creek Ranch Conservation Lands.

Of the 10,166 total survey grid cells located within the Valadeao Ranch Conservation Lands study area, approximately 6,973 survey grid cells were evaluated. A total of 58 of these grid cells were observed to be active at the time of the survey (1.0% of the cells evaluated). The 3,193 grid cells were not evaluated due to lack of landowner access, terrain that was too steep to be safely accessed, presence of bulls or other reasons precluding surveyors from entering the grid cell. Table 7 presents the results of the GKR survey and Figure 17 depicts the results of the GKR survey on the Valadeao Ranch Conservation Lands within the study area.

Table 7 GKR survey results within the VRCL

	GKR Grid Cell Status					
	Active	**Inactive**	**No GKR**	**Relict GKR**	**No Data**	**TOTAL**
VRCL	58	48	6,866	1	3,193	10,166

VRCL = Valadeao Ranch Conservation Lands

Based on this most current survey information, a map of the active and inactive GKR cells was prepared and larger colonial concentrations were delineated. Four of the larger colony concentrations within the Project Footprint were converted to GKR avoidance areas and added to the Valley Floor Conservation Land (approximately 58% of total active and inactive GKR blocks within the original project footprint). These areas were selected due to the large numbers of concentrated active and inactive GKR precincts, presence of high quality habitat, and direct connectivity to protected lands such as the Valley Floor Conservation Land, SJKF corridor, Valadeao Ranch Conservation Lands, and adjacent BLM landholdings. The summary above takes the move of the avoidance areas to the conservation lands into consideration.

The results of the 100 percent survey were used to generate estimates of the total number of GKR potentially supported in the Project Footprint. It was conservatively assumed that all 197 active cells were located in high quality GKR habitat even though habitat quality in the Project Footprint appears to be compromised over much of the occupied area due to past land use practices. An attempt was made to field verify the density of GKR per active cell, however, based on field conditions (heavy grazing), it was not possible to identify individually clipped precincts within the grid cells. Without performing systematic grid trapping study, it is assumed that each active cell within the Project Footprint is occupied with at least one individual GKR. This resulting assumed minimum density is within the range provided by Williams and above the density predicted by the habitat suitability model (HSM) for the Project.

Using this density estimate for GKR within the Project Footprint, a minimum of 197 GKR are expected to occur within the Project Footprint currently. Typically GKR populations can fluctuate significantly from year to year and within years, potentially leading to a population increase across the Project Footprint outside of the cells identified as active during the survey. A population increase would likely result in occupancy of at least the currently inactive GKR cells found within the Project Footprint. Therefore, a minimum reasonably expected estimate of the population potentially supported within the Project Footprint is 285 individual GKR.

To account for possible increases in density from one year to the next, a potentially higher density should be assumed. Project Footprint densities of GKR are not available in literature. The only colony evaluated in Williams (1992) from the Valley Floor was not trapped and no density estimate specifically for that GKR colony was calculated. In the Panoche region, other density estimates are available for Silver Creek Ranch, the vicinity of Valadeao Ranch, and on the east side of the Panoche Region in the vicinity of Panoche Creek alluvial fan. Of these, the Project Footprint is most likely more similar to Valadeao Ranch than Silver Creek Ranch or Panoche Creek, given the very high quality habitat conditions present on the latter two. Therefore, using the maximum measured density for the Valadeao Ranch area (7.90 GKR/acre), up to 506 GKR may be present within the Project Footprint.

GKR are a species that has periodic population irruptions, resulting in large increases in numbers of individuals and potentially large areas of adjacent habitat becoming occupied over very short time periods. Although these population increases may follow years of favorable precipitation, a direct causative link has not been determined. When these events occur, existing populations can increase greatly. While this type of population increase is an observed phenomenon, predicting the resulting population on a particular area (e.g. Project Footprint) is problematic and not the typical condition.

Although these population increases may follow years of favorable precipitation, a direct causative link has not been determined. When these events occur, existing populations can increase greatly. While this type of population increase is an observed phenomenon, predicting the resulting population on a particular area (e.g. Project Footprint) is problematic and not the typical condition.

2.2.3 San Joaquin Kit Fox

A variety of surveys intended to detect SJKF site use of the Project Footprint and Conservation Lands were conducted during 2009, 2010, 2012, and 2013. A summary of the results of these surveys is included in the following paragraphs.

Scat-sniffing Dog Surveys

Evidence of SJKF on the PVS, and portions of VFCL and VRCL was gathered during scat-sniffing dog surveys conducted by Working Dogs for Conservation. These surveys were conducted onsite between July 30th and August 16th, 2010, walking 33.19 miles (53.42 km) of non-random transects. During these surveys, 52 fresh (< 8 days old) and 311 old scats (> 8 days old) were collected. Individual SJKF mark their territory with urine and feces, as well as use latrines several times per day. The scats collected during these surveys were sent to the Smithsonian to have DNA analyzed. From these scat, 22 separate individual SJKF were identified in the study area of the PVS, VFCL, and VRCL (11 male and 11 female). Nine individuals were located on both the PVS and Conservation Lands, and 13 individuals were located exclusively on the Conservation Lands. As the scat-sniffing dog surveys were conducted at the end of the summer of 2010, the data collected represents a good estimate of the number of individuals occurring in the study area for a good year (the winter of 2009-2010 was a year with high precipitation and 2010 was a year with a high density of prey species).

Scat was collected from up to 35 percent slopes, a slope that is much steeper than typically reported for this species. These results from empirical data defining slope use by SJKF in the local vicinity of the Project site is important to note, as species use landscapes differently in different locations and settings. Studies often report much lower slope ranges in the literature for this species, without defining what slopes were available for use in the study area (i.e., if all slopes in the study area are less than 15 percent, then SJKF use on slopes greater than 15 percent cannot accurately be assessed).

Spotlight Surveys

Spotlighting surveys on the SCRCL have been completed with 20.5 nights of spotlighting producing two to 10 SJKF observations per night. A total of 137 detections of SJKF and 11 detections classified as probable SJKF have occurred to date. It is important to note that kit foxes were detected within drainages, on flat land, on hill slopes, and even on ridges or hills. The SJKF observed on the SCRCL appear to use hills with much steeper slopes than previous literature suggests, which is similar to the results of the scat-sniffing dog surveys on the VRCL.

Camera Trap Surveys

Twenty camera trap stations were set up on the Silver Creek Ranch Conservation Lands, and have recorded SJKF at 17 out of 20 stations. All camera traps were placed at least a half mile from each other. The 17 detections occurred on 119 of 275 trap nights, resulting in approximately 43 percent detection. Individual camera trap detections of SJKF ranged from 0 percent to almost 64 percent detection. Only one station detected two SJKF in the same photo, all other stations detected one individual at a time. As SJKF rarely exhibit unique identifying features, individuals are difficult to distinguish. Therefore, it is not possible to confirm the exact number of individuals that visited any given camera trap location.

SJKF Den Locations

Concurrent with the 2013 GKR surveys all known SJKF den and known SJKF natal den locations were recorded and mapped. A total of 46 SJKF dens were observed within the study area (37 known adult dens and 8 natal dens). **Table 8** presents the results by study area component and Figure 18 shows the locations of these dens within the study area.

Table 8 San Joaquin Kit Fox Den Observations

	Project Footprint	VFCL	SCRCL	VRCL	Total
Known Dens	2	17	7	11	**37**
Known Natal Dens	1	5	1	1	**8**
TOTAL	**3**	**22**	**8**	**12**	**46**

Habitat Suitability

The Project will be preserving over 24,000 acres that benefit the SJKF. However, any lands with greater than 11% slopes were presumed to be less than optimally suitable. This decision was made based on scat-sniffing dog results on the Project site, Valley Floor Conservation Lands, and part of the Valadeao Ranch Conservation Lands. The proportion of lands considered suitable for SJKF was contingent upon the slope values such that, for example, 100% of lands with <11% slopes were considered suitable but only 50% of lands with 11.01-21% slopes was considered suitable. The scale used for ranking is described in **Table 9**.

Table 9 Slope Classes and SJKF Scat

Slope Class	Scats Collected in this Slope Class	Prorated Habitat Suitability Acres	Acres of Land: Acres of Suitable Habitat
0-11%	70%	100% Suitable	1 : 1
11.01-21%	18.5%	50% Suitable	1 : 0.5
21.01-35%	11.5%	25% Suitable	1 : 0.25
>35%	0%*	0% Not Suitable	1 : 0

The Project Footprint contains 2,492 acres of suitable SJKF habitat. The Conservation Lands contain approximately 14,863 acres of suitable SJKF habitat according to this method. It is important to note that the Conservation Lands contain over 24,000 acres that would be managed for and could potentially be used by SJKF.

Valley Floor Conservation Lands located on the southern portion of the Project Footprint would remain intact (undisturbed and unfragmented), thus allowing SJKF to continue to disperse across this portion of the Project Footprint. Additionally, the Valley Floor Conservation Lands incorporated in washes provides for increased connectivity for dispersing SJKF throughout the total Project Footprint.

2.2.4 California Tiger Salamander

A total of 12 ponds are present on the VFCL and the VRCL and just outside these areas (see Table 10 and Figure 19); three ponds are offsite, five are within the VRCL and four are within VFCL. CTS were documented in two ponds (Ponds #3 and #12) and documented historic occurrences in two ponds (Ponds #8 and #9) (see Figure 19); one pond offsite, one on the VRCL, and two within the VFCL. No larvae or adult CTS were detected within the Project Footprint but historically CTS have been documented in the major drainages within the VFCL. Ponds #8 and #9 are no longer considered suitable for CTS, but they will be monitored as will all ponds on these Conservation Lands.

Table 10 Ponds Surveys during Protocol CTS Larval Surveys, March, April, and May, 2010

Location #	Habitat Type	Findings	Dry by Date
01	Stock Pond	Clam Shrimp	Still Hydrated 21 May
02	Old Stock Pond	None	21 May (completely dry)
03	Stock Pond	CTS Larvae	Still Hydrated 21 May
04	2 Stock Ponds	None	21 May (completely dry)
05	Old Stock Pond	None	12 April (completely dry)
06	Stock Pond	None	21 May (completely dry)
07	2 Old Stock Ponds	None	21 April (almost dry)
08	Ephemeral Pool Complex	None	21 May (only 1 pool hydrated)
09	3 New Stock Ponds	None	21 May (only 2 pools hydrated)
10	Ephemeral Pool Complex	None	21 May (completely dry)
11	Old Stock Pond	None	Still Hydrated
12	Stock Pond	CTS Larvae	Drying fast 21 May

The VFCL protect 1,500 acres and the VRCL protect approximately 2,194 acres of suitable aestivation habitat resulting in approximately 3,694 acres of suitable aestivation habitat for CTS. Suitable aestivation habitat is considered grasslands within 6,336 feet of breeding ponds (see hatch on Figure 19). The current status of CTS on the SCRCL is undetermined at this time. No surveys occurred on the SCRCL for CTS; however, at least two manmade ponds support potential habitat. Ponds on the SCRCL will be monitored for at least three years; where CTS are detected; those ponds and associated aestivation habitat will be added to conservation acreage for this species.

2.2.5 San Joaquin Antelope Squirrel

Conditions were suitable for observation of this species during all BNLL surveys and many of the other surveys conducted for Covered Species associated with the PVS and Conservation Lands. A single observation of an SJAS was recorded during GKR surveys on the PVS site. During that same period, one observation was recorded on VRCL and 13 observations were recorded on SCRCL. These observations each represented individual SJAS as they were recorded during a single survey effort. During the BNLL protocol surveys between June and September 2013, SJAS observations were recorded as follows: Project Footprint (30); VFCL (5) and VRCL (14) (Figure 20). Many of these observations that were likely the same individual observed multiple times over the survey period.

SJAS were regularly observed in the more diverse habitats on the VRCL and SCRCL during surveys conducted in 2009, 2010, and 2012 by Live Oak Associates, Inc. (LOA). The entire acreage of the Conservation Lands is considered suitable mitigation for this species. Based on these results, SJAS are expected to occur on the Project Footprint in very low numbers. Three individuals were observed within the Project Footprint during various surveys conducted in 2009, two individuals were detected on the VFCL, and seven on the VRCL during 2010 surveys. The overall population levels of this species on the VFCL and the VRCL is considered low; however, on the SCRCL, SJAS populations are considered high, with hundreds observed throughout most of the SCRCL during 2010 reconnaissance surveys, in addition, 119 were observed incidentally in a two-week period in September of 2012.

2.2.6 California Condor

Although the CACO has not been observed over the site to date, it may pass over and/or forage over the site from time to time. One of the active California condor release sites is located at Pinnacles National Monument in the Gabilan Mountains of San Benito County. Pinnacles National Monument is located approximately 16 flight miles southwest of the Project Footprint. As of May 2013, this population stood at 25 “free-flying” individuals (USFWS 2013). No critical habitat for the CACO has been designated in San Benito County. The California Natural Diversity Database (CNDDB) has no records of the CACO in San Benito County, even though Pinnacles National Monument is an active release site in the county.

No suitable nesting habitat exists on the Project Footprint or Conservation Lands. Although possible foraging habitat may exist on the Project Footprint and Conservation Lands, the CACO has not been observed during other biological surveys onsite (including ongoing golden eagle/raptor use surveys). According to the USFWS, radio-tracking surveys of released California condor have identified this species occurring over the Project Footprint while in flight, likely while foraging.

Aerial nest surveys targeting nesting golden eagles did not identify any potential CACO nests within ten miles of the Project footprint. The Conservation Lands shall provide habitat preservation. VFCL will conserve approximately 2,523 acres of suitable CACO foraging habitat. Conservation Lands on the VRCL and SCRCL will include approximately 10,772 acres and 10,890 acres of suitable CACO foraging habitat, respectively. When combined, Conservation Lands will total approximately 24,185 acres of suitable CACO foraging habitat.

2.2.7 Vernal Pool Fairy Shrimp

One-hundred and twenty-one (121) ephemeral pools were identified within the Project Footprint, which were classified as ephemeral drainages within seasonal drainages (50 features; 1.88 acres), road puddle or roadside ditch (36 features; 0.22 acres), stock pond (5 features; 0.34 acres), trough puddles that were created by livestock around leaky troughs (15 features; 0.13 acres), and vernal pools (15 features; 0.26 acres; Figure 21).

The winter 2010 Protocol Vernal Pool Branchiopod Surveys identified VPFS within the study area in one pool, a small berm pond located along the boundary of Sections 4 and 9. One other pool, created by excavated dirt used for the berm around the occupied pool, was identified as hydrologically connected with the VPFS occupied pool. VPFS were not found in any other potential habitat throughout the project site or the VRCL (Figure 22).

2.2.8 Conservancy Fairy Shrimp

One-hundred and twenty-one (121) ephemeral pools were identified within the Project Footprint, which were classified as ephemeral drainages within seasonal drainages (50 features; 1.88 acres), road puddle or roadside ditch (36 features; 0.22 acres), stock pond (5 features; 0.34 acres), trough puddles that were created by livestock around leaky troughs (15 features; 0.13 acres), and vernal pools (15 features; 0.26 acres; Figure 21).

The 2005 USFWS *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* does not note any extant populations of CFS in San Benito County. The CNDDB has no records of CFS occurring in the Project Footprint or on U.S Geologic Service (USGS) quads or the encompassing quads. No critical habitat for CFS has been designated in San Benito County.

No CFS were observed on the PVSF or the VFCL and VRCL during winter 2010 Protocol Vernal Pool Branchiopod Surveys.

2.2.9 Longhorn Fairy Shrimp

One-hundred and twenty-one (121) ephemeral pools were identified within the Project Footprint, which were classified as ephemeral drainages within seasonal drainages (50 features; 1.88 acres), road puddle or roadside ditch (36 features; 0.22 acres), stock pond (5 features; 0.34 acres), trough puddles that were created by livestock around leaky troughs (15 features; 0.13 acres), and vernal pools (15 features; 0.26 acres; Figure 21).

The 2005 USFWS Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon does not note any extant populations of LHFS in San Benito County. The CNDDB has no records of LFS occurring in the Project Footprintor the encompassing USGS quads. No critical habitat for LFS has been designated in San Benito County.

No LFS were observed on the PVSF or the VFCL and VRCL during winter 2010 Protocol Vernal Pool Branchiopod Surveys.

2.2.10 Vernal Pool Tadpole Shrimp

One-hundred and twenty-one (121) ephemeral pools were identified within the Project Footprint, which were classified as ephemeral drainages within seasonal drainages (50 features; 1.88 acres), road puddle or roadside ditch (36 features; 0.22 acres), stock pond (5 features; 0.34 acres), trough puddles that were created by livestock around leaky troughs (15 features; 0.13 acres), and vernal pools (15 features; 0.26 acres; Figure 21).

The 2005 USFWS Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon does not note any extant populations of VPTS in San Benito County. The CNDDB has no records of VPTS occurring within the Project Footprint or the encompassing USGS quads. No critical habitat for VPTS has been designated in San Benito County.

No VPTS were observed in the PVSF or the VFCL during winter 2010 Protocol Vernal Pool Branchiopod Surveys. However, VPTS were observed in one pool on the VRCL during the winter 2010 Protocol Vernal Pool Branchiopod Surveys.

3.0 Conservation Strategy for the Panoche Valley Solar Facility Conservation Lands

As stated previously, three distinct Conservation Lands have been identified for the PVS Project. These include the 2,523 acres in the VFCL to be Conservation Lands and managed specifically for the Covered Species; the 10,772-acre VRCL and the 10,890-acre SCRCL. This section focuses on the management of the Conservation Lands. Through appropriate land management, monitoring, and adaptive management, as described in Sections 3.3 and 3.4, Conservation Lands will meet conservation goals and objectives.

3.1 Key Elements of Conservation Strategy

The following are the key elements of the conservation strategy for fully mitigating impacts to Covered Species and their habitat associated with the PVS. The Applicant will:

A. Prior to the start of the construction of each phase of the Project, the conservation lands shall be recorded under a biological conservation easement to be preserved in perpetuity with endowments. This will result in the dedication of compensation lands ahead of project activities that require mitigation.
B. Enhance, as noted in Section 3.2, the existing habitat conditions on the Conservation Lands, in order to meet the "fully mitigate" standard of CESA, through a variety of means depending on site-specific needs for Covered Species.
C. Implement enhancement, management and monitoring activities that will benefit the Covered Species.
D. Provide objective and subjective evidence of benefits of Conservation Strategy to Covered Species.
E. Allow for and encourage the use of Conservation Lands for educational and research purposes.
F. Continue current land uses on Conservation Lands and actively manage such activities to protect and enhance Covered Species habitat conditions.

3.2 Conservation Goals and Objectives

The conservation goals are broad, guiding principles for the CMP. The objectives provide direction in management in order to meet conservation goals. The goals and objectives guide the implementation of an adequate and effective conservation program.

Goal 1

Identify, receive approval of, and obtain lands to be conserved as well as establish a conservation easement on lands.

<u>Objective</u>: Provide equal or greater acreage of habitat conserved in perpetuity for Covered Species as required by incidental take documents.

Implementation

The VFCL, VRCL, and SCRCL, totaling 24,185 acres, have been proposed as Conservation Lands for the PVS. Once approved, the lands will be put into conservation easements and/or fee titles transferred to an entity approved by CDFW and USFWS. Approved Conservation Lands will be managed for the benefit the various habitats and species according to this Plan and subsequent activity-specific implementation documents (e.g. agency approved grazing plan). The initial acreage as required pursuant to the ITP and BO issued for the PVS for the mitigation of Phase 1 of the Project, will be recorded in conservation easements prior to commencement of construction; but increases to the size of the managed area can be accomplished incrementally by the start of the planned Phase 2 of construction. In no case will there be a greater amount of Covered Species habitat loss at the solar facility and on Conservation Lands than the total amount of conserved acres divided by the mitigation ratio provided in the federal and state incidental take documents, if such a ratio is required.

If future acreages are conserved incrementally by subsequent conservation easement or title transfer, all measures in this Plan shall be actively incorporated into all activities on such Conservation Lands.

> **Objective:** Ensure that Conservation Lands are managed for the long term benefit of Covered Species.

Implementation

The CMP Agency selected will meet minimum criteria established by CDFW and USFWS for such management agencies. The CMP Agency will be equipped and qualified to fulfill or cause to be fulfilled all habitat management and enhancement, species monitoring, reporting and adaptive management tasks associated with management and protection of Conservation Lands. All management decisions that are not specifically called out in this or other implementation documents will be made with Covered Species and habitat value as the first priority. Reasoning and decisions will be documented in a way to provide justification for all actions being based on the best available science regarding the Covered Species. If published information is not available regarding a certain action, species and subject matter experts will be consulted if available.

Goal 2

Maintain viable, self-sustaining populations of the Covered Species within the identified Conservation Lands.

> **Objective:** Provide for measurable means to determine Covered Species status on the Conservation Lands.

Implementation

The CMP Agency will implement species-specific survey and monitoring tasks to establish current Covered Species habitat use and allow for determination of measurable changes in habitat use (**see Sections 3.4.2.1 and 3.4.2.2**). Survey and monitoring tasks will be designed in a way that allows for tracking of long term trends in Covered Species persistence, habitat use, and population levels on Conservation Lands.

The CMP Agency will implement monitoring and reporting tasks (**see Section 3.4**) that will provide responsible agencies with sufficient information to determine that Conservation Lands are mitigating impacts to Covered Species and their habitat. All management, research and other activities allowed on the Conservation Lands will include documentation of types of measurements used, pre and post-activity measurements and measured net loss or gain to the Covered Species affected.

Goal 3

Fully mitigate impacts to CESA-listed Covered Species by protecting existing populations of Covered Species and improving the conservation value of Conservation Lands for Covered Species.

Objective: Protect existing populations of Covered Species.

Implementation

The CMP Agency and all visitors to the Conservation Lands will implement Covered Species take avoidance and minimization measures (**see Section 3.3**). Avoidance and minimization measures will result in minimizing the exposure of Covered Species to sources of injury and mortality through avoidance buffers, speed limits, and other best management practices intended to protect Covered Species and their habitat. The objective of species specific measures for blunt-nosed leopard lizard will be to comply with the fully protected status afforded that species.

Objective: Maintain and, where possible, increase the habitat value of the Conservation Lands.

Implementation

The CMP Agency will provide and/or contract all equipment and personnel necessary to maintain fencing, access, operations, and other management activities on the Conservation Lands. To directly improve habitat conditions for Covered Species, the CMP Agency will conduct enhancement activities such as trash removal, targeted revegetation/restoration, and grazing management activities in occupied and potential Covered Species habitat that will be in the Grazing Plan and the Habitat Restoration and Revegetation Plan. Other Conservation Lands (e.g., riparian habitat) will be evaluated and enhancement projects conducted to benefit the overall ecological functions on the Conservation

Lands. Cattle exclusion and riparian restoration would be examples of these activities. All of these activities will improve the existing habitats in a way that benefits Covered Species and, incidentally, other wildlife.

Objective: Control invasive species that are identified as a threat or potential threat to Covered Species.

Implementation

The CMP Agency will implement removal/eradication measures (e.g. selective herbicide) to reduce the extent of tamarisk and other invasive plants rated as "high" by the California Invasive Plant Council for which effective eradication methods have been established.[1] In addition, should Covered Species monitoring indicate that feral pig habitat damage is negatively affecting directly or through habitat impacts, the CMP Agency will consult with CDFW to establish feral pig control measures on candidate Conservation Lands. Any such program will be subject to all take avoidance and minimization measures contained in this CMP and any additional measures deemed necessary to adequately protect Covered Species (e.g., timing, general location of activities, etc.).

Goal 4

Influence long-term survival and recovery of Covered Species through contributing to published recovery goals and supporting research.

Objective: Contribute to recovery goals (USFWS 1998) for BNLL, SJKF, GKR, and SJAS through land preservation and research.

Implementation

Implementation of the CMP will result in conservation, management, and enhancement of 24,185 acres that are part of the regional Panoche Natural Area targeted for several recovery actions in the "Recovery Plan for Upland Species of the San Joaquin Valley" (USFWS 1998). Specific recovery tasks that the CMP would contribute to include:

- *Protect natural lands in the Ciervo-Panoche Natural Area* (Priority 1; Tier 2 – Task 2.1.14);
- *Protect grass and shrubland communities on western Valley edge, Santa Nella to Panoche Creek* (Priority 2; Tier 4 – Task 5.3.4).
- *Conduct censuses for kit fox and monitoring for multiple animal species in the Ciervo-Panoche area* (Priority 2; Tier 4 – Task 4.38);

[1] **High** - These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically (CIPC 2013).

- Access for survey, census, demographic, and other studies (Multiple species; various tasks);

Objective: Provide opportunities for access and education regarding Covered Species and regional ecology.

Implementation

The CMP Agency will establish access procedures and identify portions of the Conservation Lands suitable for research and education (see Section 3.3.5.6). Resources of interest to the public (no general public access) will be identified and limited access to groups will be supervised by the CMP Agency or its designees. Only individuals who are familiar with sensitive habitat locations and required take avoidance and minimization measures will be permitted to lead members of the public who are not qualified biologist, researchers, and etc.

3.3 Conservation Lands Management and Enhancement

3.3.1 Overview

The Conservation Lands have been grazed historically for over 100 years. Grazing will continue once the lands are designated as Conservation Lands and will be utilized as a land management tool for management of vegetation and fuels management for the Covered Species in perpetuity. Grazing operations will include herding, watering, animal care, maintenance and/or repair activities associated with cattle, sheep, horse or other livestock operations, existing and future surface and subsurface utilities (e.g. livestock watering structures), and maintenance and creation of existing roads or future roads all within the guidelines stipulated herein on Conservation Lands. All Conservation Land enhancement, management and monitoring activities will be subject to the stipulations contained in this section as well as the ESA BO and CESA ITP issued for the PVS, here incorporated by reference. Some of these measures will affect the way tasks are carried out.

3.3.2 Implementation of Management Goals and Objectives

The overall management goal of the Conservation Lands is to maintain viable, self-sustaining populations of the Covered Species within the identified Conservation Lands and, where feasible, enhance the habitat values within the Conservation Lands for SJKF, BNLL, GKR, CTS, and other listed species while maintaining grazing practices on the properties.

3.3.3 Covered Species Protection

Baseline surveys of the Conserved Lands will be conducted to provide measurements against which future activities can be compared. During these baseline surveys, incidental observations of common species will be documented to assess general impacts of management activities and reduce these where possible. Existing biotic habitat distribution data will be used as a baseline for planning future management decisions, revegetation needs, future habitat evaluations, and etc.

Location information from all surveys for Covered Species will be maintained and used for reference when planning future management activities. All take avoidance, minimization and mitigation measures contained in the BO and ITP issued for the PVS will be adhered to.

Ongoing surveys for Covered Species will be scheduled at regular intervals (See Section 3.4.2) to continually update location information, population sizes, property use and range and provide a feedback mechanism for management decisions.

Recovery plans for Covered Species, agency status reports, agency personnel and/or Covered Species experts will be consulted when making management decisions on the Conservation Lands. Wherever possible, the goals of the Recovery Plans will be supported on the Conservation Lands. This includes access for research and education.

The CMP Agency will strictly enforce implementation of take avoidance, minimization, and mitigation measures policy for all Covered Species. The following measures from the BA will be implemented at a minimum:

General Avoidance and Minimization Measures

1. The CMP Agency will implement the following best management practices (BMPs) in order to minimize potential impacts on Covered Species. Many of these measures are also described in the Final Environmental Impact Report (FEIR). The Conservation Lands shall have biological monitors on the lands throughout potential disturbance activities.
2. Before commencing disturbance activities on the conservation lands, the CMP Agency will submit to CDFW and USFWS the name, qualifications, business address, and contact information of one or more Designated Biologist(s) for the Conservation Lands. The CMP Agency shall ensure that each Designated Biologist is knowledgeable and experienced in the biology, and natural history of the Covered Species on the Conservation Lands. The Designated Biologist(s) shall be responsible for monitoring any disturbance activities to help minimize or avoid the incidental take of individual species and to minimize disturbance of Covered Species' habitat. The Designated Biologist may appoint biological monitors to perform biological surveys or provide oversight of ground disturbing activities as needed. All biological monitors that work on the Conservation Lands will receive instruction from and report to the Designated Biologist(s).
    a. Prior to surface disturbance that could adversely impact Covered Species, a Designated Biologist shall conduct a Covered Species education program (tailgate briefing) for all personnel, which familiarizes the CMP Agency's employees and contractors with occurrence and distribution of Covered Species in areas impacted by the activities; take avoidance measures being implemented; BMPs; reporting requirements if incidental take occurs; and applicable definitions and prohibitions under the CESA and other measures regarding federal and state listed species. This program is designed to ensure all personnel who work on the Conservation Lands are aware of and can identify the federal and state listed species and the measures implemented to protect these species. In addition, contact names and numbers are given to which personnel can report

incidents regarding federal and state listed species. An employee environmental awareness program will be administered to all new employees and to all other employees every two years. Upon completion of the program, the employees are given a badge that is required for admittance onto the Conservation Lands. Badges will include the employee's picture and will be color-coded and dated in order to show that the employee is current with required training.

3. All activities that will result in permanent or temporary ground disturbances shall be preceded by a survey conducted by a Designated Biologist(s) or their representative. The biologist(s) shall identify and clearly mark the location of areas where Covered Species were identified, and dens or burrows and habitats of Covered Species that are to be avoided. Appropriate buffers will be established with highly visible markers. When burrows or dens are to be damaged, a Designated Biologist will determine when excavation procedures should be employed to protect individual Covered Species and when it is not necessary. If relocation is permissible, then the appropriate relocation plans will be followed.
4. A Designated Biologist(s) or their representative shall be present while ground-disturbing activities are occurring. In addition to conducting activity surveys, the biologist(s) shall aid crews in satisfying take avoidance criteria and implementing mitigation measures; will document all pertinent information concerning Action effects on Covered Species; and shall assist in minimizing the adverse effects of the activities on Covered Species.
5. Designated Biologists and biological monitors are empowered to order cessation of activities if take avoidance and/or mitigation measures are violated and will notify the CMP Agency immediately.
6. Unless Designated Biologist(s) allow alterations to routes, all activity vehicles shall be confined to designated roads or prominently staked and/or flagged access routes that are surveyed prior to use. All observed Covered Species and their habitat features such as dens, burrows or specific habitats shall be flagged as necessary to alert activity personnel to their presence. All Project-related flagging shall be collected and removed after completion of activity.
7. Designated Biologist(s) shall keep an accurate tally of the number of sensitive resources (as listed above) that are damaged or otherwise affected by activities. Additionally, biologist(s) shall estimate the number of small mammal burrows damaged or otherwise affected. Total number of dens and burrows affected by the activity shall be reported in the post-activity compliance report and entered into a central database developed expressly for that purpose.
8. If the activity is being carried out by a contractor or entity other than the CMP Agency, the contractor shall appoint a company representative who will be the contact source for any employee or contractor who inadvertently kills or injures a Covered Species or who finds a dead, injured, or entrapped Covered Species. The representative will be identified during the pre-performance educational briefing.
9. Any contractor, employee(s), or other personnel who inadvertently kills or injures a Covered Species shall immediately report the incident to their representative. The representative shall contact the environmental representative and the Designated Biologist(s). The Designated Biologist activity will contact CDFW and/or USFWS immediately in the case of a dead, injured, or

entrapped Covered Species. The CDFW contact for immediate assistance is State Dispatch at (916) 445-0045. State Dispatch will contact the local warden or biologist. The biologist will also document all circumstances of death, injury or entrapment of Covered Species. The biologist will: 1) take all reasonable steps to enable the individual animal to escape should it be entrapped; 2) contact CDFW, USFWS or other appropriate authorities to identify an approved rehabilitation center and appropriate capture and transport techniques should the Covered Species be injured; and 3) document circumstances of death in writing and if possible photograph the dead animal in situ prior to moving (the animal will only be moved with permission from the applicable agencies).

10. CDFW and/or USFWS shall be notified in writing within two working days in the event of an accidental death or injury of a Covered Species or of the finding of any dead or injured Covered Species. Notification shall include the date, time, and location of the incident or of the finding of a dead or injured animal, and any other pertinent information. The CDFW contact information is 1416 9th Street, Sacramento, California, 95814, and (916) 654-4262. The USFWS contact information is Ventura Fish and Wildlife Office, 2493 Portola Road, Suite B, Ventura, California 93003.
11. To prevent inadvertent entrapment of Covered Species all excavated, steep-walled holes or trenches more than two feet deep, or of any depth if they contain water or other material, with plywood or other barrier materials or provided with one or more escape ramps constructed of earth fill or wooden planks (wooden planks should be more no less than 10 inches in width and should reach to bottom of trench) at the close of each working day such that animals are unable to enter and become entrapped. Before holes or trenches are filled, a biologist (s) shall inspect them for trapped animals. If any worker discovers that Covered Species have become trapped, construction activities shall cease in the vicinity of the trapped animal and notify the Designated Biologist(s) or their representative immediately. Workers and the biologist(s) shall allow the Covered Species to escape unimpeded if possible, or the biologist(s) determines that activities are allowed to continue. If an injured Covered Species is discovered at any time, the Designated Representative shall contact the USFWS and CDFW.
12. All spills of hazardous materials shall be cleaned up immediately in accordance with a Spill Prevention Control Plan.
13. Pets are prohibited at the Conservation Lands with the exception of working dogs. Working dogs that assist ranchers are not considered pets. Any working dog entering the Conservation Lands will be required to provide proof of inoculations to prevent disease transmission..
14. All food-related trash, such as wrappers, cans, bottles, bags, and food scraps shall be disposed of daily in containers with secure covers and regularly removed from the activity site.
15. Use of rodenticides and herbicides in areas impacted by the activity will be restricted to use within the prescriptions of the Noxious Weed and Invasive Plant Control Plan. Herbicides used for noxious weed control would be applied in accordance with BLM-approved procedures and other federal and state regulations. Applications will be applied by licensed applicators in accordance with label directions and other restrictions mandated by U.S. Environmental

Protection Agency, County Agricultural Commissioner, regional label prescriptions on use, California Department of Food and Agriculture, and other state and federal legislation.

16. The width of motorized vehicle movement will be limited to 25 feet during activities when driving in occupied Covered Species habitat.
17. Appropriate measures shall be undertaken to prevent unauthorized vehicle entry to off-road survey routes in sensitive habitat areas. Signage will be the preferred method to discourage use.
18. Necessary activity vehicles shall be confined to existing roads and construction roads.. Vehicle travel is not permitted off of designated transportation routes, except in the case of emergency. A day-time speed limit of 15 miles per hour (mph) and a night-time speed limit of 10 mph will be adhered to on the Conservation Lands and activity personnel will not exceed 25 mph on public roads in the vicinity of the Conservation Lands.
19. Upon completion of any authorized activity, all areas that are significantly disturbed and not necessary for future use, shall be stabilized to resist erosion, and revegetated and re-contoured if necessary, and will follow goals and methods in the Habitat Restoration and Revegetation Plan to promote restoration of the area to activity conditions.

Species-Specific Avoidance and Minimization Measures

In addition to the general conservation measures described above, Covered Species conservation measures during activities associated management and development of the Conservation Lands as described below.

California Tiger Salamander

1. CTS Surveys. The Designated Biologist(s) or their representative shall survey the activity work site before the CMP Agency begins any ground disturbing activities. If the Designated Biologist(s) finds any life stages of CTS (adults, eggs, or larvae) the Designated Biologist(s) shall relocate the life form to suitable habitat that is being preserved. The Designated Biologist(s) shall hold the appropriate state and federal Scientific Collecting Permits (SCPs) for amphibians to be authorized to capture and handle CTS, if necessary. The Designated Biologist(s) may be assisted by approved biologists that do not have an SCP; these biologists shall be identified as Biological Monitors.
2. CTS Exclusion Fencing. The CMP Agency shall place CTS exclusion fencing around the activity footprint for any construction activity taking place within 1.2 miles of potential or known CTS breeding sites prior to the rainy season before construction begins and around temporary construction ponds. Prior to the installation of the exclusion fencing, the activity will be preceded by a preconstruction survey conducted by a Designated Biologist or their representative. The CMP Agency shall maintain the CTS exclusion fencing throughout the first rainy season prior to construction activities and throughout all construction activities on the conservation lands. The CMP Agency shall use wildlife fencing equipped with one-way exits every 250 to 500 feet to avoid entrapment of amphibians inside the fence. The CMP Agency shall bury fencing to a depth of six inches and fencing shall be a minimum of 30 inches above grade following installation. CTS exclusion fencing can be designed to work to exclude other species as well. Care should be taken in exclusion fencing design should livestock be expected to

be adjacent to the fencing. Entranceways to the activity construction areas shall be minimized as much as possible and shall be equipped with a gate that can be placed across the entranceway at the end of each working day, which would prevent CTS from entering the site. The CMP Agency shall avoid small mammal burrows to the extent possible during installation of the exclusion fencing. The exclusion fencing will be removed after the completion of construction or may be removed at the end of the rainy season if the activity within 1.2 miles of a known or potential breeding pond will be completed prior to the following rainy season.

3. CTS Relocation Plan. If a CTS is observed, the permitted Designated Biologist(s) will place the CTS into a suitable bucket or insulated cooler in the shade with a wetted sponge and an ice pack wrapped in a clean cloth (if required) to mimic subterranean conditions. The biologist will then immediately record the biologist's name, date, time, and CTS location using a handheld GPS and digital camera. The sex, age, condition, diagnostic markings, and the general condition and health of each CTS observed will also be recorded and photographed. The CTS will be released into a suitable burrow as close to the activity site as possible and as quickly as possible with a time out of the ground not to exceed one hour.
4. If a dead or injured CTS is located during the construction activities, the USFWS and CDFW will be contacted immediately and the CMP Agency and Designated Biologist(s) will follow direction from these agencies for the next steps to take. Finally, the actions undertaken and the habitat description and location of where the CTS were found and where the CTS were relocated will also be recorded and photographed. All of the above information and any field notes will be submitted to the USFWS and the CDFW. In addition, this information will be recorded in a CNDDB report and the Conservation Lands Monitoring Report and submitted to the CDFW.
5. Open Trenches. All open holes, sumps, and trenches within the areas impacted by a activity will be inspected at the beginning and end of each day for trapped animals during the rainy season. The CMP Agency shall provide earthen or wooden (at least 10 inches in width) escape ramps of no more than 3:1 slope every 250 to 500 feet.
6. Rain Forecast. The Designated Biologist(s) or their representative shall monitor the National Weather Service 72-hour forecast for areas impacted by a activity. A rain gauge shall be installed at the activity site and monitored and refreshed every morning. If rain exceeds 0.25 inches during a 24-hour period, the CMP Agency shall cease work (including construction-related traffic moving though areas except on public roads) within 1.2 miles of potential or known breeding ponds until no further rain is forecast. In areas within 1.2 miles of potential or known breeding ponds that have been encircled with CTS exclusion fencing (can include structures to permit one-way movement of CTS off the activity work site), the activity may continue during rain events. If the activity must be completed at night, in the rain, within the exclusion fencing, the Designated Biologist(s) shall monitor all activities for CTS.
7. Night Work. The CMP Agency shall restrict night work in areas within 1.2 miles of potential or known CTS breeding sites when a 70 percent or greater chance of rainfall is predicted within 48 hours of the activities that have not been encircled with exclusion fencing until no further rain is forecast. However, even after salamander exclusion fencing is installed, this condition still applies to traffic moving though areas within 1.2 miles of potential or known CTS breeding sites

but outside of the CTS exclusion fencing (e.g., on roads). If work must be completed at night, in the rain, within the exclusion fencing, the Designated Biologist shall monitor all activities for CTS.

8. Soil Stockpiles. The CMP Agency shall ensure that necessary soil stockpiles are placed where soil will not pass into potential CTS breeding pools or into any other “Waters of the State," in accordance with Fish and Game Code 5650. The CMP Agency shall appropriately protect stockpiles to prevent soil erosion.
9. Barriers to CTS Movement. Any roadways that the CMP Agency needs to construct within 1.2 miles of known or potential CTS breeding sites shall be constructed without steep curbs, berms, or dikes, which could prevent CTS from exiting the roadway.
10. Fieldwork Code of Practice. To ensure that disease is not conveyed between activities areas in aquatic habitats, all activity personnel shall follow the fieldwork code of practice developed by the Declining Amphibian Populations Task Force Fieldwork Code of Practice; the Designated Biologist(s) may substitute a bleach solution (0.5 to 1.0 cup of bleach to 1.0 gallon of water) for the ethanol solution. Care shall be taken so that all traces of the disinfectant are removed before entering the next aquatic habitat.

Giant Kangaroo Rat

The GKR avoidance and minimization measures below will be utilized during management activities conducted on the Conservation Lands.

1. Prior to construction activities, a pre-construction survey for GKR will occur in the area of work. If GKR sign is observed within the area of work, exclusion fencing will be erected around the area of work and saturated with traps to capture GKR and relocate them off-site per the Giant Kangaroo Rat Relocation Plan (appendicies of the BA). Exclusion fencing will be buried deep enough in the ground to prevent GKR from digging under and high enough to prevent them from jumping over. Exclusion fencing may be designed to exclude multiple species. Special care should be taken in exclusion fence design if livestock are adjacent to the activity site. Prior to the installation of the exclusion fencing, the activity will be preceded by a preconstruction survey conducted by a Designated Biologist or their representative. Construction will not commence in the area of exclusion fencing until that area has been completely trapped and no more GKR are expected to use the area as determined by the Designated Biologist(s). At the end of trapping, no GKR should remain within the fenced area.
2. Prior to surface disturbance or other covered activity, a Designated Biologist(s) or their representative shall conduct a listed species education program (tailgate briefing) for all activity personnel.

San Joaquin Kit Fox

1. Additional SJKF avoidance and minimization measures that will be utilized during management of the Conservation Lands of the Action are described below and in the appendices of the BA.
2. Prior to any construction activities, pre-construction surveys shall occur and any potential SJKF den (burrow size of four inches or larger) shall be avoided from direct impact. A biologist(s) shall monitor the SJKF den during construction activities and the den should be avoided by

construction personnel. If a road is to be installed near a den, speed limits of 10 mph will be implemented near the den. Any construction materials will be stored in a manner as to minimize the potential for SJKF to use the material for a den.

3. All new fencing will follow the fencing design recommendations in Section 3.3.5.1 #1, below.
4. If avoidance of known dens is not possible, the CMP Agency will take the following sequential steps when working in such areas:
    a) Allow for three consecutive days of monitoring to determine the occupancy status of each den. Activity at the den shall be monitored by using tracking medium at the entrance to the den or stationary infrared beam cameras, and by spotlighting. If no activity is observed actions described below under Step 3 may be implemented. If SJKF activity is observed the den shall be monitored for an additional five days from the date of observance. Use of the den during this time can be discouraged by partially plugging its entrance(s) with soil in such a manner that any resident animal can escape easily. If SJKF are still present after five days, den excavation, discussed below under Step 3 may proceed when, in the judgment of the qualified/approved biologist, it is determined temporarily vacant.
    b) Once the SJKF has vacated the den, methods (e.g., one way doors) shall be taken to prevent reentry to the burrow by SJKF (and other mammal species) until construction is complete in these areas. Once construction activities are complete access to the burrows shall be restored.
    c) Once it has been confirmed that the dens have been vacated, if construction related impacts would result in the crushing or destruction of the den, the den shall be excavated. Excavation shall be done only by hand and under the direct supervision of a biologist, removing no more than four inches at a time. If at any time during excavation a SJKF is discovered inside the den, all activity will cease immediately and monitoring described above under Step 1 (above) shall be resumed. As indicated above, natal dens shall not be disturbed at any time.
5. Potential SJKF dens that cannot be avoided may be excavated and back-filled pursuant to USFWS guidelines (USFWS 2011) without prior notification, provided that excavation is approved and supervised by a biological monitor or the Designated Biologist(s). Destruction of all SJKF dens shall be reported in the post-activity compliance report.

Vernal Pool Fairy Shrimp, Conservancy Fairy Shrimp, Longhorn Fairy Shrimp, and Vernal Pool Tadpole Shrimp

1. Prior to construction activities on the Conservation Lands, BMPs (such as use of silt fencing, hay bales, etc.) outlined in a site/activity-specific Stormwater Pollution Prevention Plan, will be implemented to limit erosion and sediments from entering vernal pool habitat. Additionally, a 100-ft buffer will be placed around all occupied vernal pools that could be inhabited by Covered Species to prevent equipment from inadvertently entering these pools. Additional activity avoidance and minimization measures for the VPFS are located in Appendix A of the BA.

Blunt-nosed Leopard Lizard

1. The avoidance and minimization measures, noted below and in Appendix E of the BA, are intended to avoid take of individual BNLL during management of Conservation Lands. All activity personnel and contractors working on the Conservation Lands will implement these measures.
2. Prior to initiation of any ground disturbing activities, a Designated Biologist(s) shall conduct a BNLL education program (e.g., tailgate briefing) for all activity personnel. Topics to be discussed during the briefing shall include: occurrence and distribution of BNLL in the area of the activity, take avoidance measures being implemented during the activity, reporting requirements if an incident occurs, and applicable definitions and prohibitions under the Fish and Game Code for fully protected species, and relevant provisions of the federal and state Endangered Species Act.
3. A pre-construction survey within 30 days of construction will be conducted by a Designated Biologist(s) or their representative. The biologist(s) shall identify and clearly mark the location of areas where any BNLL were observed.
4. A Designated Biologist(s) or their representative shall be present while ground disturbing activities are occurring. In addition to conducting pre-construction surveys, the biologist(s) shall aid crews in satisfying take avoidance criteria for BNLL and implementing mitigation measures.
5. Designated Biologist(s) are empowered to order cessation of activities if take avoidance and/or mitigation measures are violated and will notify the CMP Agency's environmental representative.
6. If a BNLL is subsequently identified within the activity footprint during construction, the CMP Agency use an exclusion barrier material described above and pertinent signage to separate the BNLL from the construction activities. All work will cease in this exclusion area, the biologist will monitor the individual BNLL, and the exclusion fencing will be installed under the supervision of a qualified biologist. The animal will be allowed to freely leave (i.e., passive relocation with no harassment or chasing) the excluded area through installation of a one-way, 100-foot wide movement corridor (consisting of exclusion barrier material) leading to known habitat or designated buffers outside of the established perimeter exclusion fence.
7. One-way gateways, installed at the perimeter exclusion fence, will allow movement of the animal from the corridor into the protected habitat area. Surveys, in the corridor, will be conducted by the Designated Biologist(s) or their representative (i.e., 24/7 if needed) until the individual BNLL is no longer observed inside the corridor (i.e., no evidence of the BNLL for 30 days dependent upon the discretion of the monitoring biologist). A step-by-step procedure, for the activities mentioned above, will be written and provided to the agencies for review. This procedure will include the monitor observing the BNLL until the temporary exclusion fencing is installed. The surveys, in the exclusion area, will occur when temperatures are sufficient for the BNLL to be above ground and visible (i.e., 25° Celsius -35° Celsius).
8. Unless Designated Biologist(s) allow alterations to routes, all activity related vehicles shall be confined to defined access routes that will be staked and/or flagged. All observed BNLL shall be avoided by a temporary flagged buffer to alert activity personnel to their presence. All activity-related flagging shall be collected and removed after completion of the activity.

9. The CMP Agency shall appoint a representative who will be the contact source for any employee or contractor who inadvertently kills or injures a BNLL or who finds a dead, injured, or entrapped individual BNLL. The representative will be identified during the pre-performance educational briefing.
10. Any contractor, employee(s), or other personnel who inadvertently kills or injures a BNLL shall immediately report the incident to their representative. The representative shall contact the CMP Agency's environmental representative and the Designated Biologist(s). The CMP Agency will contact CDFW and USFWS immediately in the case of a dead, injured, or entrapped BNLL. The CDFW contact for immediate assistance is State Dispatch at (916) 445-0045. State Dispatch will contact the local warden or biologist. The USFWS contact for immediate assistance is (805) 644-1766. The Designated Biologist(s) will document all circumstances of death, injury or entrapment of BNLL. The biologist will: 1) take all reasonable steps to enable the individual animal to escape should it be entrapped; 2) contact CDFW, USFWS, or other appropriate authorities to identify an approved rehabilitation center and appropriate capture and transport techniques should the covered animal be injured; and 3) document circumstances of death in writing and, if possible, photographing dead animal in situ. Notification shall include the date, time, and location of the incident or of the finding of a dead or injured BNLL, and any other pertinent information. The USFWS contact for this information is the Endangered Species, Program Field Office, 2493 Portola Rd., Suite B, Ventura, California 93003. The dead Covered animal can be transported to California State University at Bakersfield or the Endangered Species Recovery Team in Bakersfield, California for storage and research if CDFW and USFWS approve.
11. To prevent inadvertent entrapment of BNLL, all open holes, steep-walled holes, or trenches more than two feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks (wooden planks should be no less than 10 inches in width and should reach to bottom of trench). Before such holes or trenches are filled, they should be thoroughly inspected for trapped animals.
12. Motorized vehicles will be allowed on existing roads in the Conservation Lands within occupied BNLL habitat.
13. A speed limit of 10 mph will be observed during the period when BNLL could be active (approximately March 15 to October 15, depending on temperature) as determined by the Designated Biologist(s).

3.3.4 Habitat Disturbance

No permanent structures, pads, roads, or other facilities shall be permitted within the Conservation Lands, except as provided for below:

1. Existing facilities will remain and upkeep, maintenance, and repair of those facilities will be allowed, provided that all take avoidance, minimization, and mitigation measures regarding Covered Species are implemented.
2. Limited wildlife viewing platforms may be constructed when all Covered Species avoidance and minimization measures can be met as determined by the Designated Biologist(s).
3. Proposals to construct roads deemed necessary to cross the Conservation Lands for any purpose, including providing access to adjacent landowners, shall be submitted to the CDFW and USFWS for review and approval prior to initiation of grading and construction. Any mitigation deemed necessary for the construction of new roads will be determined through discussions between CDFW and the USFWS. All measures discussed above shall apply before and during the construction of any new roads as well as to the future repair or maintenance of these roads or any existing roads, except in the case of an emergency.

3.3.5 Management Strategies

The following sections describe in a general way how the Conservation Lands will be maintained to ensure protection and enhancement of habitat and wildlife. Specific requirements for maintaining the Conservation Lands will be included in but not limited to the Grazing Plan, the Habitat Restoration and Revegetation Plan, the Noxious Weed Control Plan, and the Habitat Mitigation and Monitoring Plan.

3.3.5.1 Habitat Protection and Enhancement

Management actions that protect, maintain, and enhance Conservation Lands and corridors between habitat areas on and between the VFCL, SCRCL, and VRCL will create a Conservation Lands system that complements and provides important linkages to other protected lands (e.g., adjacent BLM lands), lands supporting Covered Species and regional conservation efforts. The following shall be implemented to protect and enhance Conservation Lands to benefit Covered Species:

1. The perimeter of the Conservation Lands shall be or remain fenced to exclude unauthorized access. If new fencing is need to be installed, fencing will be designed with at least three-strand barbed wire with a fourth (bottom) strand of smooth wire at least 8 inches above the ground and shall be consistent local BLM guidelines. This fencing design will reduce potential injury to wildlife while clarifying Conservation Land boundaries to the public. Signs shall be placed on boundary fencing adjacent to public roads or property accessible by the public at 150 foot intervals indicating that entry without access permission is prohibited and the lands are protected.
2. Litter and illegally dumped wastes shall be removed from the property within the first year of establishing the conservation easement and at least on an annual basis thereafter. The initial cleanup areas will include at least the sites identified during the initial baseline survey (see Section 3.4.2.1.

3. Any areas where human disturbance already exists that are not needed for long term maintenance, landowner access, grazing activities, etc. will be restored in such a way as to blend the area into the surrounding habitat. A revegetation specialist with experience restoring western San Joaquin Valley plant communities will assess individual sites to determine restoration methods and appropriate planting procedures and species. If restoration is determined to be warranted, methods will follow the Habitat Restoration and Revegetation Plan.
4. Actions that facilitate regional connectivity for the Covered Species through enhancement of corridors and connected portions of the Conservation Lands will be implemented. Implementation shall include: a) habitat enhancement and restoration of former agricultural lands within the Conservation Lands, and b) minimization of new roads and facilities near “pinch points” in the connected Conservation Lands and adjacent protected properties.
5. Provide, on average over the long term, a sufficient population level of Covered Species to mitigate for the numbers lost from construction of the PVS. When needed, enhance habitat to increase population levels as described below which are at minimum the number lost from the construction of the Project.

3.3.5.2 Livestock Grazing Management

As part of the beneficial habitat management for Covered species, livestock (cattle, sheep, horses, and etc.) will continue to graze on the Conservation Lands under new grazing agreements. Conservation Lands grazing practices will be managed to benefit the Covered Species noted in the CMP. A mandatory Grazing Plan will be created in coordination with a range management specialist. The Grazing Plan which will be fully implemented will include at least the following:

1. Methods for identifying and protecting sensitive, rare and listed plants as well as riparian and wetland areas as well as stream corridors.
2. Provide opportunities for using results of Covered Species monitoring and research efforts to periodically adjust grazing practices to benefit Covered Species.
3. Acknowledge procedures for excluding grazing or possible re-initiation of grazing for habitat management for Covered Species in habitat restoration areas, stream corridors, and sensitive wetland areas.
4. Portions of the Conservation Lands where livestock grazing levels have resulted in wind and water erosion shall be identified for management actions to reestablish natural communities that will benefit the Covered species. Actions may include a) temporary removal of livestock or reduction of stocking levels; b) restoration/revegetation actions; c) other actions deemed necessary to promote vegetation recovery.
5. An evaluation and implementation schedule for exclusion of livestock from riparian areas on the Conservation Lands for the benefit of Covered Species, with thresholds of riparian system function and health established. This schedule will also identify the timing and areas where livestock watering will be permitted.
6. Minimum and maximum residual dry matter (RDM) targets for each natural community found within Covered Species habitat shall be established and evaluated on an annual basis.

Measured or estimated RDM levels shall be used to determine stocking levels. RDM targets shall be established using the best available information and shall be adjusted should research conducted within the Conservation Lands warrant changes to the targets.

3.3.5.3 Fire Protection

1. Fire breaks will be created and maintained around the perimeter of the property. The fire breaks may consist of a disked or mowed strip, provided that all minimization and avoidance measures can be implemented. In some cases, disking the fire breaks may not be feasible due to presence of Covered Species. Alternatives that accomplish suitable fuels reduction may be implemented provided that all minimization and avoidance measures are implemented.
2. Interior roads will maintained in a way to create internal fire breaks to help control the spread of range fires should they happen.
3. The Grazing Management Plan should also consider the need to keep invasive species that create high fuel loads down. If grazing proves ineffective on all or part of the property, mowing will be used to reduce potential fire risks.
4. Any activities on the property such as welding, grinding, etc. shall be done with fire mats in place and be prohibited if winds are in excess of ten miles per hour.

3.3.5.4 Security and Safety

1. The Conservation Lands will be fenced (**see Section 3.3.5.1**) and shall have no general public access with limited access for education and research.
2. Research and/or other educational programs or efforts may be allowed on the Conservation Lands site as deemed appropriate by the CMP Agency, but are not specifically funded or a part of this long-term management plan.
3. Annual reporting will include an accounting of trespass and other security issues documented during the reporting period and non-CMP Agency personnel who access the Conservation Lands for any reason. Any persons allowed onto the property will be either escorted by someone familiar with the conditions of this plan or will attend an environmental safety training session provided specifically for the Conservation Lands.

3.3.5.5 Noxious Weeds/Feral Pigs/ Integrated Pest Management

1. Non-native invasive plant species shall be controlled through creation and implementation of a Noxious Weed Control Plan. The plan should include at least the following:
    - a) A baseline survey identifying all locations of plants rated as “high” by the California Invasive Plant Council;
    - b) A plan for implementing eradication of those plants identified during the survey with established and demonstrated effective methods;
    - c) An assessment of status of eradication efforts on a frequency of no less than five years to be included with the CMP Annual Report in the appropriate year;
    - d) Re-inspection of the Conservation Lands every five years;
    - e) Implementation of eradication for non-controlled invasive species if effective methods are determined to be feasible;

2. If Covered Species monitoring (**see Section 3.4.2**) indicates that feral pig habitat damage is negatively affecting Covered Species either directly or through habitat impacts, the CMP Agency will consult with CDFW to establish feral pig control measures on Conservation Lands. Any such program will be subject to all take avoidance and minimization measures contained in this CMP and any additional measures deemed necessary to adequately protect Covered Species (e.g., timing, general location of activities, etc.)
3. If required, mosquito abatement issues will be addressed through the development of an Integrated Pest Management Plan by the CMP Agency and the mosquito and vector control district in coordination with and approved by the Permitting Agencies.
4. The CMP Agency may propose additional measures to control other invasive species that could harm the Covered Species.

3.3.5.6 Public Access – Research and Educational Uses

General access to the Conservation Lands by the public will be prohibited. However, Conservation Lands often make excellent locations for research and education. The following procedures will be established by the CMP Agency to prioritize research activities and access requests on the Conservation Lands:

1. A standard means of submitting a request for access will be created and made public for those who qualify.
2. A means of rating access requests will be created which will help those making the decision to allow access or not to understand and compare the benefits of the research or education and risks to the Conservation Lands. Priority will be given to research activities or access that contributes to established recovery goals (USFWS 1998).
3. Group size and number of vehicles accessing the Conservation Lands will be limited based on season and sensitivity of lands requested for access.
4. If groups that have no or limited familiarity with the sensitivity of the Conservation Lands and methods of avoiding and minimizing impacts to Covered Species request access, an escort approved by the CMP Agency will be required.

3.4 Monitoring and Reporting

3.4.1 Overview

The overall goal of the monitoring plan is to document whether protection, management and enhancement activities being conducted on Conservation Lands are contributing to the long term viability of the Covered Species. Routine monitoring and maintenance tasks are necessary to assess whether Conservation Lands are meeting the stated conservation goals. All Conservation Lands will be monitored to verify health of rangelands within defined parameters and whether those parameters are supporting viable populations of Covered Species and presence of functioning ecosystems. The results from monitoring will inform management decisions to address changes in distribution and abundance of the Covered Species. Monitoring will evaluate the success of the CMP and associated plans in meeting the stated biological objectives.

3.4.2 Monitoring Program

Certain monitoring tasks will be implemented annually to document Covered Species' presence, distribution and relative abundance. Effectiveness in monitoring evaluates the success of the conservation program in meeting its stated biological objectives (Noss and Cooperrider 1994; Atkinson et al. 2004). In this case, annual monitoring of relative abundance of Covered Species populations, vegetation condition and prey species will serve to evaluate the effectiveness of on-going management. Although not required for protection of Covered Species, records on common wildlife and plants should be maintained as well, even if they are only incidental observations while monitoring other species. Appropriate use and interpretation of species richness as a measure can be an indicator of overall ecosystem health.

All Conservation Lands will be monitored to inform decisions related to modifications of any management prescription (e.g., grazing; noxious weed control). In general, standard monitoring methods can include but not limited to spotlight surveys, pedestrian transect surveys, trapping and scat surveys.

3.4.2.1 Initial Monitoring and Baseline

Biological Surveys

The monitoring report in Year 1 shall include a biological baseline survey within the Conservation Lands to serve as a baseline against which to measure future habitat conditions and values, and any subsequent habitat enhancement. During the initial baseline survey, candidate Conservation Lands for revegetation and restoration will be identified. In addition, the purpose of the initial baseline surveys will be to evaluate the overall biological conditions on the Conservation Lands. Specific details concerning the baseline biological surveys will be laid out in the Habitat Mitigation and Monitoring Plan. The survey targeting Covered Species are described in Section 3.4.2.2.

Follow-up surveys using the same methods will be repeated every five years to ensure that conditions on the Conservation Lands have been improved or maintained as per conservation goals and objectives and to quantify enhancement benefits. The follow-up surveys will also identify previous goals and objectives; evaluate the success of those goals and objectives; and recommend new goals, objectives, adaptive management strategies that will benefit the Covered Species. The initial baseline survey and five-year follow-up surveys should include at least the following parameters measured through establishment of permanent grids, points, and transects:

<u>Vegetation/Habitat</u>

- plant species sampling within the primary Covered Species habitat alliances (annual grassland, Ephedra shrublands, and saltbush shrublands);
- litter/residual dry matter in each habitat alliance within lands available for grazing;
- soil erosion (extent and location); and
- adverse or beneficial natural and human disturbances (e.g. CTS pond mitigation, invasive plant species control).

Wildlife

- wildlife species diversity and richness in the primary Covered Species habitat alliances in the appropriate season (pedestrian transects, point counts, or similar); and
- observations of Covered Species.

The results of the baseline and follow-up biological surveys shall be maintained by the CMP Agency in an appropriate database. The biological surveys shall be conducted by qualified Designated Biologists or qualified Biological Monitor approved by the Designated Biologist(s). The initial baseline survey methodology and approach shall be reviewed and approved by the CDFW and the USFWS as part of the approval process for the Habitat Mitigation and Monitoring Plan.

Annual Grazing Evaluation

All of the Covered Species would benefit from a program that manages the grazing intensity and duration specific to their needs. Grazing intensity, season of livestock use, type and class of livestock and frequency of use are important grazing parameters for managing for habitat conditions for Covered Species. Moderate to heavy stocking rates in years of adequate vegetation response from seasonal rainfall have been found to benefit all of the Covered Species (Barry et al. 2011; Germano et al. 2011). The RDM is the typical metric for grazing intensity. Moderate stocking rates removes about 50 to 75 percent of the forage each year, retaining about 1,000 to 1,500 pounds per acre of RDM on the ground prior to fall rains while heavy stocking removes more than 75 percent of the forage, retaining less than 500 pounds per acre of RDM. Target RDM should reference University of California Cooperative Extension recommendations and/or BLM Hollister Resource Area targets.

In regard to grazing, the annual monitoring report shall include an evaluation of whether implementation of the Grazing Management Plan resulted in habitat conditions that benefitted the Covered Species. Effects on Covered Species can be inferred based on habitat conditions and population estimates and distribution across otherwise suitable habitat within the Conservation Lands.

Once per year, the CMP Agency shall have a certified rangeland manager perform an evaluation of the range conditions within the Conservation Lands. At least the following information should be included:

a. Range conditions compared to target RDM.
b. Sample plot results for plant cover, height, and density.
c. Plant community composition.
d. Native and non-native plant species.
e. Changes in conditions regarding invasive weeds.
f. Ground cover compared target range.
g. Wildlife and plant species diversity are at acceptable levels.
h. Influence of livestock grazing on habitat condition for Covered Species.
i. Recommendations for meeting management goals and objectives that are not being met.

If a problem is identified with a particular grazing practice or a particular criteria level is not being met, then a more in-depth quantitative assessment of grazing practices may be required.

Stream and Riparian Habitat Evaluation

One baseline survey will be conducted during the first year of monitoring to qualitatively evaluate the general condition of riparian habitats. General location, topographic conditions, hydrology, general vegetation cover and composition, invasive species, and erosion will all be noted, evaluated and mapped during a site examination in the spring. Notes to be made will include observations of species encountered, water quality, general extent of wetlands, and any occurrences of erosion and/or weed invasion.

Non-native Invasive Species

The baseline and annual surveys for invasive species will be conducted concurrently with other surveys to document the invasive species present as well as their locations and population size. Only CIPC ranked "high" species will be prioritized for removal. These invasive species locations on the Conservation Lands will be ranked by importance of removal based on impacts to affected plant communities, risk of spread, and effectiveness of eradication methods. Monitoring reports will include progress of eradication efforts, effectiveness of methods, and recommendations if necessary.

Trash and Trespass

During the baseline site visit, occurrences of trash and/or trespass will be recorded, as well as the type, location, and management mitigation recommendations to avoid, minimize, or rectify a trash and/or trespass impact. At least once yearly, trash will be collected and removed, and any vandalism and/or trespass impacts will be repaired and rectified. A plan for initial removal of all trash, dumping and abandoned equipment on the Conservation Lands will be created from the recorded data. Additionally, subsequent to the first annual repair, incidental findings of vandalism or trespass will be repaired in a timely manner and reported annually.

Fire Hazard Reduction

An annual evaluation of the fire break around the perimeter of the Conservation Lands and along public roads will be conducted. If necessary, fire breaks will be re-established on an annual basis to protect the Conservation Lands from wildfire. Range fires that have occurred during the previous year shall be documented in the annual monitoring report. If the existing fire breaks are not sufficiently reducing the fire risk, plans to reduce the risk should be implemented as soon as possible.

Infrastructure and Facilities

Fences and gates must be maintained to prevent casual trespass and to allow necessary access. During the baseline site visit, the condition of fences and gates will be recorded, as well as recommendations to implement fence and/or gate repair or replacement, if applicable. Fences and gates will be maintained as necessary by replacing posts, wire, and/or gates, and replaced, as funding allows. The initial installation of any missing fence should be a priority the first year. If any structures are to be removed, a qualified Designated Biologist should determine if there is risk to Covered Species and other sensitive wildlife from the demolition or removal of the structure. Minimization and avoidance measures shall be implemented for all facility removal activities. Dates of activities and any effects to Covered Species should be documented for inclusion in annual reporting.

Initial and Follow-up Report Preparation and Submittal

The initial baseline and follow-up reports will be prepared along with any other additional documentation and circulated to the Permitting Agencies within 30 days of baseline/follow-up survey completion. The reports will be used as comparative material for future reports.

Included will be the results of the biological baseline surveys including mitigation measure implementation; the annual grazing evaluations; the general condition stream and riparian habitat evaluation; monitoring reports for the non-native invasive species; the annual trash and trespass monitoring reports; the annual evaluations of the fire hazard reduction reports; and the annual infrastructure and facilities reports.

Also included will be recommendations with regard to (1) any habitat enhancement measures deemed to be warranted, (2) any Conservation Lands conditions that need near, short, and/or long-term attention, and (3) any changes in the CMP that appear to be warranted based on baseline survey results. The Grazing Plan, schedules, and practices that will be applied within the Conservation Lands shall be reported. The CMP Agency's adaptive management approach shall also be implemented as necessary.

3.4.2.2 Species Specific Monitoring

In general, monitoring data will consist of location of Covered Species (spatial distribution), detection surveys, and relative abundance (number detected per given unit of effort). When feasible, additional data such as density and occupancy may also be collected. If collected, density data using distance sampling and occupancy estimates using occupancy analysis provides probability of detection allowing a reliable way to compare these estimates between sites and across years. Without a probability of detection estimate, there is no way to reliably compare relative abundance numbers over years. Occupancy estimates can be derived using presence absence data and can be used as a surrogate for abundance.

During monitoring efforts, general information such as location, duration, weather conditions, and observers will be recorded. All sightings of Covered Species and their sign will be recorded and location data collected. Only qualified Designated Biologists familiar with the Covered Species and their life histories will conduct species specific monitoring surveys.

Blunt-Nosed Leopard Lizard

Annual monitoring of BNLL would occur for the first three years and then every three years thereafter and will consist of a combination of driving and pedestrian transect surveys conducted in potential BNLL habitat on the Conservation Lands. All monitoring surveys for BNLL shall be conducted when conditions are optimum for BNLL activity (CDFG 2004). Permanent driving routes and pedestrian transects will be established such that the same locations are surveyed from year to year.

Pedestrian transect surveys to identify adult and hatchling/juvenile BNLL will be conducted along several survey routes that will be established for each unit of the Conservation Lands. The minimum level of pedestrian transect survey effort should consist of five 1,000-foot transect per 500 acres of suitable habitat repeated four times during the adult season and two times during the hatchling season. Transect surveys will be conducted in May-June (optimum portion of adult period) and in August-September (hatchling/juvenile). BNLL surveys will be conducted between 8:00 am and 2:00 pm and within temperature ranges favorable to above ground activity by BNLL (between 25°C and 35°C).

Two observers will survey each route while walking at a leisurely rate (approximately four to six kilometers [km] per hour). Observers will systematically search on either side of the pedestrian transect to detect BNLL and other vertebrates. The surveyor should stop periodically and scan for BNLL using close-focusing binoculars (minimum 7 x 35 magnification). The location of all observed BNLL and other Covered Species will be determined using a handheld GPS or other accurate mapping technique and recorded on field data sheets. Incidentally observed non-covered species locations will also be recorded. Total numbers of species detected will be tallied and tabulated. Relative abundance (number sightings per unit effort) for routes and Conservation Lands will be reported. Distance sampling (distance from transect) could establish density estimates. Repeated sampling of the same routes could give a reliable occupancy estimate to compare between sites and years.

Road surveys to monitor adult BNLL abundance will be conducted on survey routes established on the Conservation Lands where roads traverse suitable BNLL habitat. Survey routes will extend primarily over secondary dirt roads. Road surveys will be conducted once each year, in May-June (adult survey). The road routes will be surveyed five days within a 15-day period. Surveys will be conducted by a minimum of two qualified biologists (one passenger/observer and one driver/observer). BNLL road surveys will be conducted between 8:00 am and 2:00 pm within temperature ranges that are favorable to above-ground activity by BNLL (between 25° Celsius (°C) and 35°C).

Observers will survey each route at a speed not exceeding 10 miles per hour. Observers will systematically search the road and adjacent vegetated areas to detect BNLL, western whiptail lizards, side-blotched lizards, SJAS and other vertebrates such as the American badger. The passenger/observer will record the locations and number of sighted individuals. The use of binoculars 7 X 35 minimum magnification is requisite for identifying lizards at a distance, and other species during the surveys. The location of all observed lizard species, SJAS, and any other Covered Species will be determined using a hand-held GPS and recorded on field data sheets.

Total numbers of species detected will be tallied and tabulated. Relative abundance (number sightings per unit effort) for routes and Conservation Lands will be reported. Distance sampling (distance from transect) could establish density estimates. Repeated sampling of the same routes would give a reliable occupancy estimate to compare between sites over time.

Giant Kangaroo Rat

GKR presence and abundance will be monitored by walking transects to detect active precincts and during trapping on permanently established grids.

Pedestrian transect surveys will be conducted in areas known to contain highly suitable habitat and concentrations of GKR precincts each year for the first three years and then every three years thereafter. The first survey after the initial three years may be delayed to start on the fourth year after if it is desirable to offset costs between years for different species surveys. The pedestrian surveys will consist of systematically placed 1,000 foot long transects across suitable areas will be established and walked by qualified Designated Biologist(s). A minimum of five transects per 500 acres of occupied or suspected occupied habitat will be established. These surveys will be conducted to detect active and inactive GKR precincts. Other target species' burrows and den locations will also be recorded (primarily SJAS, burrowing owls and SJKF dens).

Permanent trapping grids will be established within identified colonies to track long term trends in populations within the Conservation Lands. Permanent trapping grids will consist of at least four grids on SCRCL, two grids on VFCL, and two grids on VRCL. Each grid will consist of at least 40 traps and grid layout will be determined during the first trapping effort. Trapping will consist of three nights during September of each year of monitoring. Standard mark recapture methods will be used. If permanent grids become inactive during the life of the monitoring, additional grids may be established in areas known to be active.

GKR that have been relocated from the Project Footprint will be monitored per the GKR Relocation Plan. The results of trapping conducted on the GKR relocation areas will be included in the CMP monitoring reports.

Additional monitoring of GKR within the Conservation Lands will consist of visual assessments of new and previously identified colonies. Observations and locations of isolated burrows and precincts, clustered precincts, and colonies will be recorded and mapped using GPS whenever they are located. In monitored areas, newly identified colonies and previously detected colonies will be evaluated for activity and extent (size) in August and September. Vegetative characteristics of both occupied and abandoned colonies will be measured.

San Joaquin Kit Fox

Annual monitoring of SJKF will occur every year for the first three years and then every three years thereafter. Potential and active dens will be located during pedestrian transect surveys for the BNLL and GKR. If during other monitoring activities, natal dens are detected; remote sensing cameras or other suitable non-invasive methods will be implemented to record litter sizes. Dead adults and juveniles will be reported to resource agencies and sources of mortality will be established if possible.

Scat collection using scent stations will be conducted once per year during the first three years to establish distribution and local population size. Thereafter, scat collection will be conducted every five years. Scat collection stations will be established using an appropriate scent attractant and will be checked once per week for up to four weeks during a year. Once a sufficient number of potential SJKF scats have been collected from a given station, it may be discontinued until the next monitoring effort. Collected scats during these surveys will be analyzed for DNA to establish the number of individual SJKF potentially utilizing Conservation Lands. DNA analysis will be performed by a laboratory acceptable to both CDFW and USFWS. Scat collection stations will be established at a rate of one per square mile in suitable habitat.

Nighttime spotlighting surveys may be included to record relative abundance and distribution of SJKF. If nighttime spotlighting is conducted, abundance of SJKF prey species will also be assessed during these surveys.

When detected during the monitoring efforts, all identified natal dens will be documented. Natal dens will be identified based on the incidental observation of pups at a den, adults at dens displaying characteristics consistent with natal dens, and characteristic sign at known dens with multiple entrances. Other characteristics indicating a natal den include, but are not limited to, a large den complex surrounded by a circular area of matted/crushed vegetation, multiple den entrances (more than three), fresh digging, presence of fresh prey remains, and presence of adult and juvenile-sized scat.

Natal den documentation will include den location using handheld GPS, den characteristics (number of entrances, orientation, position on slope), indications of activity, whether any individual SJKF are observed upon discovery of the den site and photographs of den entrances. During pupping season, natal dens may be monitored by remote sensing camera or other suitable non-invasive method that does not disturb SJKF activity. Cameras will be placed at dens for at least 10 nights for each six week period during pupping season. Cameras or other recording equipment should be placed such that they are secure and would not be affected by livestock. Data to be gathered from photos will include number of adults observed, number of pups observed, estimated age (in weeks) of pups and general activity patterns. Once a den is no longer in use or juveniles have become independent, den monitoring may be discontinued. Monitoring of a maximum of four natal dens in the Conservation Lands in any given year will be required using these methods. Additional natal dens may be monitored if adequate resources are available and subject to the discretion of the CMP Agency.

Monitoring of SJKF mortality factors will be conducted opportunistically. Dead and moribund foxes discovered incidentally during management activities on the Conservation Lands will be reported to the Agencies per the reporting requirements of the ESA BO and CESA ITP. As soon as practicable, biologists will travel to the discovery location to collect pertinent data and attempt to determine the probable cause of death. Prior to removal of any dead SJKF, photographs will be taken of the discovery location with the carcass in situ. The recovering biologist will make an examination of the discovery location and the fox carcass in an attempt to determine the probable cause of death. Information collected at the discovery location will be recorded on a data sheet and will include: recovery location, condition of the carcass, position and physical description of the carcass, sex, age, evidence of predation, evidence of human-associated injury, preliminary cause of death (if evident), and disposition of specimen. Tissue sample collection is discretionary. After all pertinent data (and tissue samples) are collected; the investigating biologist will recover the carcass at the request of USFWS and/or CDFW and arrange for delivery of the carcass to an analytic laboratory selected by USFWS and/or CDFW, or other entities holding appropriate permits for possession of federal/state listed species. In addition to the above entities, the SJKF can also be handed over to or recovered by a local CDFW biologist or warden. Mortality data will additionally be part of annual reporting. In the case of moribund foxes, appropriate veterinary attention may be sought at the discretion of the biologists.

San Joaquin Antelope Squirrel

Initial baseline information will be gathered during pedestrian surveys conducted for GKR and BNLL and incidental observations. Subsequent monitoring for SJAS will occur annually for the first three years and then once every three years thereafter concurrent with pedestrian surveys for GKR and BNLL. Observations of SJAS will be recorded along established 1,000 foot transects located in suitable habitat on each Conservation Land. A qualified Designated Biologist(s) will walk transects during suitable times of day during suitable temperatures. Walking transects established for other species will be also used for each of the three conservation areas to record the occurrence of SJAS. Transects can be completed anytime during daylight hours, but preferably in the spring when temperatures range between 20 degrees °C to 30°C. Transects should not be completed in the summer months if the air temperature exceeds 42°C or in inclement weather. Routes will be surveyed once a day for a maximum of four days. The location of all Covered Species observed will be logged using GPS. This information will be compiled and presented in the annual report.

Supplemental transects within steeper portions of the Conservation Lands should be established as this species will occur on steeper slopes than those typically suitable for GKR and BNLL. At least ten 1,000 foot transects in steeper portions of the VRCL and SCRCL should be established and walked on the same schedule as the pedestrian transects described above.

California Tiger Salamander

A qualified Designated Biologist(s) will conduct larval surveys for CTS at all suitable breeding ponds on the Valadeao Ranch and Silver Creek Ranch Conservation Lands between March and May of each year for the first three years and then once every five years thereafter. Surveys will entail dip netting ponds and pitfall traps in the uplands in suitable areas. Depth of each pond will be recorded and presence of aquatic organisms will be recorded during the surveys. Presence of CTS will be reported.

Vernal Pool Fairy Shrimp, Conservancy Fairy Shrimp, Longhorn Fairy Shrimp, and Vernal Pool Tadpole Shrimp

None of these species have been documented on the Conservation Lands to date. Invertebrate sampling will be completed opportunistically, dependent upon annual conditions based on the following schedule: Annual sampling will be conducted for the first three years and then once per three years thereafter during years of adequate rainfall. If ephemeral pools are present that could be utilized by any of these species, sampling of at least 10% of the potential pools will be conducted following accepted Agency protocols for sampling these species. Sampling will be conducted by a qualified biologist holding federal permits to sample for federal listed Branchiopods. Presence of any of these species will be documented recording all data required under the permits including at least, species identified, pool location, and pool characteristic (depth, area covered).

3.4.2.3 Management Strategy Effectiveness

The effectiveness of the required activities will be evaluated by the biologists when reporting on the activities. Any requirements found to be inadequate will be subject to adaptive management strategies discussed later and recommendations made in the annual report.

3.4.3 Annual Monitoring Report

Monitoring is an essential component of maintaining the Conservation Lands. The goals and objectives of the conservation strategy depend on maintaining viable populations of Covered Species and increasing occupation where possible. In order to determine if these goals and objectives are being met, monitoring has been designed to effectively measure the abundance of Covered Species (Table 12) relative to baseline conditions. Monitoring is also an important component of an effective adaptive management program. Monitoring refers to activities that document the presence, abundance and distribution of Covered Species on the Conservation Lands. All incidental sightings of Covered Species will be entered into a central database, and this information will be reported to USFWS and CDFW annually with the monitoring results.

Table 11 Monitoring, level of effort and data analysis for annual monitoring of Covered Species for PVS Conservation Lands, San Benito County, California

Type of Monitoring	Covered Species	Frequency and Person-effort per Year of Monitoring*	Unit Effort	Data Recorded	Data Analysis
Pedestrian transects	GKR, SJAS, SJKF	1x a year for first three years; once every three years thereafter; 2 people, 4 days	1000-foot transects	Target species sign, burrows and individuals, distance from transect	Presence, relative abundance (# per unit effort), resources locations, density (distance sampling) comparable between sites and over time (target species, other prey species)
Trapping	GKR	3 nights per year for first three years; once every three years thereafter; 2 people, 16 days	40 traps per grid; 8 grids total	Location of target and non-target species	Presence, relative abundance, locations of target species, population structure
Driving and pedestrian transects	BNLL	1,000-foot transects within suitable habitat; four adult and two hatchling surveys each year for three years; once every three years thereafter; 2 people, 4 people, 24 days	Established routes during optimum conditions	Location of species and abundance of arthropods (grasshoppers)	Presence, relative abundance, location, habitat use, and prey abundance (relative)
Dip-netting of suitable ponds; pitfall traps near suitable ponds	CTS	1x a year March-May for three years; once every five years thereafter; 2 people, 2 days	Each pond	Presence of larvae/adults	Presence, pond depth, presence of suitable prey
Scat-detection surveys	SJKF	Once per year for three years; once every three years thereafter; 1 person, 20 days	1 per square mile	Local population	Location, presence, abundance, number of individuals
* Person-effort is an estimate based on surveys conducted to date					

This monitoring plan describes methods for documenting the occurrence and relative abundance of all covered wildlife species on the Conservation Lands. Monitoring efforts will focus on five of the Covered Species including the BNLL, GKR, SJKF, SJAS, and the CTS

The focus of monitoring efforts will be to focus on indices that are indicative of long-term trends. The expectation is that populations of all Covered Species will fluctuate due to changing weather conditions and other environmental conditions that are beyond the control of the CMP Agency. During and immediately after drought periods, all populations of the Covered Species are expected to decline to accommodate reduced forage or prey, while during or after normal or wet years, the populations of these species is expected to increase, in some cases quite dramatically. Therefore, fluctuations in the populations of Covered Species is normal and to be expected; what is not expected is if populations do not recover during favorable rainfall years. Monitoring, particularly grazing intensity and timing, can be key to ensuring that forage capacity is not adversely affected to the point that the species cannot persist through drought cycles. Therefore, reducing stocking rates during drought cycles can provide necessary relief to the Covered Species by maximizing available forage (prey) during poor years. This is a key part of managing these systems in an adaptive manner – shifting management strategies to maximize forage capacity for the species.

If a decline in a species is region wide and unrelated to specific conditions on the Conservation Lands, changing management practices on the Conservation Lands will most likely not affect the population numbers and should not be required, as the reason for decline is probably on a larger scale than the Conservation Lands. Adaptive management of the Conservation Lands will be applied using information gathered during monitoring efforts and other research regarding the Covered Species as it becomes available. This allows for management of the site to remain appropriate given the amount and pattern of annual precipitation or other regional factors.

This monitoring has been designed to determine the effectiveness of management in meeting goals and objectives of the conservation strategy. Monitoring efforts and techniques can be modified in consultation with the USFWS and CDFW.

The annual report will be prepared along with any other additional documentation and circulated to the Permitting Agencies by January 31 of each year. Included will be recommendations with regard to (1) any habitat enhancement measures deemed to be warranted, (2) any problems that need near, short, and/or long-term attention, and (3) any changes in the monitoring or management program that appear to be warranted based on monitoring results to date. Finally, the report will insure the implemented grazing systems are compatible with the overall management goals for the Conservation Lands.

No later than January 31 of each year, the CMP Agency shall submit an annual report to the CDFW and USFWS with the monitoring results from the prior calendar year. Five year summary reports will be prepared to compare data from multiple years. The findings from the five-year reports will be used to inform any adaptive management recommendations or changes to current management practices. In addition, these findings will be used to identify the need for any additional monitoring or data gathering that augments information regarding the status of Covered Species on the Conservation Lands. The justification for adaptive management will be based on a third party biologist review of the annual reports which will be incorporated into the five year report to the agencies.

If requested by CDFW or USFWS, the CMP Agency and the Applicant will meet with one or both agencies each year, after the annual report is issued, to review implementation issues.

4.0 Adaptive Management

The purpose of adaptive management in the context of the Project's management and monitoring responsibilities is to provide ways to improve protection, management, enhancement, and other conservation actions in the rubric of the stated biological goals and objectives of maintaining or improving conditions where feasible on the Project site. As a frame of reference for example, the USFWS Five Point Policy for Habitat Conservation Plans (USFWS 2000) states that adaptive management is defined as a method for examining alternative strategies for meeting measurable biological goals and objectives, and then if necessary, adjusting future conservation management actions according to what is learned. Grazing will be based on an adaptive management strategy that has been defined as an integrated method for addressing uncertainty in natural resource management (Holling 1978; Walters 1986; Gundersen 1999).

4.1 Overview

Various conditions change on properties over time and can result in a need to change practices that worked, or were assumed to work, previously. This is especially true when applied to land management over decades. However, changes should not be made arbitrarily. Qualified biologists familiar with the species in question, the methods being employed and results of relevant monitoring and research should be the only people suggesting changes. These changes should not occur for management or financial purposes but only for the benefit of the Covered Species and/or Conservation Lands.

4.2 Management Strategy Adjustment Process

When a qualified biologist determines that a modification of procedures is needed, they should report their concern to the CMP Agency. The reasons for the needed change, recommended changes and benefits of changing procedures should be explained thoroughly. If the change is minor, the CMP Agency can determine if the change should be implemented. If the procedure is changed significantly or has the potential to significantly impact Covered Species, concurrence from the state or federal permitting agencies should be obtained before implementation of the new strategy. Any changes that are more environmentally protective than the previously approved methods may be implemented as needed. However, no alterations which reduce the level of monitoring effort will be put in place without prior authorization from permitting agencies. The exception would be implementation of updated agency protocols for species surveys. Although the five year reports discussed above require the evaluation of effectiveness, items that a qualified Designated Biologist performing monitoring activities believes should be considered earlier can be presented to the agencies at any time the CMP Agency deems appropriate.

5.0 Funding and Implementation

5.1 Funding

Table B-1 (Appendix B) summarizes the anticipated costs of long- term management for the Conservation Lands. These costs include estimates of time and funding needed to conduct the basic monitoring site visits and reporting, weed mowing, trash removal, fence and sign repair, and a prorated calculation of funding needed to fully replace the fences every 20 years. The total annual funding anticipated is approximately $168,648, therefore, with the current annual estimated capitalization rate of three percent the total endowment amount required will be $5,621,173.

Senate Bill 1094 (2012) (amending Government Code, 65965-65968) states that endowment funds are conveyed solely for the long-term stewardship of a mitigation property. Endowment funds are held as charitable trusts that are permanently restricted to paying costs of long-term management and stewardship of the specific mitigation property for which the funds are set aside. The endowment shall be calculated to include a principal amount that, when managed and invested, is reasonably anticipated to cover the annual stewardship costs of the property in perpetuity. Endowments shall be governed by the underlying laws, regulations, and specific government approvals under those laws and regulations pursuant to which endowments were exacted, consistent with subdivision (b) of Section 65966 and with Uniform Prudent Management of Institutional Funds Act (Part 7).

5.2 Task Prioritization

All tasks during the initial six years of Conservation Land establishment shall be fully funded. However, due to potential unforeseen circumstances after those initial years, prioritization of tasks, including tasks resulting from new requirements, may be necessary if insufficient funding is available to accomplish all tasks. The land manager and the Permitting Agencies shall discuss task priorities and funding availability to determine which tasks will be implemented. In general, tasks are prioritized in this order: 1) those required by a local, state, or federal agency; 2) tasks necessary to maintain or remediate habitat quality; and 3) tasks that monitor resources, particularly if past monitoring has not shown downward trends. Equipment and materials necessary to implement priority tasks will also be considered priorities. Final determination of task priorities in any given year of insufficient funding will be determined in consultation with the Permitting Agencies.

5.3 Estimated Cost Calculation

Costs to create and maintain conservation lands can be quite involved but are typically based on a PAR Analysis (Appendix B). These calculations consider the initial costs to put the lands into place, fence the property, establish population estimates, estimate frequency of various tasks over years, and estimate rate of return to provide a perpetual fund to run and maintain the lands. From such a fund, costs can be withdrawn annually to reimburse the owner or manager for the previous year’s activities. However, it is typical to prevent withdraws during the initial three to five years while the account is established.

5.4 CMP Agency, Transfer, Replacement, Amendments, and Notices

The CMP Agency shall be an entity approved by the Applicant and the permitting agencies. The CMP Agency, and subsequent CMP Agencies upon transfer, shall implement this CMP, managing and monitoring the Conservation Lands in perpetuity to maintain conservation values in accordance with the conservation easement, the CMP and all supporting and implementing documents. Long-term management tasks shall be funded through the Endowment Fund. The CMP Agency shall be responsible for providing an annual funds report to the Implementation Group (Applicant and Permitting Agencies, or other, as approved by Permitting Agencies) detailing the time period covered, an itemized account of the management tasks and total amount expended. Any and all enhancement, management, and/or maintenance activities undertaken by the land manager or its representatives must be in accordance with the CMP, implementing documents, or must obtain separate approval and/or permits from the applicable Permitting Agencies prior to the activity.

Transfer

Any subsequent transfer of responsibilities under this CMP to a different CMP Agency shall be requested by the CMP Agency in writing to the Implementation Group, shall require written approval by the Permitting Agencies, and shall be incorporated into this CMP by amendment. Any subsequent Property Owner assumes CMP Agency responsibilities described in this CMP and as required in the Conservation Easement, unless otherwise amended in writing by the Permitting Agencies.

Replacement

If the CMP Agency fails to implement the tasks described in this CMP and is notified of such failure in writing by any of the Permitting Agencies, the CMP Agency shall have 90 days to cure such failure. If failure is not cured within 90 days, the CMP Agency may request a meeting with the Permitting Agencies to resolve the failure. Such meeting shall occur within 30 days or a longer period if approved by the Permitting Agencies. Based on the outcome of the meeting, or if no meeting is requested, the Implementation Group may designate a replacement CMP Agency in writing by amendment of this CMP. If the Implementation Group fails to designate a replacement CMP Agency, then the Permitting Agencies may direct a public or private land or resource management organization to enter onto the Conservation Lands property in order to fulfill the purposes of this CMP.

Amendments

The CMP Agency, the Implementation Group, and/or the Permitting Agencies may meet and confer from time to time, upon the request of any one of them, to revise the CMP to better meet management objectives on the Conservation Lands, the habitat and/or conservation values of the Conservation Lands property. Any proposed changes to the CMP shall be discussed with the Permitting Agencies and the CMP Agency at a minimum. Any proposed changes will be designed with input from all parties. Amendments to the CMP shall be approved by the Permitting Agencies in writing and shall become required management components to be implemented by the CMP Agency.

If the CDFW or USFWS determine, in writing, that continued implementation of the CMP or any element of the CMP would jeopardize the continued existence of a state or federally listed species, such agency will submit such evidence to the Implementation Group. If evidence is used by the agency to support an amendment that is determined by either the CDFW or USFWS as necessary to avoid jeopardy, it shall become a required management component and shall be implemented by the land manager.

Notices

Any notices regarding this CMP shall be directed as follows:

CMP Agency (name, contact, address, telephone and FAX)
To Be Determined

U.S. Army Corps of Engineers
San Francisco District
1455 Market Street, 16th Floor
San Francisco, California 94103-1398
Attn: Chief, Regulatory Branch
Telephone: (415) 503-6795
Fax: (415) 503-6693

U.S. Fish and Wildlife Service
Ventura Office
2493 Portola Road, Suite B
Ventura, CA 93003
Attn: Field Supervisor
Telephone: 805-644-1766

U.S. Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105
Attn: Director, Water Division
Telephone: 415-947-8707
Fax: 415-947-3549

California Department of Fish and Wildlife
1234 East Shaw Avenue
Fresno, CA, 93710
(559) 243-4014

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FIGURES

APPENDICES

APPENDIX A

Species Descriptions

Species Descriptions

Blunt-nosed Leopard Lizard (Gambelia sila) (BNLL)
Status and description:

Legal Status – The BNLL is currently listed as endangered by the ESA and endangered by the CESA (Fish and Game Code §§ 2050 et seq.) and it is also a Fully Protected species under California Fish and Game Code Section 5050. The BNLL was originally listed as being in danger of extinction under the Endangered Species Preservation Act of 1966 (32 FR 4001, March 11, 1967), and is currently listed as endangered under the ESA of 1973, as amended. No critical habitat has been designated for the BNLL. The BNLL is included in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998).

Species Ecology – The BNLL most closely related to the long-nosed leopard lizard (*Gambelia wislizenii*), and was originally thought to be a subspecies. Montanucci (1970) presented solid information for the separation of the two species based upon studies of hybrids between the BNLL and long-nosed leopard lizard. The two species will hybridize where their ranges overlap. Adult male BNLL are larger than females, ranging in size from 8.7 to 12.0 centimeters (cm) in snout-vent length. Total length including the tail can be up to 35.7 cm (Germano and Williams 2005). Adult males weigh between 31.8 and 37.4 grams and adult females weigh between 20.6 and 29.3 grams. BNLL are quite often the largest lizard throughout its range and coloration can vary greatly. Background colors on the dorsal surface can range from yellowish, light gray or dark brown depending on the surrounding soil and vegetation. The ventral surface is uniformly white. The color pattern on the back consists of longitudinal rows of dark spots interrupted by white, cream, or yellow bands. These cross bands can aid in distinguishing the BNLL from other leopard lizards; the cross bands of the BNLL are much broader, more distinct, and extend from the lateral folds on each side of the body. Juvenile BNLL have blood-red spots on the back that darken with age.

BNLL originally inhabited the San Joaquin Valley, ranging from Stanislaus County in the north to the Tehachapi Mountains of Kern County in the south (Montanucci 1970). The foothills of the Sierra Nevada and Coast Range Mountains defined the eastern and western boundaries. The currently known occupied range of the BNLL is scattered in undeveloped lands of the San Joaquin Valley and Coast Range foothills. The Ciervo, Tumey, and Panoche Hills and the Panoche Valley all support populations of BNLL in the northern portions of its range. The BNLL prefers to inhabit open, sparsely vegetated areas of low relief. Nonnative grasslands and valley sink-scrub communities support BNLL populations on the San Joaquin Valley floor. Valley needlegrass grasslands and alkali playas also provide suitable habitat for BNLL. The most important aspect of any BNLL habitat is sparse vegetation. BNLL rely mainly on speed to avoid predators and catch prey. A thick cover of herbaceous vegetation impedes BNLL movement, making them more vulnerable to predators and less likely to capture prey. In areas with thick herbaceous vegetation, BNLL will utilize barren washes and roads (Warrick et al. 1998).

Adult BNLL emerge from below ground dormancy in early to mid-April and remain active into July and August (Germano and Williams 2005; CDFW 2004). Adults are rarely seen in September. Hatchlings emerge in July and remain active into late October and early November (Germano and Williams 2005; CDFW 2004). Optimal air temperatures for BNLL range between 23.5°C and 40°C and optimal ground temperatures are between 22°C and 36°C. Home range areas differ between males and females. Warrick et al. (1998) found the average home range of males to be 4.24 hectares and females to be 2.02 hectares. Males will aggressively defend their home ranges against other males. Germano and Williams (2005) noted many instances of males with scars the outline the jaws of other adult BNLL. Other studies had Passive Integrated Transponders (PIT) tags broken in fighting males (Germano and Williams 1993).

Other lizards that may overlap with the BNLL include the side-blotched lizard (*Uta stansburiana*), western whiptail (*Aspidoscelis tigris*), and coast horned lizard (*Phrynosoma coronatum*; Stebbins 2003). The BNLL is the largest of these lizards and will consume smaller lizards when given the opportunity. Germano and Williams (2005) noted adult BNLL eating side-blotched lizards and smaller BNLL. While adult BNLL do not hesitate to prey on smaller lizards, grasshoppers, crickets, and beetles make up the majority of their diet (Germano et al. 2007). Diet preferences can vary by location and year. Coleopterans made up the bulk of BNLL diet on the Elkhorn Plain and Lokern Natural Area. Grasshoppers were the main prey source on the Kern Front Oil Field (Germano 2007). Bees, wasps, and ants will also be taken by BNLL, although in smaller numbers than grasshoppers and beetles.

Adult BNLL emerge from dormancy in early April and breeding activity begins within a month of emergence. Breeding activities last from April through the beginning of June and may last throughout June. Eggs are laid in June and July, with clutch size ranging from two to six eggs (Montanucci 1967) and hatchlings emerge after approximately two months of incubation. Germano and Williams (2005) first noted hatchlings appearing on the Elkhorn Plain in mid-July, depending on the weather trends of that year. Cool wet weather patterns in April may delay the emergence of adults, thus delaying egg laying and hatchling emergence.

Potential predators for the BNLL include whipsnakes, gopher snakes, western rattlesnake, loggerhead shrike, American kestrel, prairie falcon, burrowing owl, various diurnal raptors, SJKF, coyote, American badger, and adult BNLL. Germano and Williams (2005) found several individuals that had been struck by passing vehicles.

San Joaquin Kit Fox (Vulpes macrotis mutica) (SJKF)

Status and Description

Legal Status – The SJKF is currently listed as endangered by the ESA and threatened by the CESA (Fish and Game Code §§ 2050 et seq.). The SJKF was originally listed as being in danger of extinction under the Endangered Species Preservation Act of 1966 (32 FR 4001, March 11, 1967), and is currently listed as endangered under the ESA of 1973, as amended. No critical habitat has been designated for the SJKF.

The SJKF is included in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998).

Species Ecology – The SJKF was originally described to science by C. Hart Merriam (1888) from near Riverside, California. This area is now highly urbanized and no longer supports kit fox. Historically, eight subspecies of kit fox have been recognized, but now only two are recognized: kit fox (*Vulpes macrotis macrotis*) and SJKF (*Vulpes macrotis mutica*; Mercure et al. 1993). The kit fox is the smallest canid species in North America, and the SJKF is the larger of the two subspecies. SJKF have long, slender legs and are approximately 30 cm tall at the shoulder. The average male weighs 2.3 kilograms and the average female weighs 2.1 kilograms (Morrell 1972). SJKF have a relatively small, slim body, large ears set close together, and a long, bushy tail tapering toward the tip. The tail is usually carried low and straight. The most common colorations are described as buff, tan, or yellowish-gray on the body. Two distinctive coats develop each year: a tan summer coat, and a silver-gray winter coat. The undersides vary from white to light buff. The tail is distinctly black tipped.

Other species of fox that occur in the Panoche Valley region include the red fox (*Vulpes vulpes*) and gray fox (*Urocyon cinereoargenteus*). Because all three fox species inhabit the same region, are often fast moving, and nocturnal, identification of SJKF can be a challenge. The coat color and black tipped tail can usually distinguish the SJKF from the red fox. Gray foxes also have a black tipped tail, but also have a distinct black line running along the top to the tail, which is lacking in the SJKF. The small body size of the SJKF can also aid in identification.

Historically, SJKF was known to occur in most of the San Joaquin Valley from southern Kern County north to San Joaquin County (Grinnell et al. 1937); however these authors believe that the SJKF had already had its range substantially reduced by the 1930s. Currently, the largest extant populations of SJKF are in western Kern County on and around the Elk Hills and Buena Vista Valley, and the Carrizo Plains Natural Area in San Luis Obispo County (USFWS 1998). The USFWS (1998) identified three core areas for SJKF populations: Carrizo Plain, western Kern County, and the Ciervo-Panoche Natural Area. The Ciervo-Panoche Natural Area consists of the Ciervo Hills, Tumey Hills, Panoche Hills, and the Panoche Valley. Cypher et al. (2007) identified the Panoche Valley and the Pleasant Valley populations as potential source populations for recolonizing reclaimed farmland in the San Luis Unit of the Central Valley Project. This study showed reasonable connectivity between Panoche Valley and Pleasant Valley along the western edge of the San Luis Unit, as well as reasonable connectivity between Panoche Valley, Pleasant Valley, and reclaimed farmland to the east. Survey efforts to determine SJKF population size are currently underway at Ciervo Panoche Natural Area in Fresno and San Benito Counties, Fort Hunter Liggett in Monterey County, and Camp Roberts in Monterey and San Luis Obispo Counties. Recent records from the 1980s and 1990s also exist for San Luis Reservoir in Merced County (Briden et al. 1987), North Grasslands and Kesterson National Wildlife Refuge on the valley floor in Merced County (Paveglio and Clifton 1988), and in the Los Vaqueros watershed in Contra Costa County. Optimal habitat for SJKF is arid with relatively low grassland vegetation. Preferred habitat is often dependent on the density of kangaroo rats and lagomorphs, the two favored prey items of SJKF.

SJKF are predominantly nocturnal, with peaks in activity occurring during crepuscular periods and are occasionally seen during the day during late spring and early summer (Meaney et al. 2006; Orloff et al. 1986). Distance of nightly movements varies depending on the season. Nightly movements on the Elk Hills Naval Petroleum Reserves averaged 15.4 km during the breeding season, and 10.2 km during the pup-rearing season (USFWS 1998). Home ranges have been reported from as small as 2.6 km2 to as large as 31 km2 (USFWS 1998). Home ranges may overlap, depending on prey density and prey allocation. Zoellick et al. (2002) found that home range size and home range overlap of SJKF did not differ between undisturbed areas and areas disturbed by the Naval Petroleum Reserves. Zoellick et al. (2002) showed up to a 30 percent home range overlap in SJKF, and surmised that this was due to a localized food source such as a high density or rabbits.

The diet of the SJKF varies seasonally and annually, based on variation in abundance of potential prey. In descending order of occurrence, white-footed mice, California ground squirrels, kangaroo rats, SJAS, black-tailed jack rabbits, and chukar partridge were identified in SJKF scat (USFWS 1998; Archon 1992). Other studies have shown that kangaroo rat and lagomorphs are important staples in the diet of SJKF (Meaney et al. 2006). Laughrin (1970) collected over 600 scat samples of SJKF, and 80 to 90 percent of this contained kangaroo rat remains (Laughrin 1970 in Meaney et al. 2006). Cypher et al. (2000) noted that SJKF abundance in the southern San Joaquin Valley was highly correlated with precipitation based prey abundance, particularly kangaroo rat. Drought years, which decreased kangaroo rat abundance, produced significant negative and rapid changes in SJKF abundance. SJKF is also an opportunist and will not pass up potential scavenging opportunities. Scat samples have also included human foods, paper, cloth, and larger mammals such as cattle and sheep that had been scavenged.

SJKF occupy several dens throughout their home range during the year. Dens are usually modified ground squirrel, badger, or coyote dens, and can be up to 2.3 m deep (Tannerfeldt et al. 2003). Radio telemetry studies indicate that foxes use individual dens for an average of 3.5 days before moving to a different den. Possible reasons for frequently changing dens include parasite load, prey depletion, and predator avoidance (Egoscue 1956; USFWS 1998); however an adult SJKF can easily cover its entire home range in one night (Cypher et al. 2005). Multiple dens in the home range of an individual SJKF are necessary for thermal regulation, resting, and predator avoidance. Den openings are 20 to 25 cm high and less than 20 cm wide to exclude coyotes and badgers (Meaney 2006). Resting dens usually are simple with only one opening, while natal dens can be much deeper and more complex, and have multiple openings. Artificial dens constructed by humans can act as suitable dens for SJKF. Artificial dens are generally lengths of buried pipe or culvert approximately 20 cm in diameter (Cypher et al. 2007).

Females are capable of reproducing at ten months old and begin searching for natal dens in September and October (USFWS 1998). Pair bonds between male and female SJKF vary; some will mate for life while others may only remain together for a single breeding season. SJKF litters can range from one to six pups and success is often dependent on prey abundance (White and Ralls 1993). SJKF litter size averaged 3.8 for adults more than one year old and 2.5 for yearlings (Cypher et al. 2000). Natal dens have more than one opening and are changed two to three times per month. Females rarely hunt while lactating and the male supplies the female with prey during the first few weeks of pup-rearing (Meaney 2006). Family groups generally split up in October, although pups may remain with the parents and assist with rearing the next generation.

Dispersal of yearling SJKF averaged eight kilometers during a six year study on the Naval Petroleum Reserves (Scrivner et al. 1987). Long distance dispersals of up to 69 km by SJKF throughout their range have also been noted (Meaney 2006). While agricultural lands may not present suitable habitat for SJKF, they have been known to disperse through them. Agricultural lands, highways, aqueducts, and urban areas have all been used by dispersing SJKF (USFWS 1998). While these man-made obstacles do not seem to inhibit SJKF dispersal and nightly movements (Zoellick et al. 2002, Cypher et al. 2005), fences and walls can create impenetrable barriers to SJKF movement (Cypher and Van Horn Job 2009). Simple fence alterations such as portals, larger mesh or hog wire, and elevating the bottom six inches off the ground can negate the negative effects of fences and walls and make them permeable to SJKF (Cypher and Von Horn Job 2009).

Predators of the SJKF include golden eagle, domestic dogs, coyotes, red fox, and badgers. Cypher et al. (2005) radio collared 63 SJKF. Twenty-five of those were recovered dead, and of those 25, 12 (48 percent) were killed by large predators, most likely coyotes. Fences which are not permeable to SJKF as described above, can cause a serious threat to SJKF being chased by potential predators. However, a permeable fence may aid in SJKF escape if the fence is situated to provide through points at reasonable intervals and limits the ability of predators to pass through (Cypher and Van Horn Job 2009).

California Tiger Salamander (Ambystoma californiense) (CTS)

Status and Description

Legal Status – The CTS population segment that may occur within the Conservation Lands is currently listed as threatened by the ESA and threatened by the CESA (Fish and Game Code §§ 2050 et seq.). Two other distinct population segments in Sonoma County and Santa Barbara County are listed as endangered by the ESA. The Santa Barbara County Distinct Population Segment was listed as endangered in 2000. The Sonoma County Distinct Population Segment was listed as endangered in 2002. The remaining population occurs throughout central California, including the study area. The Central California Distinct Population Segment was listed as threatened in 2004. No Recovery Plan has been written for the CTS to date.

Species Ecology – The CTS was formerly classified as a subspecies of tiger salamander (*Ambystoma tigrinum*) but has since been identified as an individual species (Kraus 1988; Shaffer et al. 1991). A broad head, small eyes, and tubercles on the side of the feet characterize CTS. Coloration is a black back with yellow, cream, or white oval spots or bars. Some individuals may have a prominent cream band on the undersides. Snout-vent length ranges from 7.6 to 12.7 cm, and total length ranges from 15 to 22 cm (Stebbins 1966 and 2003).

The CTS originally inhabited most of central California, and remains in remnant populations throughout much of its original range. CNDDB records for CTS show its distribution encompasses portions on Alameda, Amador, Calaveras, Contra Costa, Fresno, Kern, Kings, Madera, Mariposa, Merced, Monterey, Sacramento, San Benito, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Tulare, Tuolumne, and Yolo Counties (NatureServe 2009). About 80 percent of all extant occurrences are in Alameda, Contra Costa, Madera, Merced, Monterey, San Benito, ad Santa Clara counties, with 30 percent of all occurrences in Alameda County (*ibid*.). The use of vernal pools and other temporary bodies of water for breeding limits the CTS to areas of low elevation and low topographic relief throughout their range (Stokes et al. 2008). Ephemeral vernal pools which refill with water on a yearly basis, are 40 to 80 cm in depth, and have a surface area of 0.2 hectares or more are optimal for breeding CTS, although small, shallower pools will also house breeding CTS (Stokes et al. 2008). Depth of the breeding pool was highly correlated with breeding CTS. Stokes et al. (2008) found no CTS larvae in pools with an average depth of less than 22 cm. Deep pools with permanent water may not be optimal for breeding populations of CTS because they often house predatory fish, crayfish, or bullfrogs that prey upon larval CTS. This creates a narrow window of pool depth where the pool will not completely dry out before CTS have metamorphosed, but also not contain water year round and house predators. Metamorphosed CTS move out of the vernal pools and into upland habitats. Small mammal burrows are important features of upland habitat. Adult CTS occupy small mammal burrows in grassland, savanna, or open woodland habitats (Trenham and Shaffer 2005).

Activity patterns of adult CTS are not well understood. Adult CTS live their entire lives in the burrows of small mammals such as the California ground squirrel. Adults begin moving toward breeding pools when the first fall rains begin to inundate pools. Breeding adults will continue moving to pools through the winter and spring. Adults can generally be found at breeding pools from October through May, although breeding is highly dependent on the amount of precipitation (Trenham et al. 2001; Trenham and Shaffer 2005). Adult CTS leave the breeding pools in late spring and return to upland habitats. Trenham and Shaffer (2005) used pitfall traps at various intervals away from a pool to determine the extent of upland use. They found that the numbers of adult CTS declined as distance from the pool increased out to 620 meters. Subadults also moved up to 600 meters away from the pools, but most were concentrated between 200 and 600 meters from the pool. This has led managers to suggest preserving upland habitats with suitable small mammal burrows out to 600 meters from breeding pools (Trenham and Shaffer 2005).

CTS may take upward of four to five years to reach sexual maturity (Trenham et al. 2000). Although individuals can live upward of ten years, less than 50 percent of individuals breed more than once (Trenham et al. 2000). Rainfall can significantly alter adult breeding pool attendance, and production of metamorphs tends to be a boom-or-bust scenario (Loredo and Van Vuren 1996). Typically, greater numbers of breeding adults return to pools during years with greater rainfall (Trenham et al. 2000 and 2001; Cook et al. 2006; Stokes et al. 2008). Males are often the first to arrive at breeding pools and remain in the pool longer than females (Trenham et al. 2000). Larvae remain in the pools approximately four months and emigrate from the pools as they dry. Metamorph emigration typically occurs throughout May and is directly related to the pool drying date (Trenham et al. 2000).

Often amphibian populations are used as an example for the metapopulation/source-sink models. The CTS populations at different breeding pools often act in a metapopulation fashion (Trenham et al. 2001). Mark – recapture studies found that while most breeding adults return to their natal pool, 22 percent dispersed to different ponds (Trenham et al. 2001). It should be noted that Trenham and Shaffer (2005) did not capture any CTS, adult or subadult, more than 620 meters from the pool. Thus, pools more than 1,240 meters from one another may limit dispersal. Breeding CTS have been known to use artificially created pools, and the creation of pools in a stepping-stone fashion has been suggested to aid dispersal between populations (Stokes et al. 2008).

The diet of larval and metamorphosed CTS is not well studied. Studies on the diet of other larval *Ambystomids* have found that less developed larvae prey mainly on zooplankton, and larger, more developed larvae prey on amphipods, mollusks, and insect larvae as well as zooplankton (Dodson and Dodson 1971; Hoff et al. 1985; McWilliams and Bachmann 1989). Adult diet consists of terrestrial invertebrates such as earthworms, snails, and other insects. Vertebrates, such as small mammals and fish, may be taken as well (Stebbins 1959; NatureServe 2009).

Predatory fish and amphibian populations negatively affect CTS populations. Mosquitofish (*Gambusia* sp.), smallmouth bass (*Micropterus dolomieu*), green sunfish (*Lepomus cyanellus*), and bullfrogs (*Rana catesbiana*) are common predators of CTS larvae and adults (NatureServe 2009). Yearly drying of vernal pools used for breeding greatly reduces the numbers of these potential predators, however heavy spring and winter rains can connect pools to other permanent water sources and introduce CTS predators.

San Joaquin Antelope Squirrel (Ammospermophilus nelsoni) (SJAS)

Status and Description

Legal Status - The SJAS is listed as threatened under CESA (October 2, 1980). The species does not have its own recovery plan, but is included in the *Recovery Plan of Upland Species of San Joaquin Valley, CA* (USFWS 1998).

Species Ecology – The SJAS is one of five subspecies in the genus *Ammospermophilus*. This genus is generally confined to desert and arid steppe habitats and open shrubland communities in the southwest United States and portions of Mexico. Merriam (1893) collected the type specimen for this species in Tipton, Tulare County, California.

Adults weigh between 130 and 170 grams. They have a fusiform shape typical of ground dwelling squirrels. They are buffy tan, have a light stripe on their sides, and have lighter fur on the ventor. They are much smaller than the California ground squirrel (*Otospermophilus beecheyi*), and have a shorter, less bushy, flatter tail.

Grinnell and Dixon (1918) observed an uneven distribution, and they noted that the species occurred in abundance in a few spots that included the Lokern and Elk Hills.

According to Williams (1980), as of 1979, there was 680,000 acres of habitat of which only 102,000 acres was of good quality; none of the best habitat originally described by Grinnell and Dixon remained. Good quality is defined as habitat that supports one to four individuals per acre. The SJAS has been nearly eliminated from the Tulare Basin floor and continues to exist in more marginal areas such as the mountainous areas bordering the western edge. In 1979, there was a notable decline and disappearance from a number of formerly occupied patches including Pixley, Alkali Sink and Kerman Ecological Reserves, and Allensworth State Park (although SJAS were never abundant here; Wes Rhodenhamel, pers. comm.).

SJAS are found in arid annual grassland and shrublands and are numerous in areas with sparse to moderate cover of shrubs including saltbush, ephedra (*Ephedra* sp.), bladderpod (*Isomeris arborea*), golden bushes (*Isocoma* sp.), matchweed and others. SJAS are present but tend to sparsely inhabit shrubless areas. SJAS use shrubs and burrows to escape predators and escape the heat of the sun. For this reason, they may be somewhat dependent on kangaroo rats whose burrows they may enlarge and takeover. The range of the GKR overlaps extensively with the SJAS, but microhabitats may differ. SJAS are also associated with friable soils.

SJAS breed in late winter and early spring. Young do not breed in the first year. Gestation is 26 days, and there are six to 11 embryos. Young are born in March and April and emerge from the burrow after 30 days. The young are weaned as early as late April to late May. Mortality on the Elkhorn Plain Ecological Reserve was 0.7 for young and 0.5 to 0.6 for adults.

These squirrels are generally omnivorous eating green vegetation, fungi, insects (primarily grasshoppers), and seeds (including filaree, brome, ephedra, and saltbush). SJAS are diurnal.

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APPENDIX B

Par Analysis – Panoche Valley Solar Facility

Par Analysis – Panoche Valley Solar Facility

Table B-1. Conservation Lands Management and Monitoring Activities, Level of Effort, Frequency and Cost

General Conservation Lands Management & Monitoring Activities		Description	Level of Effort	Cost per Unit	Cost	Frequency	Schedule	Annual Cost
Element A.1 Waters of the U.S., including Wetlands and Riparian	Monitor waters if the U.S.	Walking survey; notes, photos	16	160	$2,560	Annual	Winter, spring	$2,560
Element A.2 Listed Species	Reference photography	Compile and present	8	160	$1,280	Annual	Winter, spring	$1,280
Element A.3 Listed Species Habitat	Monitor Covered Species	Walking survey; notes, photos	120	160	$19,200	Annual	Spring, summer	$19,200
Element A.4 Threatened/Endangered Plant Species Monitoring	Monitor Covered Species	Map; assess abundance/health	160	160	$25,600	Annual	As appropriate (e.g., flowering period)	$19,200
Element A.5 Threatened/Endangered Species Monitoring	Animal	Map; assess abundance/health	200	160	$32,000	Annual	As appropriate	$25,600
Element A.6 Invasive Species	Monitor Species	Map; assess abundance/health	40	160	$6,400	Every year	As appropriate	$6,400
	Assess weed growth, extent	Walking survey, map; research	40	160	$6,400	Annual	Spring, summer	$6,400
	Weed removal	Hand labor	120	40	$4,800	No less than every 5 years or as needed	Late spring, summer	$4,800
Element A.7 Vegetation Management	Mowing	Contract mowing	120	40	$4,800	Annual	Early summer	$4,800

General Conservation Lands Management & Monitoring Activities		Description	Level of Effort	Cost per Unit	Cost	Frequency	Schedule	Annual Cost
	Grazing research and management	Research and coordination	120	160	$19,200	As appropriate	As needed	$19,200
Element B.1 Trash & Trespass	Trash and Trespass monitoring	Walking surveys	40	40	$1,600	Annual	As appropriate	$1,600
	Trash removal and cleanup	Hand labor	40	40	$1,600	As needed	As needed	$1,600
Element B.2 Fire Hazard Reduction	Fire hazard assess and contracting	Survey, contract, supervise	40	40	$1,600	As needed	Late spring	$1,600
Element C.1 Fences and Gates	Survey & assess fences	Walk; document conditions	40	40	$1,600	Annual	As needed	$1,600
	Repair fencing and signs	Hand labor	180	40	$7,200	As needed	As needed	$7,200
	Replace fencing	Materials and labor	2000	4	$8,000	Replace as needed	Ongoing	$8,000
	Gate replacement	Materials and labor	4	500	$2,000	Replace as needed	As needed	$2,000
Element D.1 Annual Report	Annual report	Analyze & report; maps, photos	80	160	$12,800	Once per year	Due in summer	$12,800
Account administration			80	160	$12,800	As needed	Annually	$12,800
Vehicles and Supplies					$10,000	As needed		$10,000
Totals								$168,648
Current annual capitalization rate								3%
TOTAL ENDOWMENT								**$5,621,173**

Appendix G – Support for Silver Creek Ranch as Mitigation Lands

APPENDIX G: SUPPORT FOR SILVER CREEK RANCH AS MITIGATION LANDS

For the

PANOCHE VALLEY SOLAR FARM

San Benito County, California

Submitted by:
Panoche Valley Solar, LLC
Charlotte, NC 28202
Contact: Steve Rutledge
Telephone: (980) 373-6962

November 15, 2012 PN 1534-04

TABLE OF CONTENTS

1 INTRODUCTION.....1

1.1 PROJECT BACKGROUND.....1

1.2 OFF-SITE MITIGATION LANDS.....5

1.3 SILVER CREEK RANCH LOCATION.....5

1.4 SILVER CREEK RANCH BACKGROUND.....5

1.4.1 Blunt-nosed Leopard Lizard Background for the Silver Creek Ranch.....7

1.4.2 Giant Kangaroo Rat Background for the Silver Creek Ranch.....9

1.4.3 San Joaquin Kit Fox Background for the Silver Creek Ranch.....11

1.4.4 Recovery Plan and 5-year Review Recommendations.....14

2 CONFIRMATION OF PRESENT CONDITIONS OF SPECIAL STATUS SPECIES ON THE SILVER CREEK RANCH IN 2010.....14

3 SILVER CREEK RANCH 2012 FOCUSED SURVEYS.....19

3.1 BLUNT-NOSED LEOPARD LIZARD.....20

3.1.1 Survey Protocol.....20

3.1.2 Blunt-nosed Leopard Lizard Survey Results.....23

3.1.3 Determination of Blunt-nosed Leopard Lizard Estimates and Methodology.....23

3.2 GIANT KANGAROO RAT FOCUSED SURVEYS.....25

3.2.1 Survey Protocol.....25

3.2.2 Giant Kangaroo Rat Survey Results.....25

3.2.3 Determination of Giant Kangaroo Rat Estimates and Methodology.....27

3.3 SAN JOAQUIN KIT FOX FOCUSED SURVEYS.....30

3.3.1 Survey Protocol.....30

3.3.2 San Joaquin Kit Fox Survey Results.....30

3.3.3 Determination of San Joaquin Kit Fox Estimates and Methodology.....41

4 CONCLUSIONS.....42

5 LITERATURE CITED.....47

LIST OF FIGURES

FIGURE G-1. VICINITY MAP 2

FIGURE G-2. PROJECT SITE AND CONSERVATION LANDS 3

FIGURE G-3. PROJECT LAYOUT 4

FIGURE G-4. CIERVO-PANOCHE NATURAL AREA 6

FIGURE G-5. CNDDB RECORDS ON THE SILVER CREEK RANCH 8

FIGURE G-6. CNDDB RECORDS FOR GKR 12

FIGURE G-8. GOLDEN EAGLE SURVEY RESULTS AROUND THE SILVER CREEK RANCH 16

FIGURE G-9. SILVER CREEK RANCH BIOTIC HABITATS 18

FIGURE G-10. BNLL OBSERVATIONS ON THE SILVER CREEK RANCH 21

FIGURE G-11. SPECIES OBSERVATIONS DURING BNLL FOCUSED SURVEYS ON THE SILVER CREEK RANCH 22

FIGURE G-12. BNLL MITIGATION ACREAGE 24

FIGURE G-13. 50-METER RADIUS PLOTS WITHIN GKR SOURCE POPULATION POLYGONS 26

FIGURE G-14. GKR MITIGATION ACREAGE 28

FIGURE G-15. SPOTLIGHTING RESULTS FOR THE SILVER CREEK RANCH CONSERVATION LANDS 31

FIGURE G-16. SJKF SPOTLIGHTING RESULTS FOR THE SILVER CREEK RANCH CONSERVATION LANDS .32

FIGURE G-17. CAMERA TRAP STATIONS ON THE SILVER CREEK RANCH CONSERVATION LANDS 33

FIGURE G-18. ONLY ONE STATION (#6) DETECTED TWO SJKF IN THE SAME PHOTO, ALL OTHER STATIONS DETECTED ONE INDIVIDUAL AT A TIME. 38

FIGURE G-19. SAN JOAQUIN KIT FOXES WERE OBSERVED VISITING BAITED CAMERA STATIONS WITH DEAD KANGAROO RATS. 38

FIGURE G-20. ONE SJKF WAS OBSERVED BRINGING TWO DEAD KANGAROO RATS TO A BAITED STATION. 39

FIGURE G-22. AN AMERICAN BADGER AND A SJKF VISITED A BAIT STATION AT CAMERA STATION #9 WITHIN 31 SECONDS OF EACH OTHER; AS SJKF AND BADGER WERE OBSERVED TWICE TRAVELING TOGETHER DURING SPOTLIGHTING SURVEYS, THIS MAY BE ANOTHER EXAMPLE OF THE TWO SPECIES TRAVELING TOGETHER. 40

FIGURE G-23. SJKF MITIGATION ACREAGE 44

FIGURE G-24. BURROWING OWL OCCURRENCES ON THE SILVER CREEK RANCH CONSERVATION LANDS 45

FIGURE G-25. SELECT SPECIAL STATUS SPECIES IN MITIGATION LANDS 46

LIST OF TABLES

TABLE G-1. HISTORIC GKR DENSITY ESTIMATES REPORTED IN THE LITERATURE 9

TABLE G-2. SURVEYS CONDUCTED ON THE SILVER CREEK RANCH CONSERVATION LANDS IN 2012 19

TABLE G-3. INDIVIDUALS IMPACTED AND POPULATION ESTIMATES FOR SPECIAL STATUS SPECIES ON CONSERVATION LANDS...25

TABLE G-4. ESTIMATED GKR DENSITIES ON THE SILVER CREEK CONSERVATION LANDS 29

TABLE G-5. SAN JOAQUIN KIT FOX SPOTLIGHTING DETECTIONS...34

TABLE G-6. TRAP NIGHTS SPECIES DETECTED PER CAMERA STATION (WESTERN HALF OF THE SILVER CREEK RANCH CONSERVATION LANDS) 36

TABLE G-7. PERCENT TRAP NIGHTS SPECIES DETECTED PER CAMERA STATION (WESTERN HALF OF THE SILVER CREEK RANCH CONSERVATION LANDS)..37

TABLE G-8. MITIGATION AND IMPACT ASSESSMENT BREAKDOWN FOR THE SJKF AT THE PROJECT........41

1 INTRODUCTION

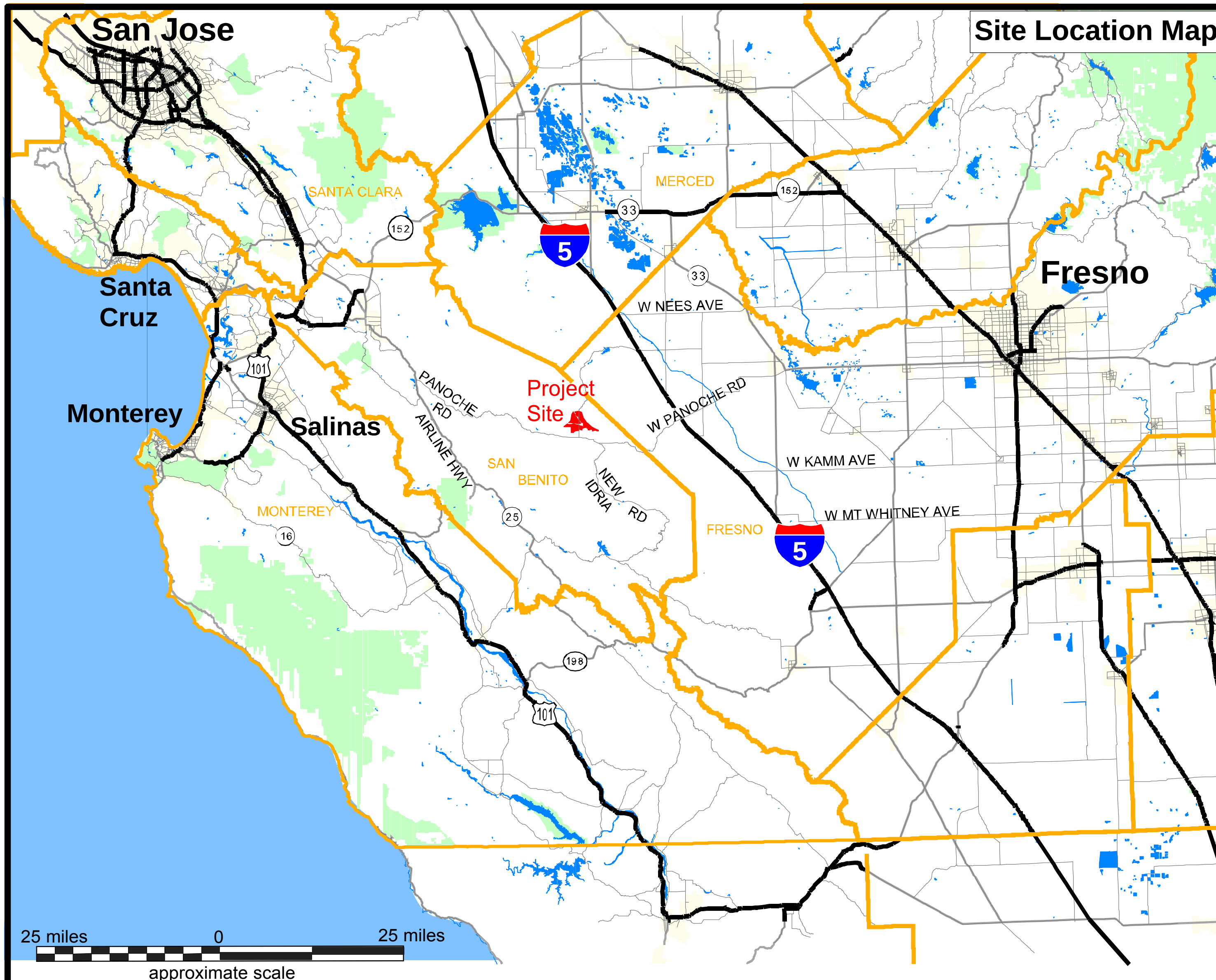
1.1 PROJECT BACKGROUND

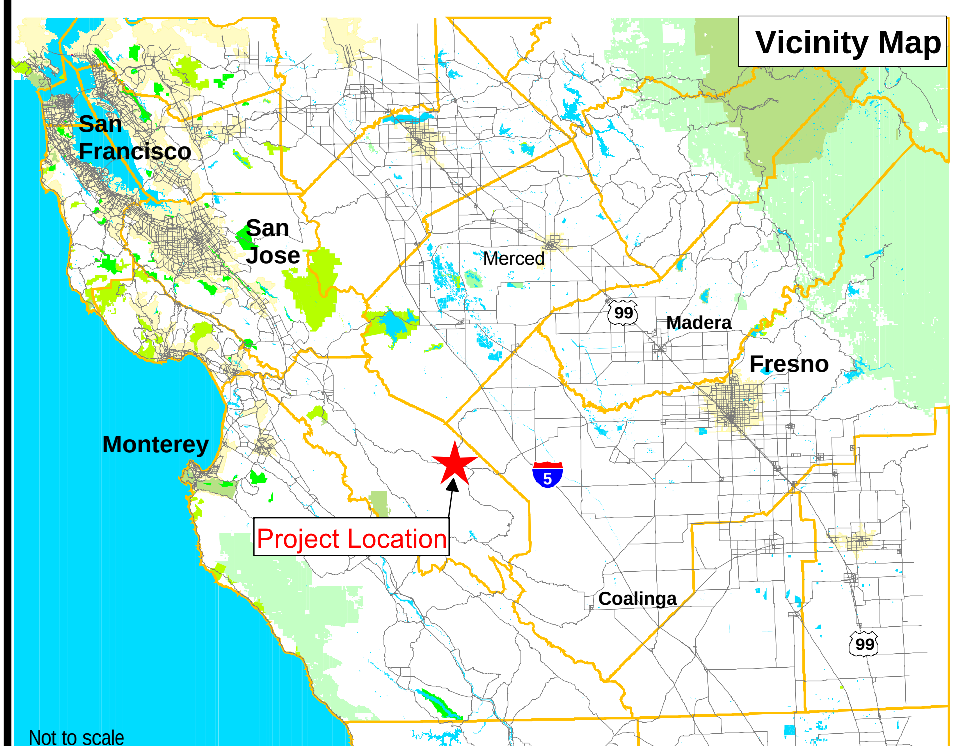
The Applicant, Panoche Valley Solar LLC (formerly Solargen Energy, Inc.) intends to construct a utility-scale, photovoltaic (PV) solar energy production facility on the approximately 2,813-acre Project site, reduced from the original acreage of 4,885 acres (stated in the Final Environmental Impact Report), in the Panoche Valley, San Benito County, California (Figure G-1). The construction and operation of the Panoche Valley Solar Project (Proposed Project or Project) may result in the incidental take of species listed as threatened or endangered under the Federal Endangered Species Act and/or the California Endangered Species Act.

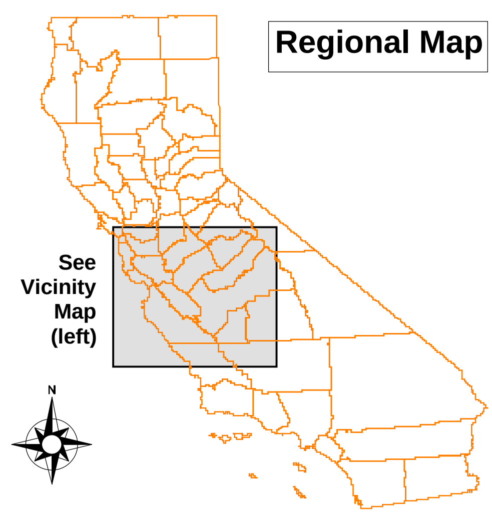
The Proposed Project evolved during San Benito County's 13 month environmental review process under the California Environmental Quality Act (CEQA). The Proposed Project was initially to produce 1,000 megawatts (MW) of PV solar energy from a facility incorporating approximately 10,000 acres of the Panoche Valley. However, in response to concerns about the size of the Proposed Project, it was reduced in size by approximately 60 percent from 1,000 MW on 10,000 acres, to 420 MW on approximately 4,700 acres. San Benito County then prepared a Draft Environmental Impact Report (DEIR) pursuant to CEQA which analyzed the environmental impacts of a 420 MW Project. The DEIR was made available for public comment on June 28, 2010.

The 399-MW Proposed Project footprint is comprised of 4,885 acres (7.6 square miles) in the Panoche Valley located in eastern San Benito County, California. The Proposed Project would be located on heavily grazed rangeland and would generally include development of a solar farm on 2,813 acres of the 4,885 acre footprint, or approximately 50 percent of site (see Figures G-1, G-2, and G-3). Of the 2,813 acres, temporary construction laydown yards would occupy 100 acres and would be reclaimed with native vegetation once construction has completed. Interstitial space between Project infrastructures would incorporate approximately 610 acres, once temporary disturbance areas are reclaimed. The remaining 2,072 acres within the Project boundary would be left undisturbed and designated as the Valley Floor Conservation Lands.

The Valley Floor Conservation Lands would include wildlife movement corridors within onsite drainages and 100-year floodplain totaling 389 acres, as well as 1,683 acres of open space in the southern portion of the Project area, for a total of 2,072 protected acres. These undisturbed areas would remain as open space, and would be managed as onsite conservation areas to maintain and enhance habitat conditions for listed species.







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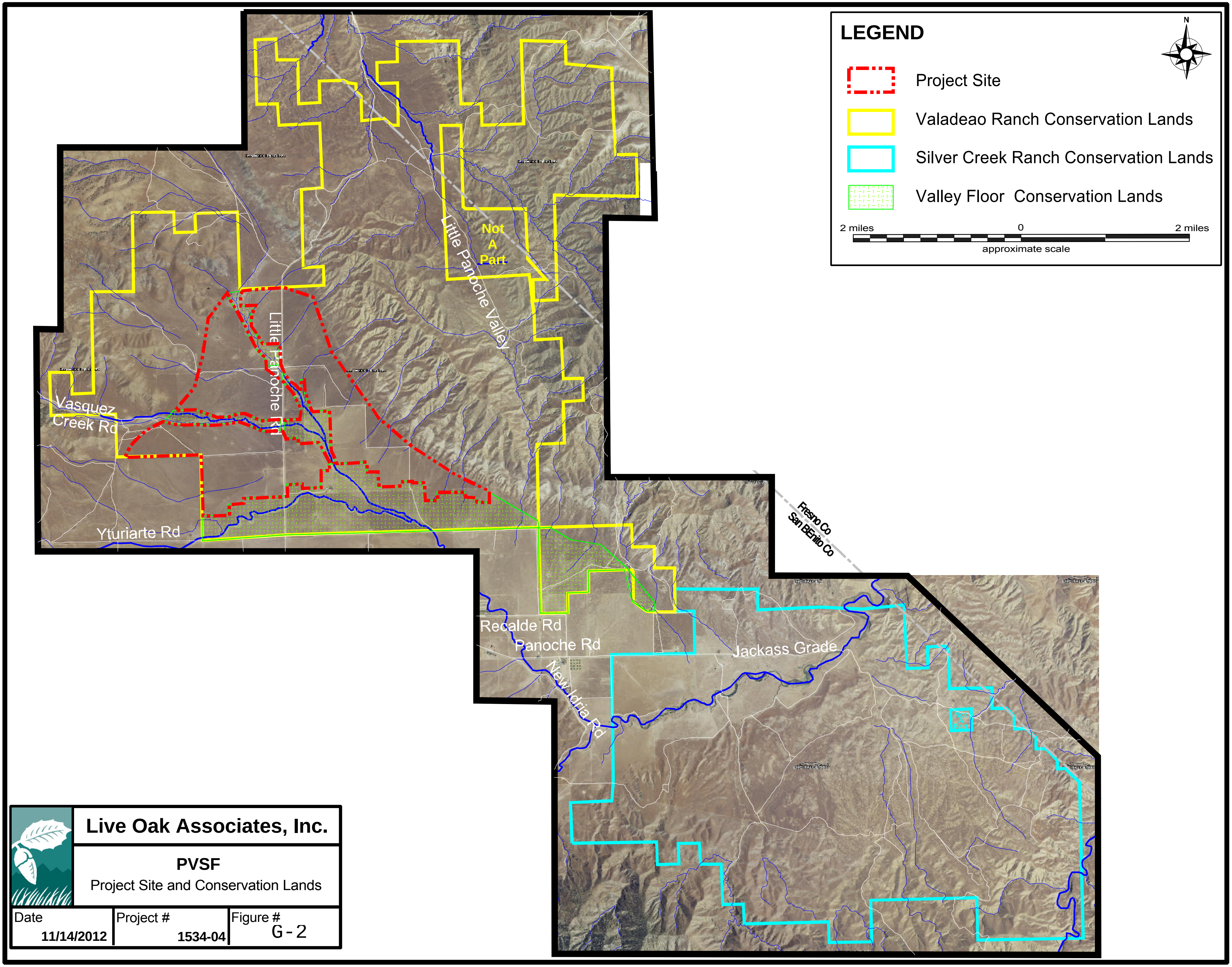
Vicinity Map

Date	Project #	Figure #
11/14/2012	1534-04	G-1



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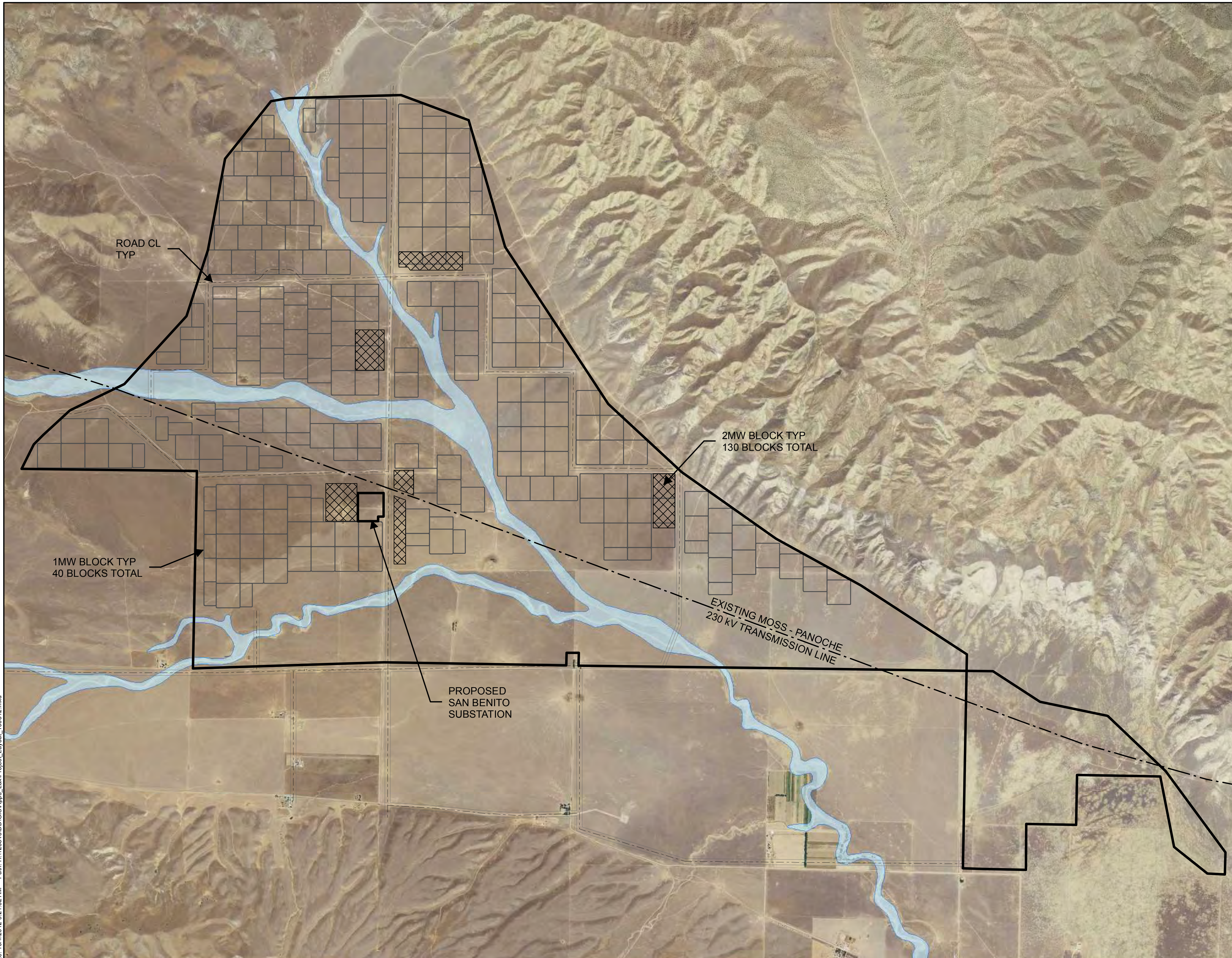
Project Site and Conservation Lands

Date	Project #	Figure #
11/14/2012	1534-04	G-2

Panoche Valley Solar Farm

Figure G-3
Project Layout



Legend

- Existing Moss-Panoche T-Line
- Panoche Valley Solar Farm Boundary
- 2MW Block
- Substation
- Laydown Areas
- Right of Way
- Centerline
- 100-Year Flood Zone

0 1,250 2,500 5,000
Feet

1 in = 2,500 feet

POWER ENGINEERS

Duke Energy Renewables

Date: 10/4/2012 9:21:32 AM Path: H:\125845DD\GIS\Apps_Lax\Project_Layout_100312.mxd

1.2 OFF-SITE MITIGATION LANDS

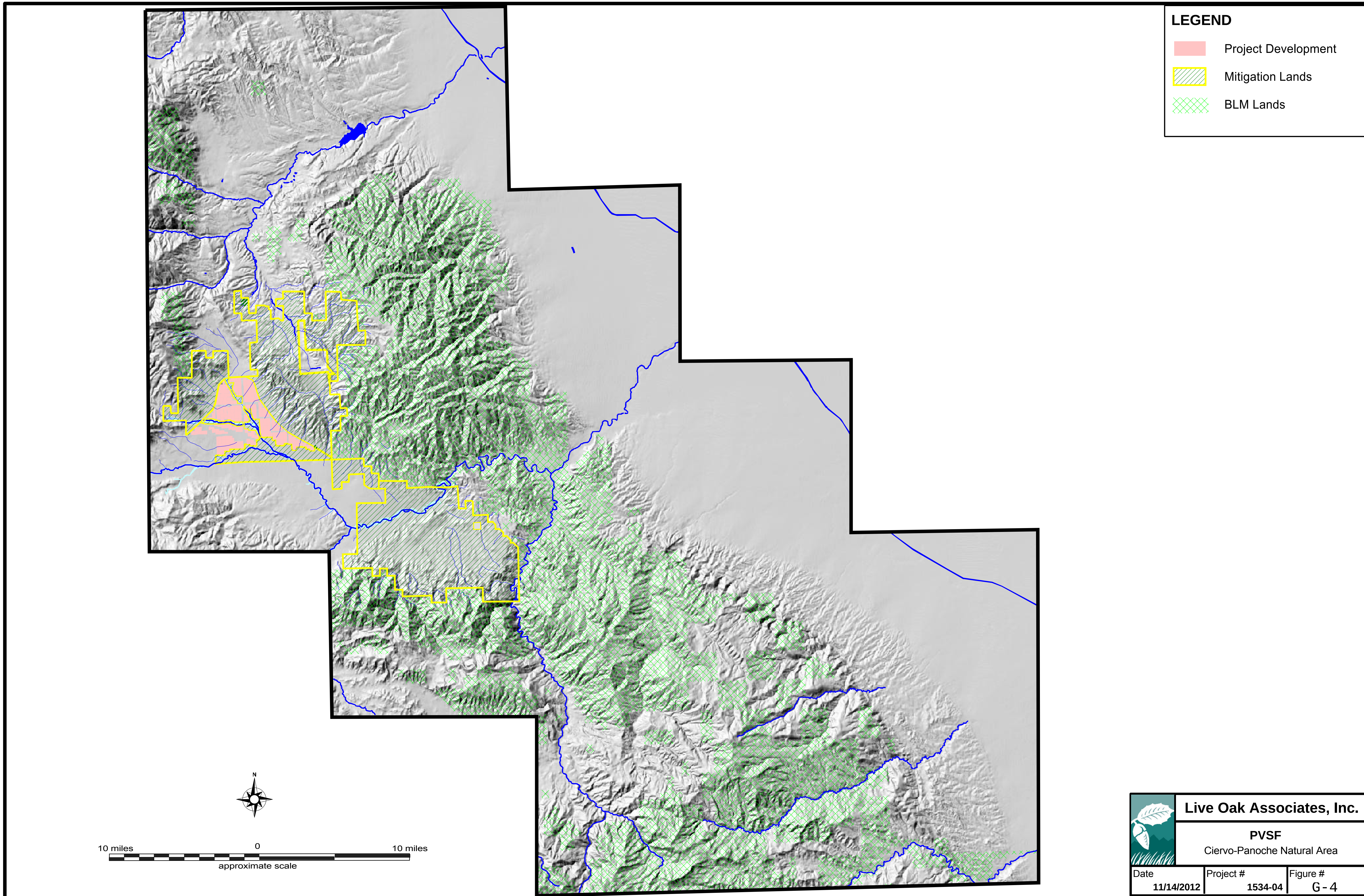
In addition to the designation of the Valley Floor Conservation Lands, the Proposed Project has also retained two large ranches for conservation purposes. These ranches, the Valadeao Ranch Conservation Lands (10,331 acres) and the Silver Creek Ranch Conservation Lands (10,889 acres), are contiguous with the Project site and each other (Figures G-1 and G-2). The Applicant had secured the rights to permanently preserve and manage the mitigation lands in the Panoche Valley known as the Valadeao Ranch prior to the DEIR public comment period. During the DEIR public comment period, the Applicant consulted further with the County, the California Department of Fish and Game (CDFG), the U.S. Fish and Wildlife Service (USFWS), and various experts on the Covered Species regarding additional possible mitigation for unavoidable impacts to sensitive biological resources. The Applicant then identified and secured the rights to permanently preserve and manage additional mitigation lands in the Panoche Valley known as the Silver Creek Ranch.

1.3 SILVER CREEK RANCH LOCATION

The Silver Creek Ranch is located in the Ciervo-Panoche Natural Area in the Panoche Valley along Panoche Road between Hollister and Interstate 5 (Figure G-2). The Silver Creek Ranch is directly south and east of the Project site, adjacent to the Valley Floor Conservation Lands, which is also adjacent to the Valadeao Ranch Conservation Lands (Figure G-2). Elevation on the Silver Creek Ranch ranges from 900 to 2,200 feet, and is mostly surrounded by Bureau of Land Management (BLM) lands with the Griswold Hills to the south, Tumey Hills to the east, and Panoche Hills to the north (Figure G-4), with some adjacent private property as well.

1.4 SILVER CREEK RANCH BACKGROUND

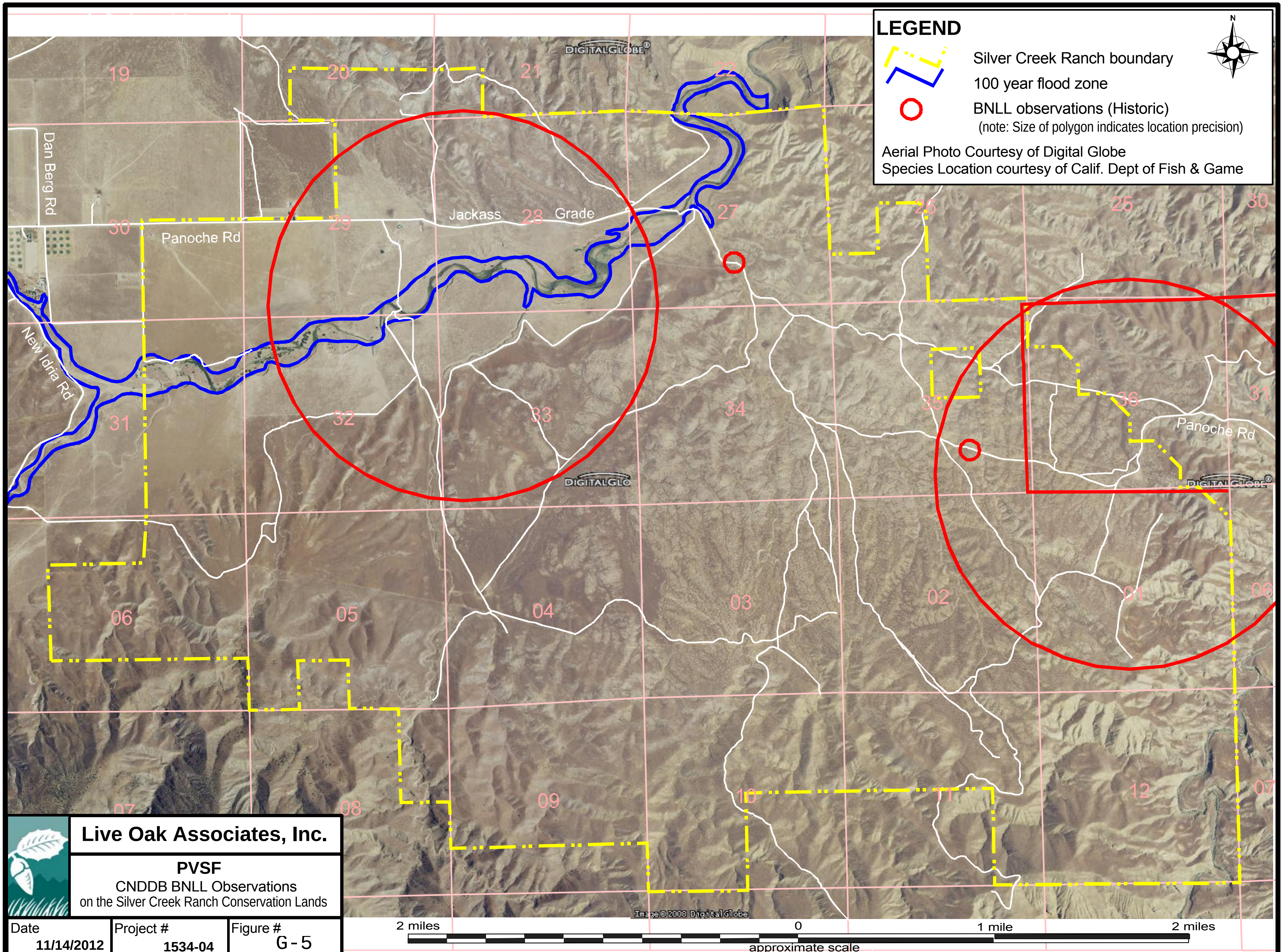
Several published studies have been conducted either on or in the vicinity of the Silver Creek Ranch. No published studies of the blunt-nosed leopard lizard (BNLL) have been published for the Silver Creek Ranch, however, the BNLL 5-year Review (USFWS 2010a) does identify important BNLL habitat near the Silver Creek Ranch. Most published studies are regarding the giant kangaroo rat (GKR) (Grinnell 1932, Hawbecker 1944, Hawbecker 1951, Shaw 1934, Williams and Germano 1992, and Williams et al. 1995). Studies have not been published for the San Joaquin kit fox (SJKF) on the Silver Creek Ranch specifically, however, studies have been published for the SJKF in the general vicinity of the Silver Creek Ranch in the Panoche Valley and Ciervo-Panoche Natural Area (Constable et al. 2009 and Smith et al. 2006).


LEGEND
Project Development
Mitigation Lands
BLM Lands
N
10 miles
0
10 miles
approximate scale
Live Oak Associates, Inc.
PVSF
Ciervo-Panoche Natural Area
Date
11/14/2012
Project #
1534-04
Figure #
G - 4

1.4.1 Blunt-nosed Leopard Lizard Background for the Silver Creek Ranch

The BNLL 5-year review (USFWS 2010a) identifies two Areas of Critical Environmental Concern (ACEC) separated by two miles of BLM lands within the Ciervo-Panoche Natural Area, 4,800 acres and 3,800 acres; these ACECs protect contiguous BNLL habitat east of the Silver Creek Ranch. This designation is the highest level of protection the BLM can assign. There are no other published accounts of BNLL in the vicinity of the Silver Creek Ranch, however, the BNLL 5-year review also states that the Panoche Creek and Silver Creek have been identified as important dispersal corridors through the Ciervo-Panoche Natural Area; portions of both creeks flow through the Silver Creek Ranch.

The California Natural Diversity Database (CNDDB) (CDFG 2012) has records of the BNLL occurring in Cerro Colorado, Chounet Ranch (1958), Hammonds Ranch (1978), Idria (1980), Laguna Seca Ranch (1993), Mercey Hot Springs (2005), Panoche (2004), and Tumey Hills (1993) USGS quads. The years in parenthesis represent the most recent CNDDB documented occurrence in each quadrangle. There are four records in the CNDDB of BNLL on the Silver Creek Ranch (Figure G-5).



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CNDDB BNLL Observations
on the Silver Creek Ranch Conservation Lands

Date	Project #	Figure #
11/14/2012	1534-04	G-5

1.4.2 Giant Kangaroo Rat Background for the Silver Creek Ranch

Grinnell (1932) reported observations of GKR along Panoche Pass in 1932 from 600 feet to close to 1,100 feet in elevation "between Panoche Creek and Silver Creek, and thus a trifle over on the San Benito County side of the boundary between that county and Fresno County". This location is a description of the eastern side of the Silver Creek Ranch. Grinnell stated that the land was grazed by sheep "to the limit of its carrying capacity", with bare barren ground, dead shrubs, and soil eroding from the steeper slopes, however, he also stated that GKR "owned" the terrain, as no other seed-eating mammals were observed within the area of GKR precincts. Grinnell counted GKR precincts in three one-acre plots and trapped for GKR. His studies on the Silver Creek Ranch resulted in density estimates for three, one-acre plots of 28, 16, and 21 GKR per acre (Table G-1), caught 36 GKR in 175 trap-nights, noted that they ate "green stuff" and not just seeds when herbaceous vegetation is in the beginning of the growing season, and identified the great horned owl and coyote as predators of the GKR. Grinnell also studied areas near where Panoche Creek leaves the foothills.

TABLE G-1. HISTORIC GKR DENSITY ESTIMATES REPORTED IN THE LITERATURE

LOCATION	ESTIMATED DENSITY (#GKR/ACRE)	ESTIMATED DENSITY (#GKR/HECTARE)	SURVEY PERIOD	PUBLICATION	ADDITIONAL INFORMATION
Panoche Valley region	0.82 to 21.04	0.33 to 8.51	July 1979 to October 1987 *Note: Above avg. precipitation*	Williams (1992)	2 in 6 hectares
Panoche Creek	3.64	1.47	1986 *Note: Above avg. precipitation*	Williams (1992)	
Panoche Fan	21.04	8.52	1932 *Note: Above avg. precipitation*	Williams (1992)	
Panoche Hills	2.43	0.98	1981 *Note: Above avg. precipitation*	Williams (1992)	
Panoche Valley	0.82	0.33	1979 *Note: Above avg. precipitation*	Williams (1992)	
Tumey Hills	2.83	1.15	1981 *Note: Above avg. precipitation*	Williams (1992)	
Near Valadeao Ranch	5.93 and 7.90	2.4 and 3.2	Summer of 1992 *Note: Above avg. precipitation*	Williams et al. (1995)	
On Silver Creek Ranch*	2.25 to 36.33	0.91 to 14.71	Summer of 1992 *Note: Above avg. precipitation*	Williams et al. (1995)	

LOCATION	ESTIMATED DENSITY (#GKR/ACRE)	ESTIMATED DENSITY (#GKR/HECTARE)	SURVEY PERIOD	PUBLICATION	ADDITIONAL INFORMATION
On Silver Creek Ranch	2.26 to 36.35 With an average of 11.99	0.91 to 14.72 With an average of 4.85	Summer of 1992 *Note: Above avg. precipitation*	Williams et al. (1995)	10 colonies were located #28-37; however, population estimates were not calculated for #28.
Valley Floor Conservation Lands and adjacent private land.	No estimate	No estimate	Summer of 1992 *Note: Above avg. precipitation*	Williams et al. (1995)	No population estimate was made for colony #5.
Panoche Fan along Panoche Creek approx. 5.5 miles to the northeast of Silver Creek Ranch	16, 20, and 28 With an average of 21	6.48, 8.10, and 11.34 With an average of 8.50	February 1932 *Note: Above avg. precipitation*	Grinnell (1932)	For 3 separate acres

*The 14.71/hectare colony is an outlier, and without it the highest density is 6.92 GKR / hectare.

Shaw's (1934) studies in 1933 involving investigations into GKR seed harvesting and storing was conducted at "Panoche Creek near where it leaves the foothills of the Coast Ranch Mountains and enters the plain, about 50 miles west of the City of Fresno…". This location is in the vicinity of the Silver Creek Ranch. Shaw stated that the land was over-grazed and that "several hundreds of sheep" were trampling the land, however, GKR pit caches remained unharmed. Shaw's studies resulted in descriptions of surface pit caches and excavations of precincts resulted in mapping of precincts including dichotomous burrow systems, surface pit caches, and copious amounts of stored seeds underground; one excavated precinct revealed nine underground caches with a total of almost 35 quarts of seeds.

Hawbecker (1944) studied GKR's relationship to sheep forage six miles east of Panoche and approximately six miles southwest of Grinnell's (1932) and Shaw's (1934) studies took place where Panoche Creek leaves the foothills. This triangulation places Hawbecker's (1944) studies on the Silver Creek Ranch. Hawbecker's studies noted that San Joaquin antelope squirrels (SJAS) were "definitely resident in numbers", and used kangaroo rat burrows; identified San Joaquin kit fox (*Vulpes mutica mutica*), American badger (*Taxidea taxus*), barn owl (*Tyto alba*), and a weasel (*Mustela* sp.) as predators of kangaroo rats; identified seed curing known as haystacks; identified locations of GKR precincts as "high spots of hillsides" or "the tops of 'hog-wallows' in flat country" with occasional activity in low spots; indicated that sheep forage on precincts including old precincts supported better growths than non-precinct areas, causing sheep to preferentially forage on precincts; and indicated that kangaroo rats increase herbaceous sheep forage by five times on precincts than off precincts.

Hawbecker's (1951) examination of small mammal relationships in ephedra community on the Silver Creek Ranch (note: photos within this article show the Silver Creek Ranch topography, though current vegetation consists of less ephedra shrubs than photos in this article) in an area ranging from 1,000 to 1,800 feet elevation. Hawbecker ran transects and observed SJAS present irregularly in the non-shrubby area; identified GKR as the dominant nocturnal small rodent in brushless areas; noted that the "levelness of terrain does not seem to be as important here as the lack of cover"; showed dominance changing to Heermann's kangaroo rat in areas of denser cover; and did not locate GKR on ridges, but did locate them on slopes with less cover on either side of ridges.

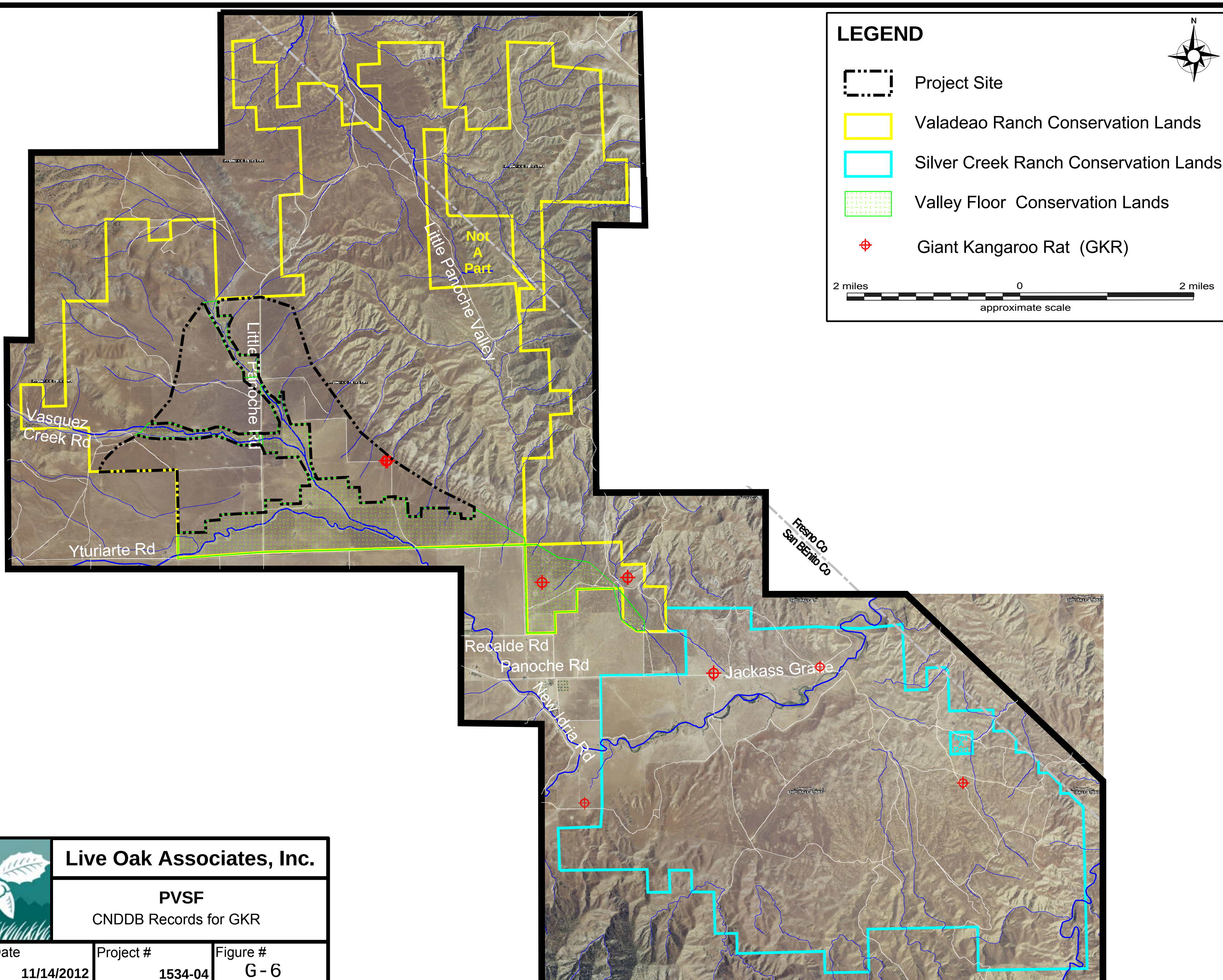
Williams and Germano (1992) examined the state of endangered kangaroo rats in the San Joaquin Valley in order to guide recovery planning. One of the sites Williams and Germano surveyed for potential habitat in western Fresno and eastern San Benito counties included the Tumey-Panoche region (which is in the vicinity of the Silver Creek Ranch). These sites were revisited in 1993 and results were reported for GKR by Williams et al. (1995).

Williams et al.'s (1995) study revisited colonies and potential habitat for GKR identified in 1992 by Williams and Germano (1992) in western Fresno and eastern San Benito counties. For the 1992-1993 timespan, an estimate of 37,125 GKR on the study area was calculated, this is an increase from an estimate of 2,000 GKR in 1980-1985; the authors attribute this population increase to the end of a five year drought that ended in 1991. Seventy-nine GKR colonies were identified and mapped. The largest colonies were located on Panoche and Mugata fine sandy-loam soils; however, smaller colonies were located on various other soil types. Ten of these colonies were identified on the Silver Creek Ranch with estimated densities ranging from 2.25 to 36.33 GKR per acre. These colonies are shown in Figure 41 of the *Recovery Plan for Upland Species of the San Joaquin Valley* (USFWS 1998; Recovery Plan) and identified as "source populations".

The CNDDB has records of the GKR occurring in the following USGS quadrangle maps: Chounet Ranch (1958), Idria (1979), Mercey Hot Springs (1992), Monocline Ridge (1992), Panoche (2004), and Tumey Hills (2006). The years in parenthesis represent the most recent CNDDB documented occurrence in each quadrangle. There are three records in the CNDDB of GKR on the Silver Creek Ranch (Figure G-6).

1.4.3 San Joaquin Kit Fox Background for the Silver Creek Ranch

No published studies exist for the SJKF on the Silver Creek Ranch, and few published studies exist for SJKF in the vicinity of the Silver Creek Ranch.



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CNDDB Records for GKR

Date	Project #	Figure #
11/14/2012	1534-04	G-6

Smith et al. (2006) conducted a study using scat-sniffing dogs throughout the range of the SJKF. The population in the Panoche Valley is of lower abundance and more difficult to detect than in the southern portion of their range. After searching 12 kilometers (km) in the Ciervo-Panoche Natural Area, only 19 scats were located (1.58 scats/km), in contrast, the least dense area searched in the southern portion of the range that was positive for SJKF, Carrizo Plain National Monument, had 4.0 km searched and 221 scats located (55.25 scats/km). The overall difference between the central and southern portions of the range was that out of all the transects searched, the central range had a density of 0.24 scats/km and the southern range had a density of 8.02 scats/km. This indicated that the central region of the SJKF range is much less dense than the southern region.

Constable et al. (2009) conducted a study directed at gaining information about the SJKF population north of Panoche Valley, and found that in Panoche Valley, camera stations captured photos of SJKF 0.4 per 100 camera-nights and track stations captured prints of SJKF 1.5 per 100 station-nights. SJKF were continually observed in these manners. They also observed two road-killed SJKF, one was on Little Panoche Road and one was on Panoche Road; neither of these road-kills were on the Project site, however, one live sighting was either near or on the Project site. They observed a lower abundance of coyotes in Panoche Valley; coyotes are a major source of mortality for the SJKF, so this lower abundance may be why the SJKF population is doing better in Panoche Valley than in some other areas.

The CNDDB shows 32 records of SJKF occurring within 10-miles of the site from 1958 to 2006, with the majority of these observations occurring along roads. CNDDB observations were made in the following USGS quadrangle maps: Chounet Ranch (1977), Hammonds Ranch (1920), Idria (1975), Laguna Seca Ranch (2001), Llanada (1994), Mercey Hot Springs (2006), Ortigalita Peak (1975), Panoche (2006), Topo Valley (1987) and Tumey Hills (1989). The years in parenthesis represent the most recent CNDDB documented occurrence in each quadrangle. There are five records in the CNDDB of SJKF on the Silver Creek Ranch (Figure G-7).

1.4.4 Recovery Plan and 5-year Review Recommendations

The Silver Creek Ranch is specifically identified in the Recovery Plan (USFWS 1998) and the Recovery Plan 5-year Reviews (USFWS 2010a, 2010b, 2010c), as an area with high habitat value for the Covered Species. The Recovery Plan (USFWS 1998:19) also identifies that the BLM has a program of acquisition in which the Silver Creek Ranch is one of the two main ranches that the BLM has a goal of purchasing (this is later called the Ciervo-Panoche Natural Area in the rest of that document; Figure G-4 shows an approximate outline of the Ciervo-Panoche Natural Area). The Recovery Plan (USFWS 1998), in reference to GKR, also has a goal to "protect all existing natural land on the Silver Creek Ranch…" (Page 95) and in reference to BNLL to "Protect additional habitat for them in key portions of their range; areas of highest priority to target for protection are: …Natural lands in the Panoche Valley area of Silver Creek Ranch, San Benito County" (Page 122). Even though the Project does not propose to take any BNLL, it will preserve a "highest priority" area by preserving the Silver Creek Ranch. As biological surveys on the Silver Creek Ranch reported in the literature last occurred in 1993, it was determined that more recent data was required to examine present conditions of these species on the Silver Creek Ranch. Section 2 of this report provides 2010 field confirmation of present conditions for Special Status Species on the Silver Creek Ranch.

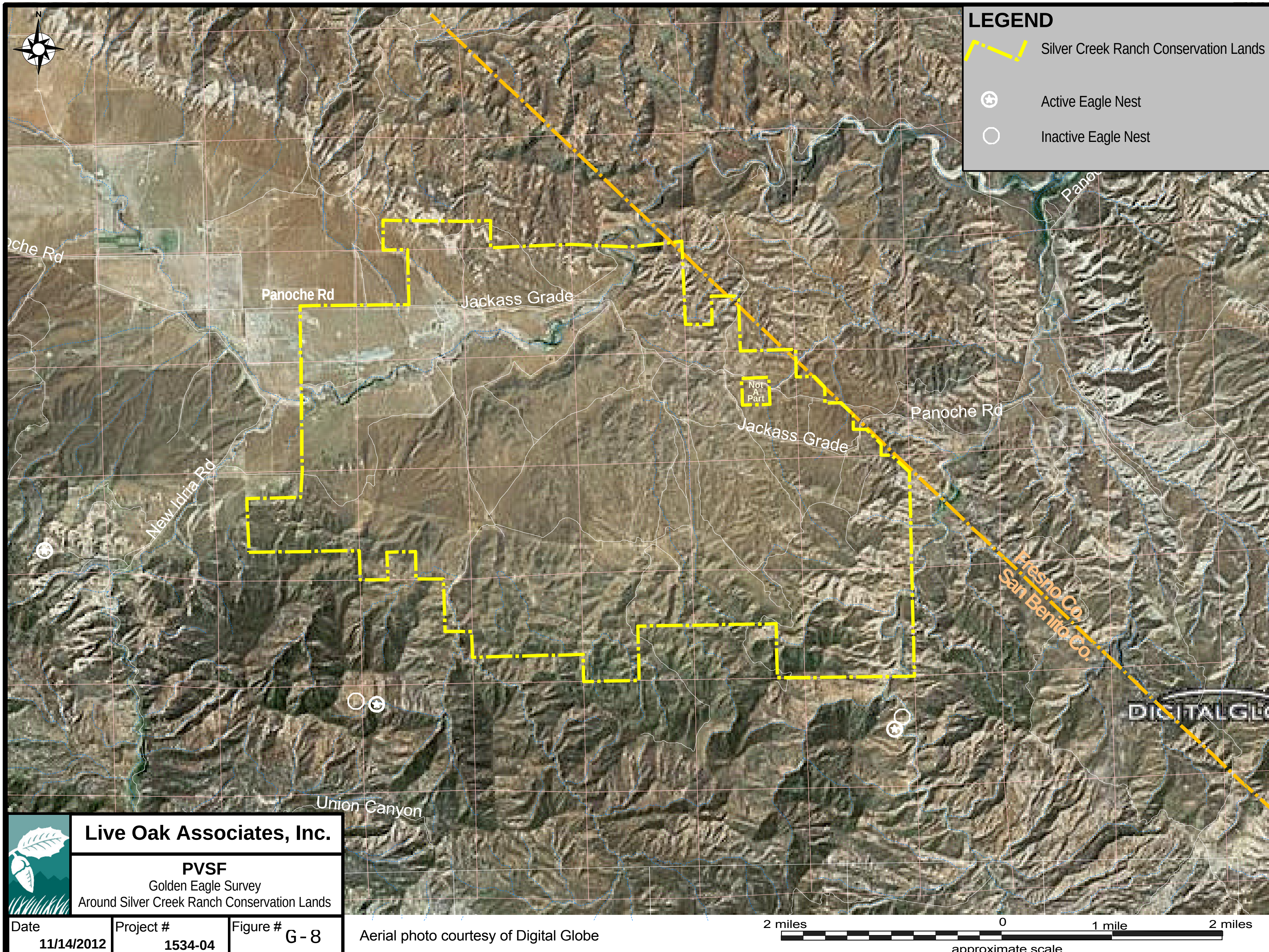
2 CONFIRMATION OF PRESENT CONDITIONS OF SPECIAL STATUS SPECIES ON THE SILVER CREEK RANCH IN 2010

Although previous literature, including the Recovery Plan (USFWS 1998) and 5-year Reviews (USFWS 2010a, 2010b, 2010c), reports the high density of various special status species on the Silver Creek Ranch, and identifies the Silver Creek Ranch as a key area for conservation in the Ciervo-Panoche Region for these species, current biological information on the Silver Creek Ranch was not available. Therefore, LOA conducted several surveys on the Silver Creek Ranch Conservation Lands in 2010 in order to assess the current conditions on the Ranch. 2010 surveys on the Silver Creek Ranch Conservation Lands were conducted in order to confirm current conditions of special status species on the Silver Creek Ranch; these surveys were qualitative surveys, not quantitative surveys, and were conducted as an initial assessment of the Ranch as potential mitigation land.

Golden Eagle Survey

A survey for golden eagles and their nests was conducted via helicopter on August 6 and 7, 2010. The area surveyed included a 10-mile radius around the 4,885-acre Project site, which includes the 2,813 acres that will be impacted by the Project and the 2,072-acre Valley Floor Conservation Lands. The survey was conducted in accordance with the *U.S. Fish and Wildlife Service Interim Guidelines for Golden Eagle Surveys*. Blue Sky Helicopters of Redlands, CA flew two biologists (Pete Bloom and Scott Thomas) over the site and within a 10-mile radius of the Project site. During the flight, one biologist observed at all times while the other recorded and marked data when appropriate. Two global positioning system (GPS) units, one primary and one backup, were used to document geographic locations of importance and the routes taken; these coordinates were also entered in field notes.

The Silver Creek Ranch is entirely within the area surveyed for golden eagles. The entire survey identified a total of 15 golden eagle nests; nine active and six inactive nests. No golden eagle nests were observed on the Silver Creek Ranch Conservation Lands, however, five were observed nearby to the south of the Silver Creek Ranch Conservation Lands. Three of these nests were active and two were inactive during the 2010 survey (Figure G-8). Additionally, nests of barn owls, great horned owls, prairie falcons, red-tailed hawks, and turkey vultures were identified. None of these nests were on the Silver Creek Ranch Conservation Lands; however, many were in the nearby hills. Given the proximity of the golden eagle nests, golden eagles and other raptors are likely to use the entire site for foraging habitat; although no golden eagle nests were identified on the Silver Creek Ranch during these surveys, marginal nesting habitat exists on the Ranch in the form of rock crevices and trees along the Panoche and Silver Creeks.



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Golden Eagle Survey

Around Silver Creek Ranch Conservation Lands

Date	Project #	Figure #
11/14/2012	1534-04	G-8

Aerial photo courtesy of Digital Globe

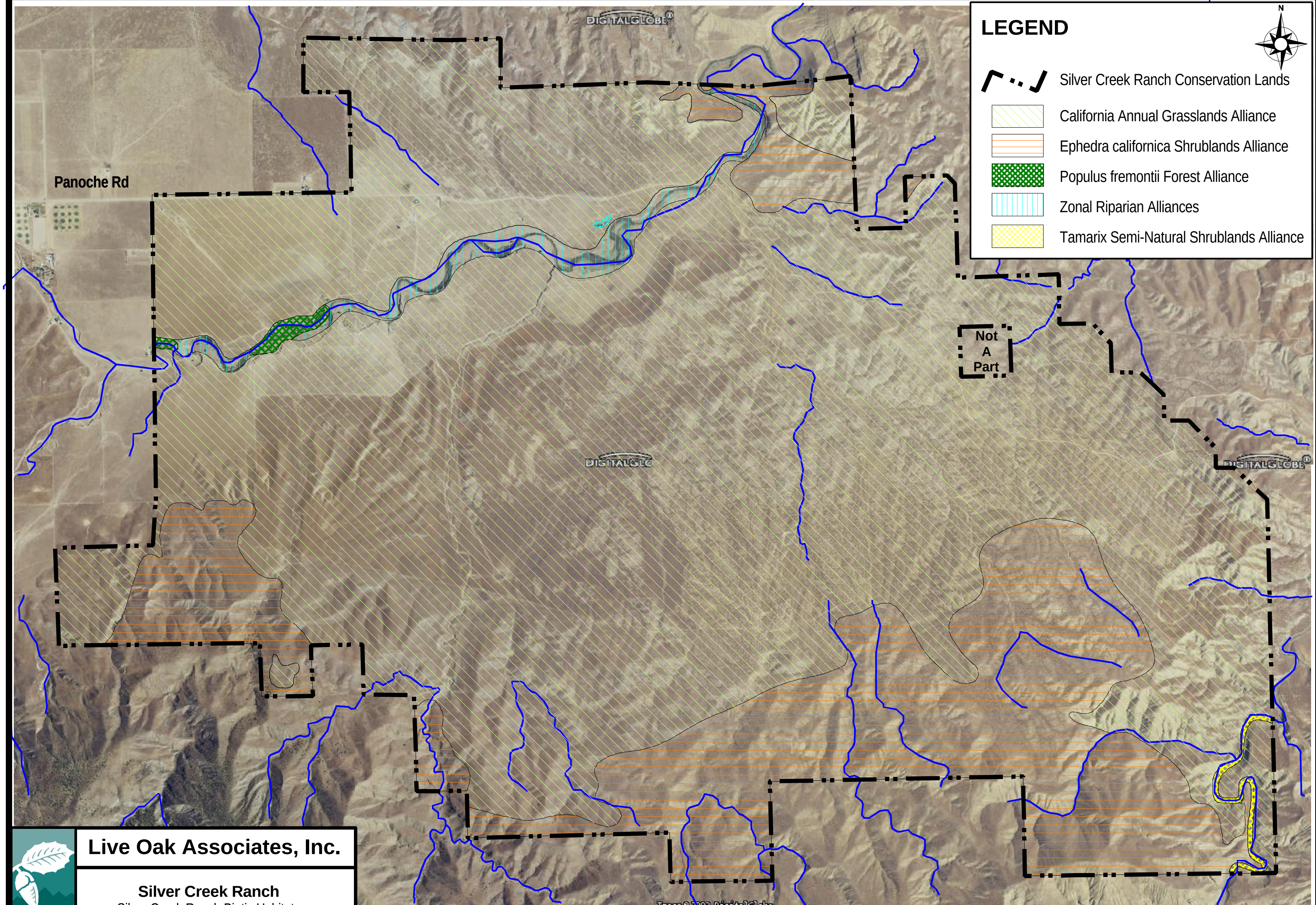
Habitat Mapping of the Silver Creek Ranch Conservation Lands

Live Oak Associates (LOA) botanists surveyed the Silver Creek Ranch Conservation Lands from September 3 through September 5, 2010 to create a general habitat map to be used to better understand the biotic conditions on the Ranch. Elevations on the Silver Creek Ranch range from 900 to 2,200 feet above mean sea level (amsl). California annual grasslands comprise the majority of ground cover on the site (approximately 8,400 acres) and are dominated by non-native species distributed sparsely over the landscape; the site also supports ephedra shrubland (approximately 2,260 acres), riparian areas, seeps, springs, and barrens (see Figure G-9). An area of tamarisk shrubland occurs along Silver Creek, and small areas of emergent wetlands and marsh occur along Panoche Creek. These lands also include several seasonal drainages and upland habitat. Soils on the Silver Creek Ranch are less complex than those found on the Valadeao Ranch and are generally characterized as well drained and moderately permeable. Two populations of *Eriogonum nudum* var. *indictum* (California Native Plant Society [CNPS] List 4) were also observed during the reconnaissance surveys. This habitat mapping effort provides a general characterization of habitats of the Silver Creek Ranch, which was further used to assess the Ranch for possible presence of special status species.

Reconnaissance Surveys on the Silver Creek Ranch Conservation Lands

LOA biologists surveyed Silver Creek Ranch August 30 through September 3, 2010. Reconnaissance level surveys of the entire property confirmed the presence of BNLL (four individual juveniles), loggerhead shrike (individuals), mastiff bat (*Eumops perotis*) (at least one individual), GKR (precincts and scat), SJKF (burrows, scat, and five individuals identified during one night of spotlighting), SJAS (dozens of individuals and scat), and American badger (burrows). All Covered Species except CTS or evidence of them were observed by LOA on these lands during the reconnaissance survey in late August-early September of 2010, however, the survey time was short and in the wrong season to appropriately survey for CTS.

These surveys confirmed the value of the Silver Creek Ranch as stated in the Recovery Plan (USFWS 1998), however, additional surveys were required to collect quantitative information to inform a detailed conservation strategy, therefore, focused surveys were conducted for the BNLL, GKR, and SJKF in 2012. Section 3 provides a summary of the 2012 focused surveys at the Silver Creek Ranch.



Live Oak Associates, Inc.

Silver Creek Ranch
Silver Creek Ranch Biotic Habitats

Date	Project #	Figure #
11/14/2012	1534-04	G-9

2 miles 0 1 mile 2 miles
approximate scale

Aerial photo courtesy of Digital Globe

3 SILVER CREEK RANCH 2012 FOCUSED SURVEYS

Although BNLL, GKR, and SJKF presence was confirmed by LOA during 2010, in order to collect quantitative information to inform a detailed conservation strategy, focused surveys were conducted for the BNLL, GKR, and SJKF in 2012. Table G-2 lists focused surveys conducted on the Silver Creek Ranch in 2012, and each is discussed in detail in the following text. Although not a focused survey, a hydrology and CTS reconnaissance survey was conducted on the Silver Creek Ranch Conservation Lands on June 28, 2012 in order to identify potential locations to construct new CTS ponds.

Training was conducted prior to the BNLL and GKR focused surveys to (re)familiarize each of the nine biologists (three teams of three) with the identification of the species that occur or may occur on the Silver Creek Ranch (side-blotched lizard, western fence lizard, whiptail lizard, coast horned lizard, BNLL, Heermann's kangaroo rat, GKR, SJAS, California ground squirrel, and SJKF). When new biologists started on the team they were also trained. These trainings ensured that all biologists calibrated their search image to a consistent search image and thus reduced bias. Conversations and retrainings also recalibrated this search image throughout the two weeks. Teams included biologists from LOA, Rincon Consultants, Inc., and McCormick Biological, Inc.

TABLE G-2. SURVEYS CONDUCTED ON THE SILVER CREEK RANCH CONSERVATION LANDS IN 2012

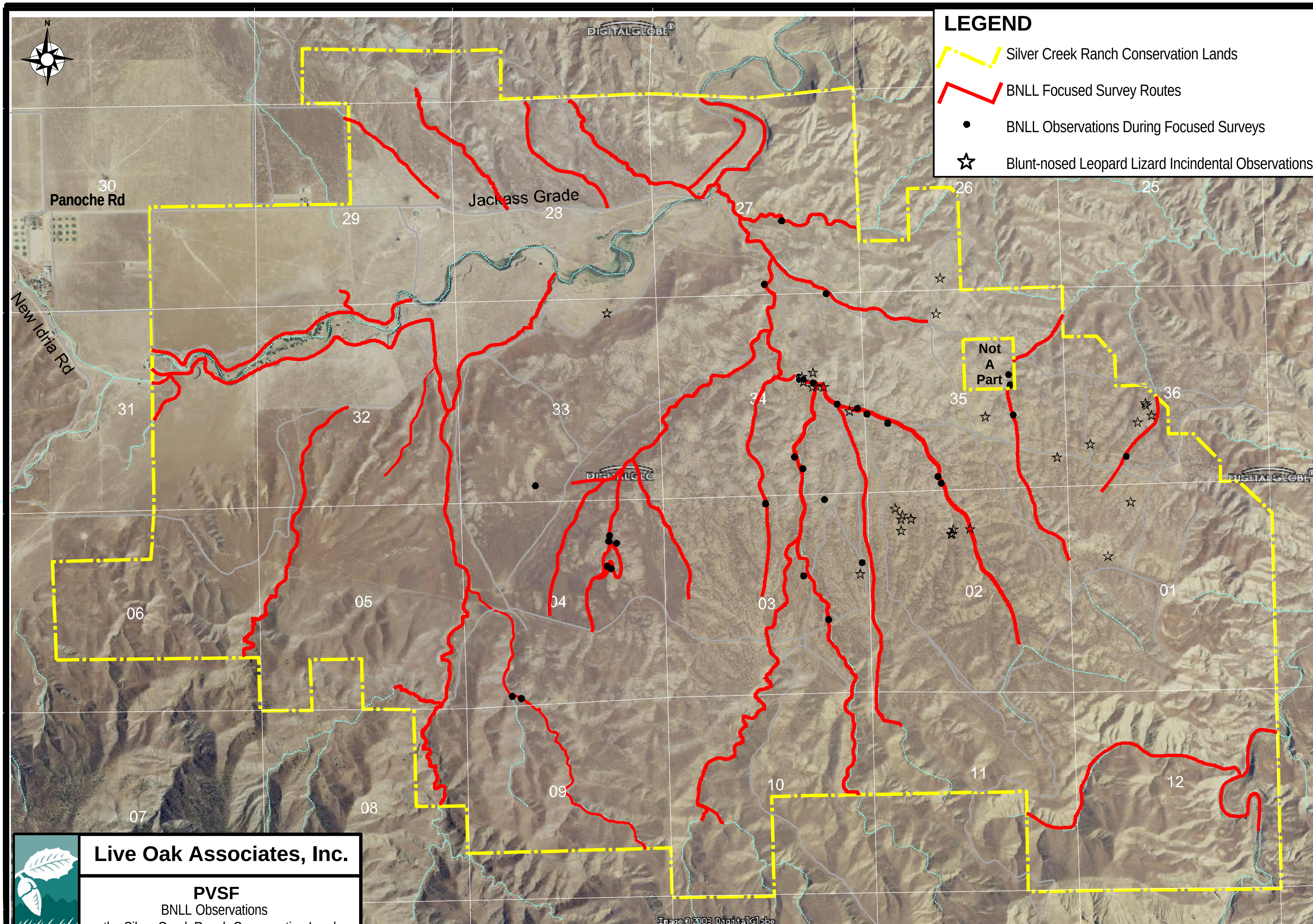
SURVEY NAME	SURVEY DESCRIPTION	DATES	LANDS SURVEYED	SPECIAL STATUS ANIMAL SPECIES DETECTED
Hydrology and CTS Reconnaissance Survey	Identify locations to construct new CTS ponds.	June 28, 2012	Valadeao Ranch and Silver Creek Ranch Conservation Lands (CL)	GKR, SJKF
Blunt-nosed Leopard Lizard Focused Survey (2012)	Focused BNLL surveys on the 10,889-acre Silver Creek Ranch, following time of day and weather protocols, targeting drainages.	Summer 2012 (September 10-17, 2012)	Silver Creek Ranch CL	BNLL, GKR, SJAS, SJKF, Amercian badger, golden eagle, western burrowing owl, western pond turtle
Giant Kangaroo Rat focused surveys	GKR focused surveys (100 50-meter radius plots) on the Silver Creek Ranch in source population polygons identified in Figure 41 of the Recovery Plan (USFWS 1998).	Summer 2012 (September 10-21, 2012)	Silver Creek Ranch CL	GKR, SJKF, SJAS, BNLL, golden eagle, American badger
Spotlighting for San Joaquin Kit Fox	Spotlighting on the 10,889-acre Silver Creek Ranch and public roads in the vicinity surrounding the ranch.	Summer/Fall 2012 (September 23-November 2, 2012)	Silver Creek Ranch CL	SJKF, Amercian badger, GKR, western burrowing owl,
Camera Trapping for San Joaquin Kit Fox	Camera Trapping (with bait) on the 10,889-acre Silver Creek Ranch. 20 camera trap locations.	Summer/Fall 2012 (September 25-November 2, 2012)	Silver Creek Ranch CL	SJKF, Amercian badger, GKR, western burrowing owl, tricolored blackbird

3.1 BLUNT-NOSED LEOPARD LIZARD

3.1.1 Survey Protocol

Focused BNLL surveys were conducted on the Silver Creek Ranch Conservation Lands in September of 2012. These focused surveys were organized in the field by Dr. Mark Jennings, an expert herpetologist. As abridged protocol-level surveys in 2009 and full protocol-level surveys in 2010 of the Valley Floor Conservation Lands located all observations of BNLL in or near the washes, targeted habitat areas for the focused surveys on the Silver Creek Ranch Conservation Lands were the drainages of the ranch. Figures G-10 and G-11 show focused survey routes and species detections during these surveys.

BNLL focused surveys were conducted from September 10th through September 17th, 2012. Each team of three biologists surveyed drainages, with one biologist walking in the drainage and two biologists on either side. Focused BNLL surveys were conducted according to specifications within the BNLL survey protocol except that drainages were targeted and surveys were conducted on September 17th (two days past the protocol dates). However, Dr. Jennings determined that the weather was still warm enough to continue with surveys, as evidenced by incidental BNLL sightings through September 21st, 2012.



Live Oak Associates, Inc.

PVSF

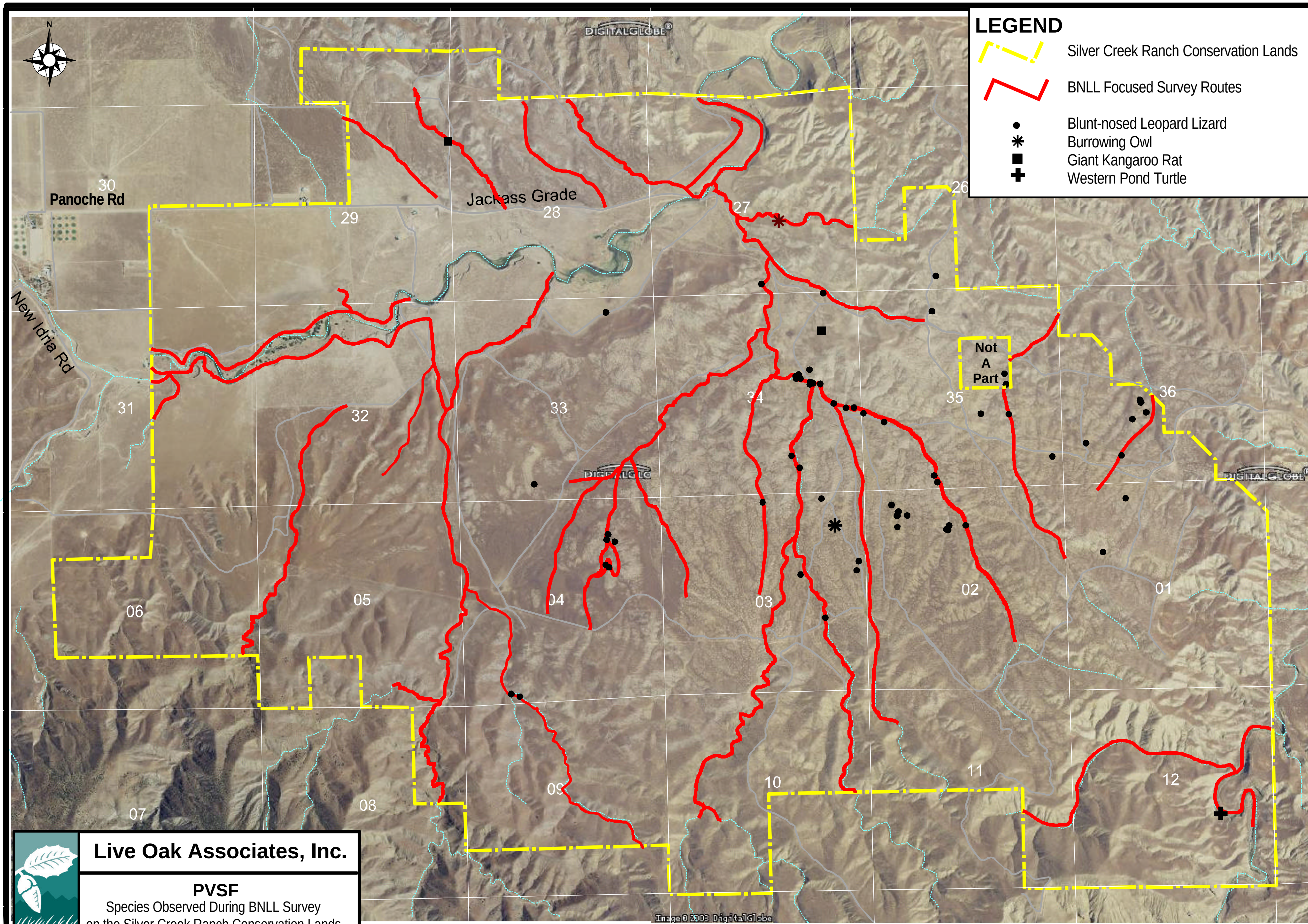
BNLL Observations
on the Silver Creek Ranch Conservation Lands

Date	Project #	Figure #
11/14/2012	1534-04	G-10

2 miles | 0 | 1 mile | 2 miles

approximate scale

Aerial photo courtesy of Digital Globe



Aerial photo courtesy of Digital Globe

Live Oak Associates, Inc.

PVSF
Species Observed During BNLL Survey
on the Silver Creek Ranch Conservation Lands

Date	Project #	Figure #
11/14/2012	1534-04	G-10

3.1.2 Blunt-nosed Leopard Lizard Survey Results

Focused BNLL surveys confirmed presence of BNLL, western pond turtle, golden eagle, western burrowing owl, GKR, SJAS, SJKF and American badger on the Silver Creek Ranch Conservation Lands. Thirty-one (31) BNLL were observed during focused surveys for BNLL and there were 30 incidental BNLL detections during GKR focused surveys. BNLL were incidentally observed during GKR focused surveys from September 11th through September 21st, 2012. The majority of these incidental observations were not associated with a drainage. A total of 61 BNLL detections occurred in a two-week period (Figures G-10 and G-11). All BNLL observed were juveniles except for two subadults. It is important to note that during BNLL focused surveys, juvenile BNLL were observed within drainages, on hill slopes, and even on top of rocks on ridge tops.

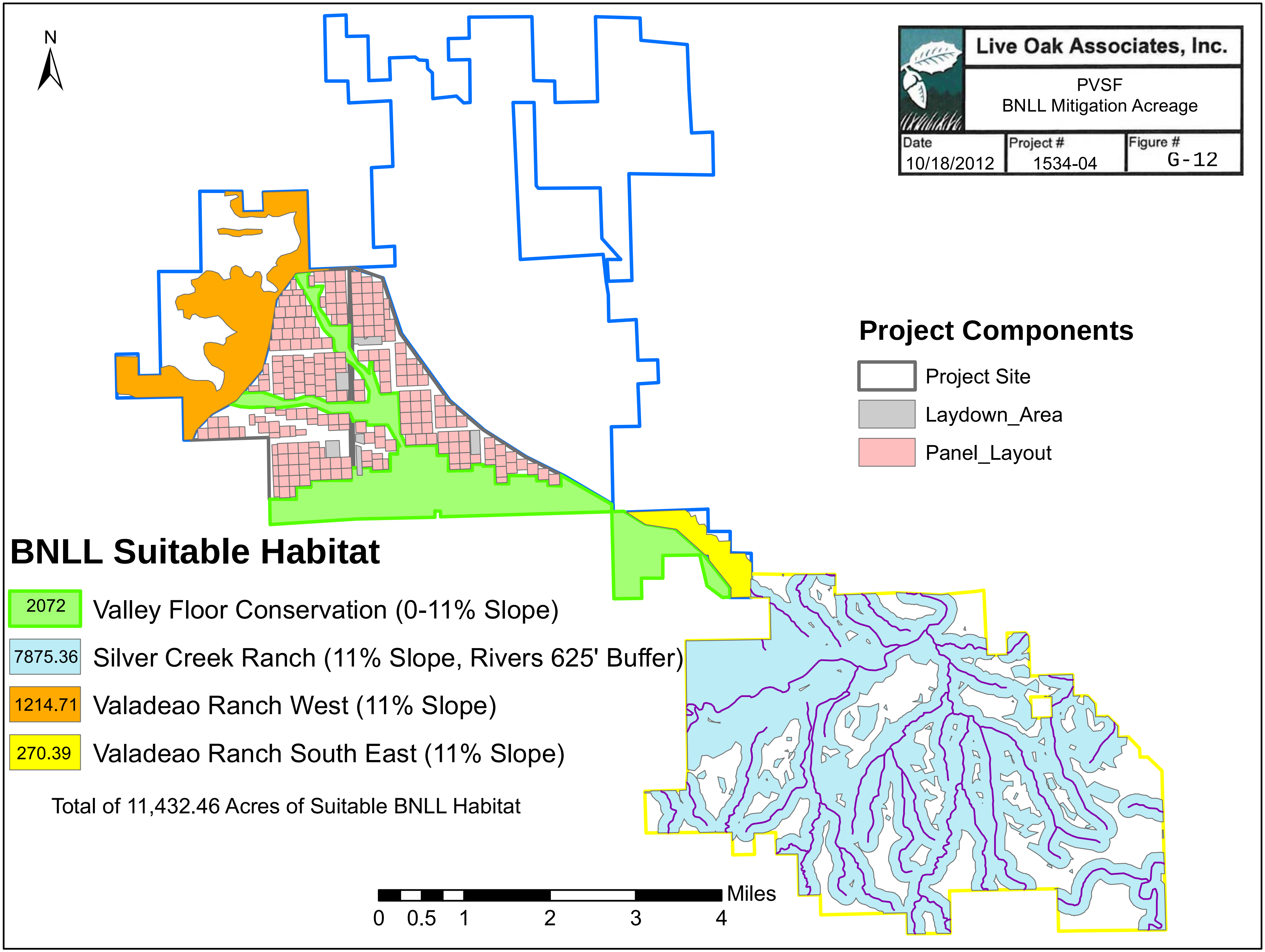
3.1.3 Determination of Blunt-nosed Leopard Lizard Estimates and Methodology

Habitat Acreage Estimate for the Silver Creek Ranch

To determine the suitable habitat acreage for BNLL on the Silver Creek Ranch Conservation Lands, two decision rules were used together. First, a slope analysis was performed, and considering all of the Project site known to support BNLL is between 0 and 11 percent slope, it was determined that all areas within the same slope range supporting appropriate habitat (i.e., sparse vegetation, friable soils and small mammal burrows) were considered suitable habitat for the species. The second decision rule was to use a 625-foot buffer around the "rivers" GIS layer. The rivers layer was used due to the fact BNLL were found closely associated to this type of habitat on the Project site; and 625 feet was the average distance from the center of Panoche Creek that juvenile BNLL were observed during surveys conducted by LOA in 2009 and 2010. This buffer connects most of the polygons and serves as a viable connection between 11 percent slopes as suitable habitat or corridors. All observations of individual BNLLs on the Silver Creek Ranch were within these areas; had any observations occurred outside these areas, they would have been factored in. At least 7,875 acres of suitable habitat for BNLL exists on the Silver Creek Ranch (Figure G-12).

Population Estimate on the Silver Creek Ranch

The focused BNLL and GKR surveys conducted in 2012 located 61 detections of BNLL. As all BNLL observed were juveniles (except two subadults), and surveys were conducted late in the juvenile season when adult BNLL are underground where they are not observable during surface surveys, more than 61 BNLL are expected to use the Silver Creek Ranch (Table G-3).



N
Live Oak Associates, Inc.
PVSF
BNLL Mitigation Acreage
Date
10/18/2012
Project #
1534-04
Figure #
G-12
Project Components
Project Site
Laydown_Area
Panel_Layout
BNLL Suitable Habitat
2072
Valley Floor Conservation (0-11% Slope)
7875.36
Silver Creek Ranch (11% Slope, Rivers 625' Buffer)
1214.71
Valadeao Ranch West (11% Slope)
270.39
Valadeao Ranch South East (11% Slope)
Total of 11,432.46 Acres of Suitable BNLL Habitat
0 0.5 1 2 3 4
Miles

TABLE G-3. INDIVIDUALS IMPACTED AND POPULATION ESTIMATES FOR SPECIAL STATUS SPECIES ON CONSERVATION LANDS

Species	Estimate of Individuals #		Acres of Habitat			
	Impacted by the Project	Silver Creek Ranch CL	Acres Impacted	Mitigation Acres Required	Mitigation Acres on CL	Additional Mitigation
BNLL	Up to 6	61+	2,813	7,829	11,432	Conservation Management Plan
GKR	Up to 799	Up to 44,871 individuals	2,813	7,829	16,125	Conservation Management Plan
SJKF	9 onsite and 2 affected by vehicle-strike	30+ individuals	2,813	9,422	14,603	Conservation Management Plan

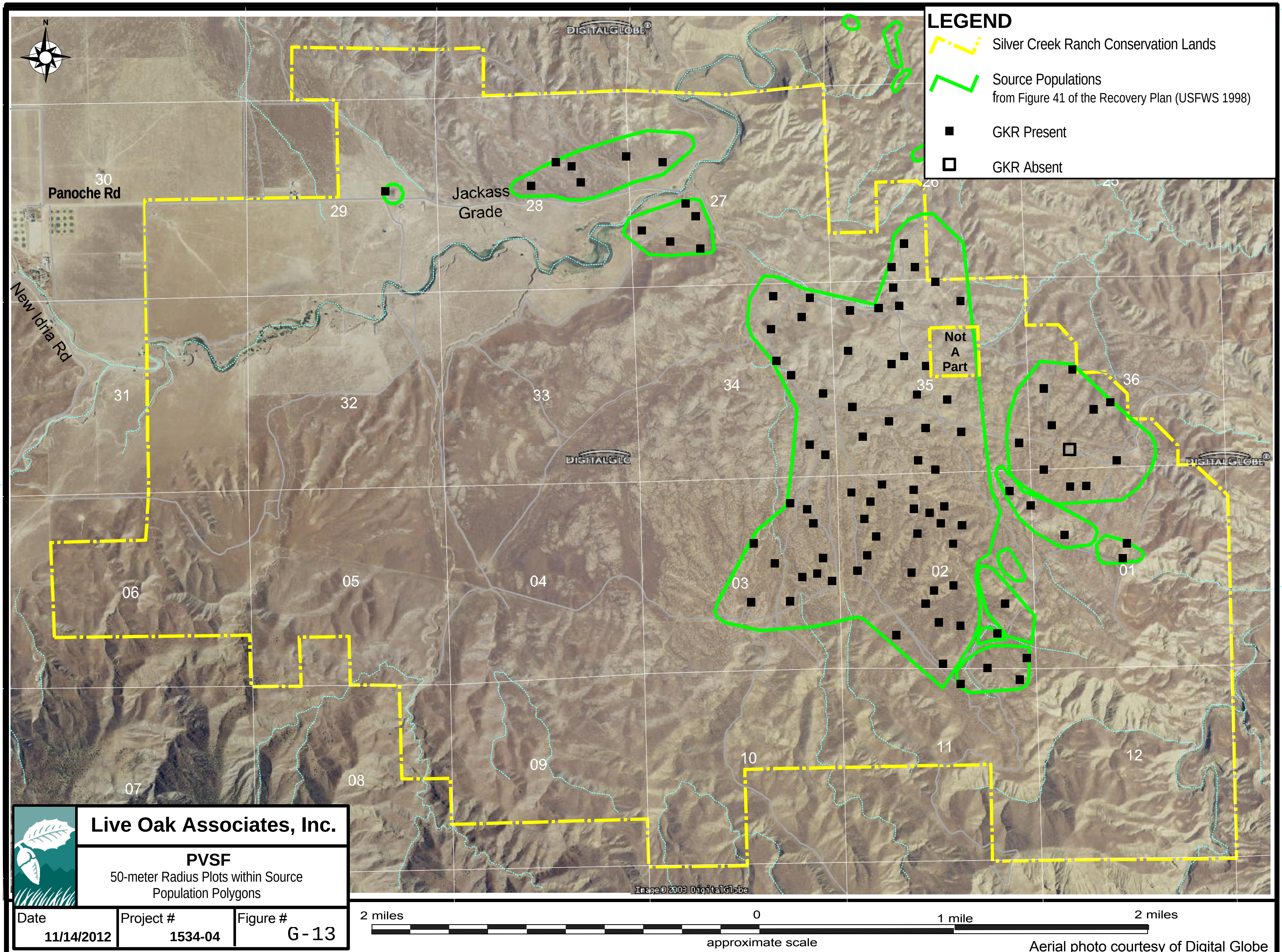
3.2 GIANT KANGAROO RAT FOCUSED SURVEYS

3.2.1 Survey Protocol

Focused GKR surveys were conducted within the source populations identified in Figure 41 of the Recovery Plan (USFWS 1998) in September of 2012. The source populations were originally mapped by Williams et al. (1995). One hundred 50-meter radius plots were surveyed for GKR and active precincts on the Silver Creek Ranch. GKR presence was verified by the presence of suitable scat (larger than seven millimeters [mm]) and footprints (larger than 47 mm), and further identified (e.g., confirmed) by the presence of surface pit caches, and size and type of burrow entrances (e.g., vertical and horizontal shafts). Active precincts were identified by the presence of scat, footprints, tail drags and surface pit caches. Two random plot centers were moved in the field due to one of them being in a dangerous curve of a road, and one of them partially including a house. These two points were moved just enough to avoid those obstacles.

3.2.2 Giant Kangaroo Rat Survey Results

Ninety-nine of the 100 plots surveyed supported GKR (see Figure G-13). Average density for these plots was 25.66 GKR precincts per plot (or 13.23 per acre). During GKR surveys, additional BNLL, golden eagle, SJAS, SJKF, and American badger observations were made. During the BNLL and GKR surveys (a two-week effort), 119 observations of SJAS were incidentally made on the Silver Creek Ranch Conservation Lands over two weeks during focused BNLL and GKR surveys.



LEGEND
Silver Creek Ranch Conservation Lands
Source Populations
from Figure 41 of the Recovery Plan (USFWS 1998)
GKR Present
GKR Absent
N
DIGITALGLOBE
Panoche Rd
New Idria Rd
Jackass Grade
Not A Part
30
29
28
27
26
25
31
32
33
34
35
36
06
05
04
03
02
01
07
08
09
10
11
12
Image © 2003 DigitalGlobe
Live Oak Associates, Inc.
PVSF
50-meter Radius Plots within Source Population Polygons
Date
11/14/2012
Project #
1534-04
Figure #
G-13
2 miles
0
1 mile
2 miles
approximate scale
Aerial photo courtesy of Digital Globe

3.2.3 Determination of Giant Kangaroo Rat Estimates and Methodology

Habitat Acreage Estimate for the Silver Creek Ranch

To determine the suitable habitat acreage for GKR on the Silver Creek Ranch, four decision rules were used together. First, a slope analysis was performed, and considering all of the Project site known to support GKR is between 0 and 11 percent slope, it was determined that all areas within the same slope range supporting appropriate habitat (i.e., annual grassland and friable soils) were considered highly suitable habitat for the species. Second, previously reported GKR locations from the CNDDB were added as a GIS layer; third, observations made by LOA during reconnaissance surveys between late August and early September 2010 were added as a GIS layer; and fourth, the area up to the first flood terrace of Panoche Creek was removed; GKR are not expected to use this area, as it would be low-suitable habitat. These layers were combined to derive a habitat suitability map for GKR on the SCR resulting in approximately 7,223 acres of suitable habitat (Figure G-14).

Population Estimate for the Silver Creek Ranch

As population densities of GKR on the Silver Creek Ranch within the source population polygons are high and the suitable habitat of Silver Creek Ranch outside of these polygons is moderate (as shown by the 2012 surveys), the average density for GKR plots on the Silver Creek Ranch was used for the source population areas. That density estimate was reduced (proportionally to reductions on the Project site and Valley Floor Conservation Lands from high to moderate) to an estimate of 2.63 GKR per acre for the suitable habitat outside of the source populations. These density estimates were used to estimate a population of up to 44,871 individual GKR (see Tables G-3 and G-4).

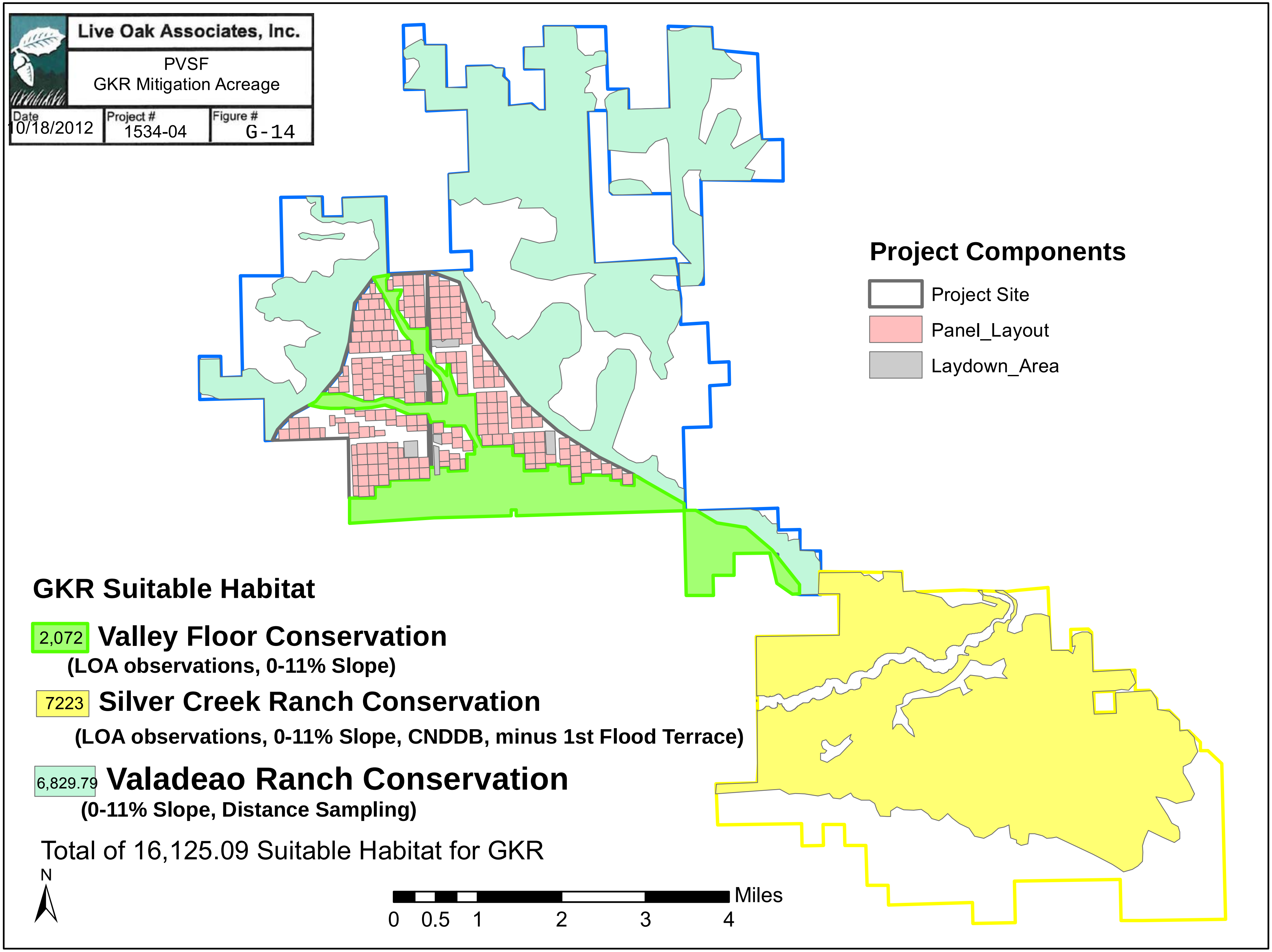

Live Oak Associates, Inc.
PVSF
GKR Mitigation Acreage
Date
10/18/2012
Project #
1534-04
Figure #
G-14
Project Components
Project Site
Panel_Layout
Laydown_Area
GKR Suitable Habitat
2,072
Valley Floor Conservation
(LOA observations, 0-11% Slope)
7223
Silver Creek Ranch Conservation
(LOA observations, 0-11% Slope, CNDDB, minus 1st Flood Terrace)
6,829.79
Valadeao Ranch Conservation
(0-11% Slope, Distance Sampling)
Total of 16,125.09 Suitable Habitat for GKR
N
0
0.5
1
2
3
4
Miles

TABLE G-4. ESTIMATED GKR DENSITIES ON THE SILVER CREEK CONSERVATION LANDS

MITIGATION SITE	AVERAGE DENSITY OF GKR (GKR/ACRE)	CL TOTAL (ACRES)	CL ADJUSTED (ACRES)	CONSERVATION OF INDIVIDUALS	SOURCE FOR DENSITY ESTIMATES
Silver Creek Ranch CL† (High Suitability)	13.23	10,889	2,441	32,294	Average density of GKR precincts for 100 50-meter plots focused in source population polygons identified in the Recovery Plan (USFWS 1998) on the Silver Creek Ranch CL
Silver Creek Ranch CL† (Moderate Suitability)	2.63	10,889	4,782.3	12,577	Average density of GKR precincts for 100 50-meter plots focused in source population polygons identified in the Recovery Plan (USFWS 1998) on the Silver Creek Ranch CL reduced proportional to reductions in estimates on the Project site and Valley Floor CLs.
Silver Creek Ranch CL (Total)		**10,889**	**7,223.3**	**44,871**	**The total of the two rows above.**

†Based on empirical data collected in 2012 on the Silver Creek Ranch Conservation Lands within source population polygons previously defined and previously identified in Figure 41 of the Recovery Plan (USFWS 1998).

3.3 SAN JOAQUIN KIT FOX FOCUSED SURVEYS

3.3.1 Survey Protocol

Spotlighting Surveys

For consistency, two LOA biologists, Ms. Krakow and Dr. Townsend, conducted the spotlight surveys throughout; Ms. Krakow did not survey for four nights and Dr. Townsend did not survey for two separate nights; three other LOA biologists substituted for spotlighting on those nights. Having at least one of the two main biologists spotlighting on all nights maintained consistency of observations, identifications, and also ensured that someone with knowledge of the site (at night) was one of the surveyors. Portions of the public roads were surveyed on both routes, and that a portion or all of each survey route on the Silver Creek Ranch Conservation Lands was surveyed each night. Approximately 20 miles were spotlighted each night.

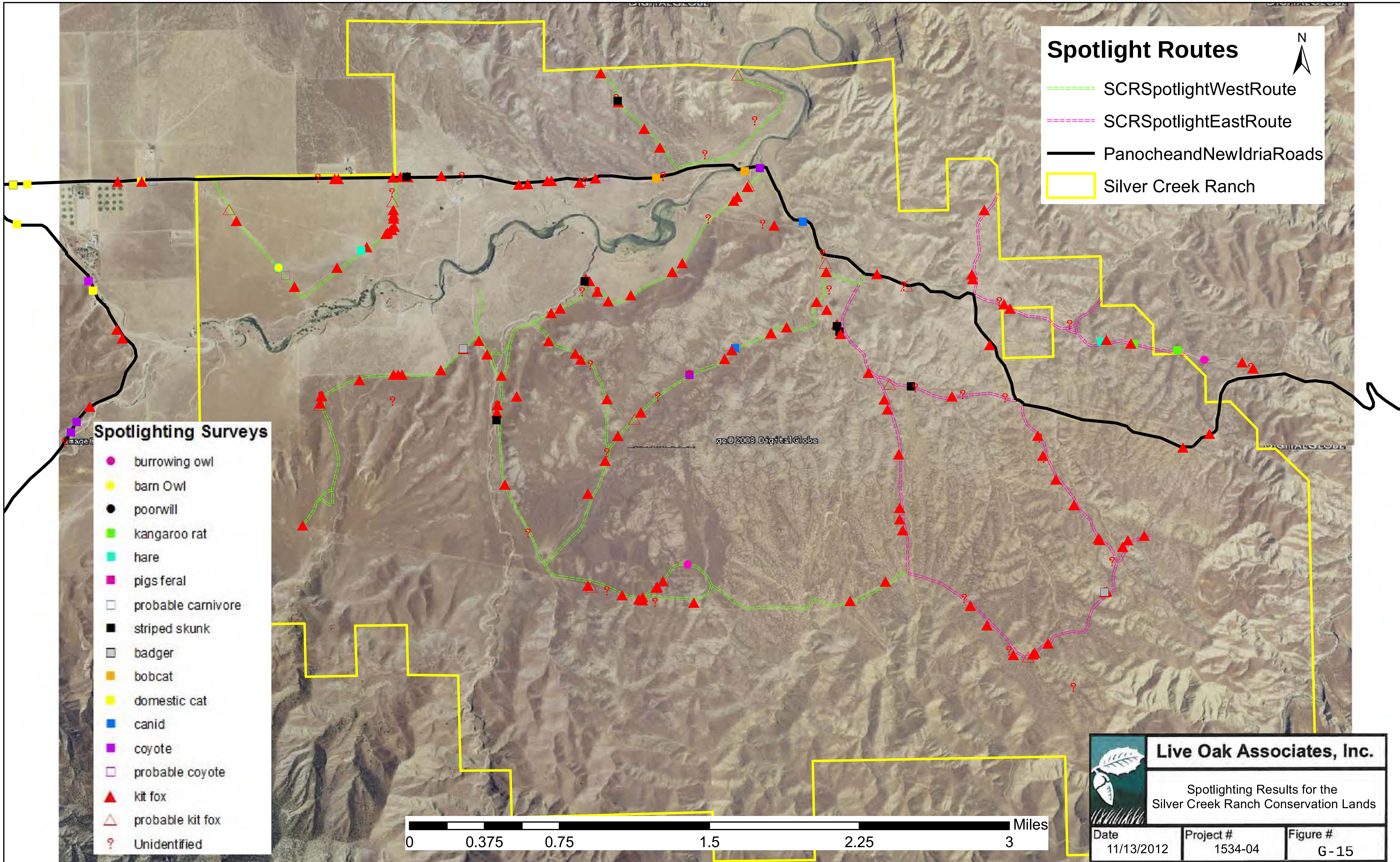
Spotlighting surveys were conducted on 20.5 nights (the half a night was due to vehicle trouble, and thus, an additional full night was spotlighted to compensate for this) surveying approximately 20 miles of public and ranch roads per night. Spotlighting was conducted on 10 nights on the eastern half of the ranch and 10.5 nights on the western half of the ranch.

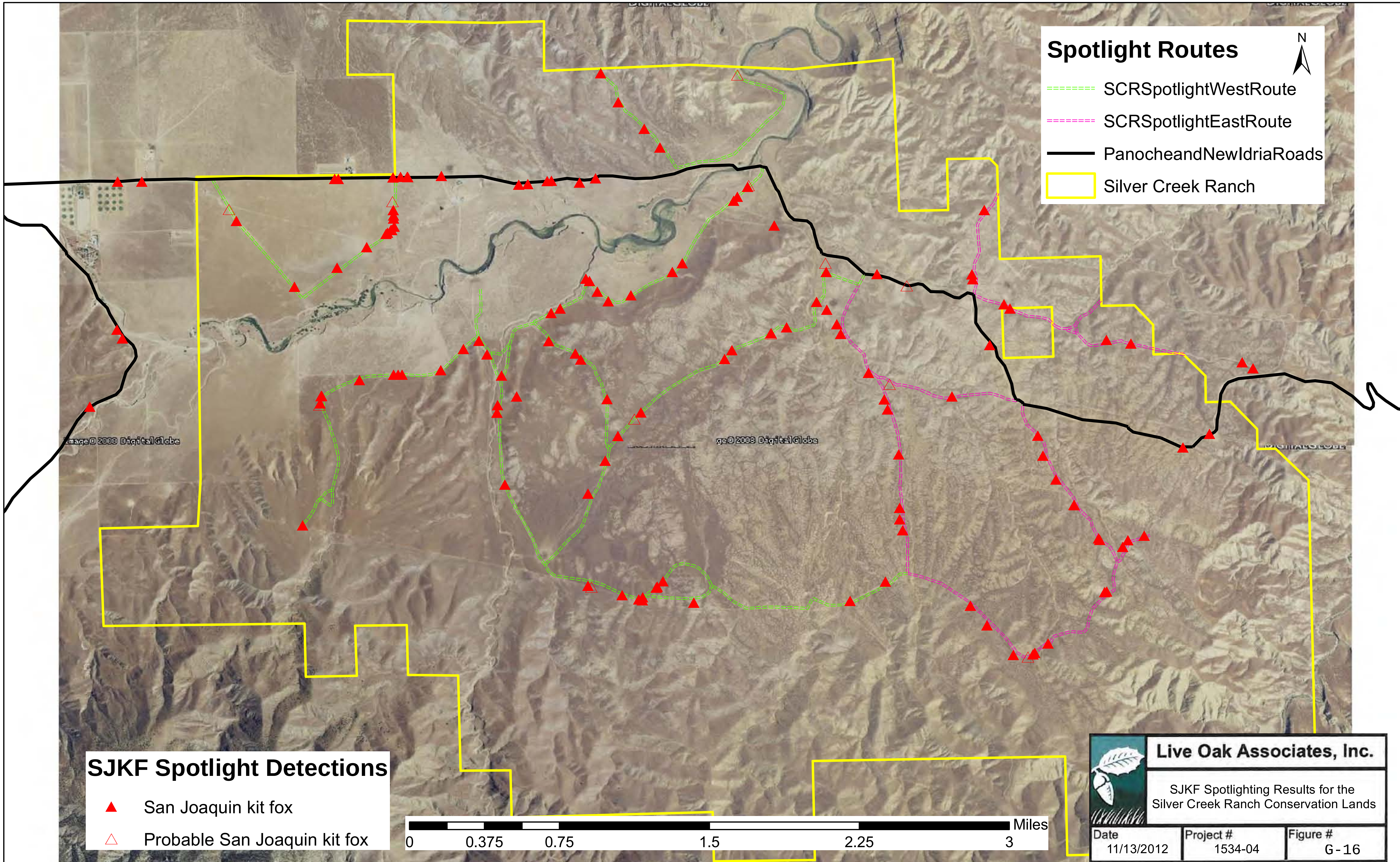
Camera Trap Station Surveys

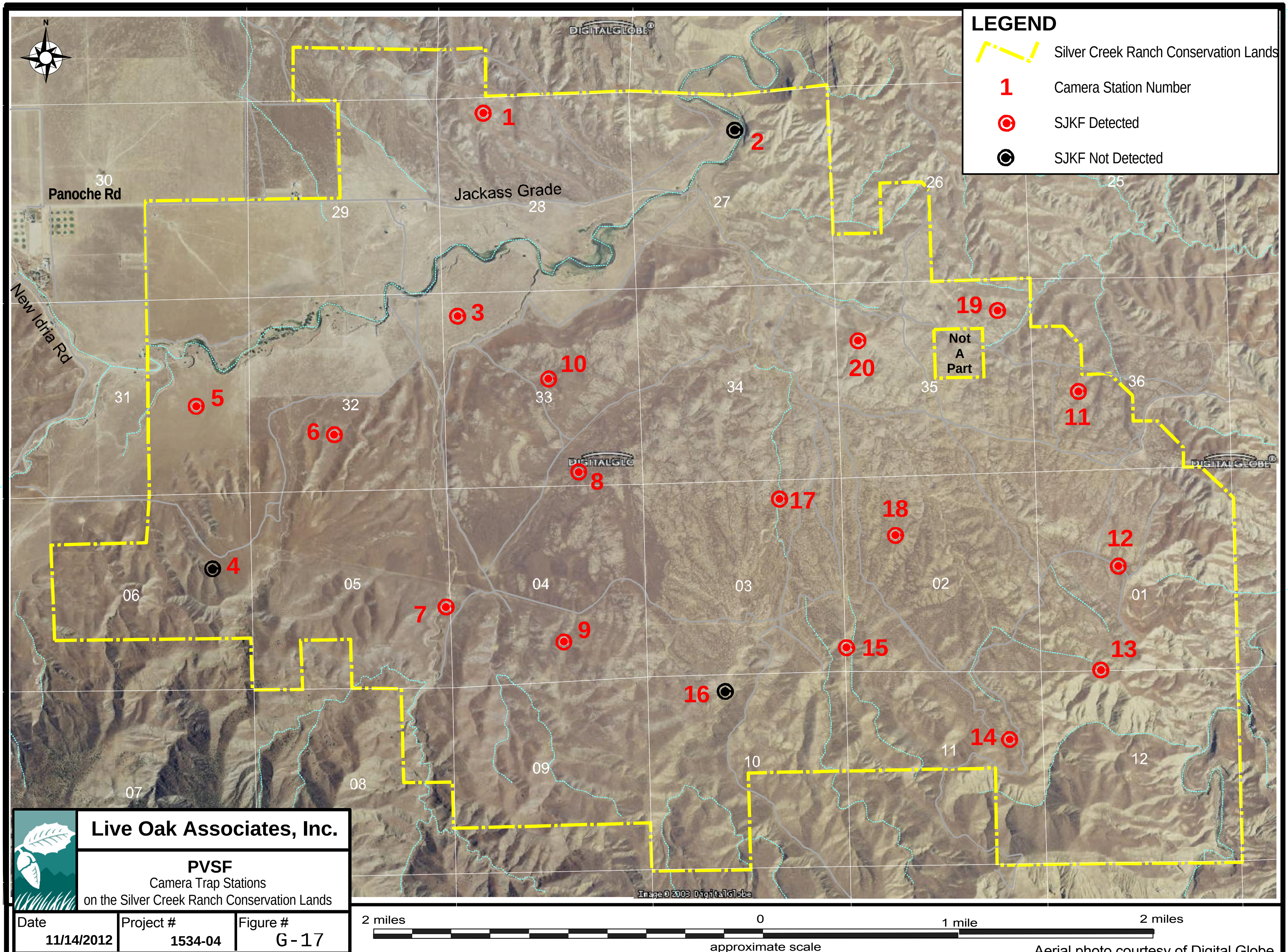
A total of 20 camera trap stations were set up on the Silver Creek Ranch. Ten camera trap stations were set up on the western half of the Silver Creek Ranch Conservation Lands, and ten camera trap stations were set up on the eastern half. Camera trap stations were set up on the opposite side of the ranch from spotlighting activities, and in areas that would not be visible during spotlighting activities. All camera traps were placed at least a half mile from each other as to ensure they were spread out far enough. 2012 model Bushnell Trophy Cam HD cameras (Overland Park, Kansas) were used; cameras were set to take three photos for each event with a five second interval, with settings of high sensitivity and low LED. Cameras were baited with canned cat food, which was re-baited at least once during the surveys. Each set of 10 camera trap stations were functional for at least 10 trap nights.

3.3.2 San Joaquin Kit Fox Survey Results

Spotlighting and camera station surveys of the Silver Creek Ranch Conservation Lands identified multiple SJKF. Figures G-15 and G-16 show spotlighting routes, overall results, and SJKF locations; Figure G-17 shows locations of camera trap stations where SJKF were observed.


Spotlight Routes
N
SCRSpotlightWestRoute
SCRSpotlightEastRoute
PanocheandNewIdriaRoads
Silver Creek Ranch
Spotlighting Surveys
burrowing owl
barn Owl
poorwill
kangaroo rat
hare
pigs feral
probable carnivore
striped skunk
badger
bobcat
domestic cat
canid
coyote
probable coyote
kit fox
probable kit fox
Unidentified
0
0.375
0.75
1.5
2.25
3
Miles
Live Oak Associates, Inc.
Spotlighting Results for the
Silver Creek Ranch Conservation Lands
Date
11/13/2012
Project #
1534-04
Figure #
G-15


Spotlight Routes
N
SCRSpotlightWestRoute
SCRSpotlightEastRoute
PanocheandNewIdriaRoads
Silver Creek Ranch
SJKF Spotlight Detections
San Joaquin kit fox
Probable San Joaquin kit fox
0
0.375
0.75
1.5
2.25
3
Miles
Image © 2008 DigitalGlobe
Live Oak Associates, Inc.
SJKF Spotlighting Results for the Silver Creek Ranch Conservation Lands
Date
11/13/2012
Project #
1534-04
Figure #
G-16



Live Oak Associates, Inc.

PVSF

Camera Trap Stations
on the Silver Creek Ranch Conservation Lands

Date	Project #	Figure #
11/14/2012	1534-04	G-17

Spotlighting Surveys

A range of two to 10 SJKF were observed in one night (Table G-5). Spotlighting resulted in 137 SJKF detections and 11 detections classified as probably SJKF. Spotlighting on the eastern half of the Ranch observed 62 detections of SJKF (14 of which were juveniles) and three detections classified as probable SJKF. The western half of the Ranch observed 75 detections of SJKF (two of which were juveniles) and eight detections classified as probable SJKF. It is important to note that kit foxes were detected within drainages, on flat land, on hill slopes, and even on ridges of hills; the SJKF observed on the Silver Creek Ranch Conservation Lands appear to use hills with much steeper slopes than previous literature suggests, which agrees with the results of the scat-sniffing dog surveys on the Valadeao Ranch Conservation Lands, which also show SJKF using slopes steeper than previously described in literature.

Other species observed during spotlight surveys include the western burrowing owl, great horned owl, short-eared owl, barn owl, common poorwill, kangaroo rat, jack rabbit, desert cottontail, striped skunk, American badger, domestic cat, bobcat, coyote, and feral pig.

Notable Spotlighting Observations

1. On a few occasions, multiple SJKF were observed together.
2. Only one uniquely identifiable SJKF was observed during spotlight surveys; it only had one eye.
3. A young American badger and a young SJKF appeared to be traveling together on two separate dates of spotlighting on opposite sides of the Silver Creek Ranch Conservation Lands.

TABLE G-5. SAN JOAQUIN KIT FOX SPOTLIGHTING DETECTIONS

Day	Date	# Total SJKF	# Juveniles	Additional probable kit fox
West 1	23-Sep-12	9	4	0
West 2	24-Sep-12	7	2	0
West 3	25-Sep-12	2	0	0
West 4	26-Sep-12	4	1	1
West 5	27-Sep-12	10	3	0
West 6	30-Sep-12	7	1	2
West 7	1-Oct-12	3	0	0
West 8	2-Oct-12	7	0	0
West 9	3-Oct-12	3	1	0
West 10	4-Oct-12	10	2	0
East 1	13-Oct-12	6	0	1
East 2	14-Oct-12	10	0	2

Day	Date	# Total SJKF	# Juveniles	Additional probable kit fox
East 3	22-Oct-12	6	1	2
East 4a	23-Oct-12	2	0	0
East 4b	24-Oct-12	8	0	1
East 5	25-Oct-12	10	0	0
East 6	26-Oct-12	9	0	1
East 7	27-Oct-12	4	1	1
East 8	31-Oct-12	7	0	0
East 9	1-Nov-12	3	0	0
East 10	2-Nov-12	10	0	0
Total		**137**	**16**	**11**
Total West		**62**	**14**	**3**
Total East		**75**	**2**	**8**

*East 4a was only a couple hours of spotlighting, as vehicle trouble occurred; East 4b was a full night of spotlighting to compensate for East 4a.

Camera Trap Station Surveys

Ten camera trap stations were set up on the western half of the Silver Creek Ranch Conservation Lands, which recorded SJKF at eight of the 10 stations, and ten camera trap stations were set up on the eastern half, which recorded SJKF at nine of the 10 stations. Seventeen out of 20 camera trap stations detected SJKF on 119 of 275 trap nights, resulting in approximately 43 percent detection. Individual camera trap detections of SJKF ranged from 0 percent to almost 91 percent detection (Figure G-17, Tables G-6 and G-7). Tables G-6 and G-7 illustrate species detected in relation to camera trap nights.

It is important to note that camera station #9 was knocked over by a cow and the batteries came loose, resulting in a reduction of trap nights for that camera. A few other cameras also got knocked over by cows, but continued to detect species through the duration of their trap nights. As SJKF rarely have unique identifying features, individuals are difficult to distinguish. Therefore, it should be assumed that a minimum of one SJKF visited each camera station where SJKF was detected; however, it is likely that many of the camera stations were visited by multiple SJKF.

TABLE G-6. TRAP NIGHTS SPECIES DETECTED PER CAMERA STATION (WESTERN HALF OF THE SILVER CREEK RANCH CONSERVATION LANDS)

Species	# Trap Nights Species Detected per Camera Station										Total # Stations Species Detected (out of 10)	Total Camera-trap Nights Detected	Total Camera-trap Nights	Total Percent Trap Nights Species Detected
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10				
SJKF	8	0	4	0	7	8	9	6	7	9	8	58	170	34.12
Coyote	2	3	1	0	1	1	0	0	0	3	6	11	170	6.47
Bobcat	0	1	0	0	0	0	0	0	0	0	1	1	170	0.59
Striped Skunk	2	1	0	0	0	0	5	2	3	3	6	16	170	9.41
American Badger	0	0	0	0	0	0	0	1	0	1	2	2	170	1.18
Kangaroo Rat	1	1	0	0	0	4	2	0	2	1	6	11	170	6.47
Unidentified Small Mammal	0	0	0	1	0	0	0	0	0	0	1	1	170	0.59
Jack Rabbit	0	4	0	3	4	0	0	0	0	0	3	11	170	6.47
Cottontail	0	0	0	4	0	0	0	0	0	0	1	4	170	2.35
Cattle	14	2	5	0	0	3	0	0	4	0	5	28	170	16.47
Boar	0	0	0	0	0	2	0	1	0	0	2	3	170	1.76
Great-horned Owl	0	0	0	0	0	0	0	1	0	0	1	1	170	0.59
Burrowing Owl	0	0	0	0	0	0	0	0	1	0	1	1	170	0.59
Raven	0	0	1	0	2	0	0	1	0	0	3	4	170	2.35
Roadrunner	0	2	0	1	0	0	0	0	0	0	2	3	170	1.76
Tricolored Blackbird	0	0	1	0	0	0	0	0	0	0	1	1	170	0.59
Brown-headed Cowbird	0	0	1	0	0	0	0	0	0	0	1	1	170	0.59
Say's Phoebe	0	0	0	0	0	0	1	0	0	0	1	1	170	0.59
Lark Sparrow	0	0	0	0	0	0	0	0	1	0	1	1	170	0.59
Total Camera-trap Nights	18	18	18	18	18	18	17	17	11	17				

TABLE G-7. PERCENT TRAP NIGHTS SPECIES DETECTED PER CAMERA STATION (WESTERN HALF OF THE SILVER CREEK RANCH CONSERVATION LANDS)

Species	Percent Trap Nights Detected Per Camera Station										Total Percent Trap Nights Species Detected
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	
SJKF	44.44	0.00	22.22	0.00	38.89	44.44	52.94	35.29	63.64	52.94	34.12
Coyote	11.11	16.67	5.56	0.00	5.56	5.56	0.00	0.00	0.00	17.65	6.47
Bobcat	0.00	5.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59
Striped Skunk	11.11	5.56	0.00	0.00	0.00	0.00	29.41	11.76	27.27	17.65	9.41
American Badger	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.88	0.00	5.88	1.18
Kangaroo Rat	5.56	5.56	0.00	0.00	0.00	22.22	11.76	0.00	18.18	5.88	6.47
Unidentified Small Mammal	0.00	0.00	0.00	5.56	0.00	0.00	0.00	0.00	0.00	0.00	0.59
Jack Rabbit	0.00	22.22	0.00	16.67	22.22	0.00	0.00	0.00	0.00	0.00	6.47
Cottontail	0.00	0.00	0.00	22.22	0.00	0.00	0.00	0.00	0.00	0.00	2.35
Cattle	77.78	11.11	27.78	0.00	0.00	16.67	0.00	0.00	36.36	0.00	16.47
Boar	0.00	0.00	0.00	0.00	0.00	11.11	0.00	5.88	0.00	0.00	1.76
Great-horned Owl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.88	0.00	0.00	0.59
Burrowing Owl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.09	0.00	0.59
Raven	0.00	0.00	5.56	0.00	11.11	0.00	0.00	5.88	0.00	0.00	2.35
Roadrunner	0.00	11.11	0.00	5.56	0.00	0.00	0.00	0.00	0.00	0.00	1.76
Tricolored Blackbird	0.00	0.00	5.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59
Brown-headed Cowbird	0.00	0.00	5.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59
Say's Phoebe	0.00	0.00	0.00	0.00	0.00	0.00	5.88	0.00	0.00	0.00	0.59
Lark Sparrow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.09	0.00	0.59
Total Camera-trap Nights	18	18	18	18	18	18	17	17	11	17	

Notable Photo Captures

Figure G-18. Only one station (#6) detected two SJKF in the same photo, all other stations detected one individual at a time.

Figure G-19. San Joaquin kit foxes were observed visiting baited camera stations with dead kangaroo rats.

Figure G-20. One SJKF was observed bringing two dead kangaroo rats to a baited station.

Figure G-21. San Joaquin kit foxes were observed at bait stations with live kangaroo rats in close proximity.

Figure G-22. An American badger and a SJKF visited a bait station at camera station #9 within 31 seconds of each other; as SJKF and badger were observed twice traveling together during spotlighting surveys, this may be another example of the two species traveling together.

3.3.3 Determination of San Joaquin Kit Fox Estimates and Methodology

Habitat Acreage Estimate for the Silver Creek Ranch

To determine the suitable habitat acreage for SJKF on the Silver Creek Ranch, LOA extrapolated the information derived from the analysis on the Valadeao Ranch Conservation Lands, for which two decision rules were used together. First, a slope analysis was performed, and considering all of the Project site known to support SJKF is between 0 and 11percent slope, it was determined that all areas within the same slope range supporting appropriate habitat (i.e., annual grassland and friable soils) were considered highly suitable habitat for the species. Second, LOA used results from the scat-sniffing dog surveys conducted in August and September 2010 on the Valadeao Ranch to further refine the 11 percent slope analysis. SJKF scat was located at slopes with a grade up to 35 percent; the breakdown is shown in Table G-8. Based on conversations with the resource agencies, species experts, and literature review, LOA prorated suitable habitat for SJKF on the Silver Creek Ranch Conservation Lands. Based on this formula, the Silver Creek Ranch Conservation Lands support a total of 7,412 acres of suitable habitat for SJKF (Figure G-23).

Population Estimate for the Silver Creek Ranch

Spotlighting surveys detected up to 10 SJKF on the eastern half of the Silver Creek Ranch, and up to 10 SJKF on the western half of the Silver Creek Ranch, and camera trap station surveys detected SJKF at 17 of the 20 camera trap stations. It is expected that some individuals were observed during multiple types of surveys (eastern spotlighting, western spotlighting, and/or camera trap stations), however, it is also expected that 100 percent of the SJKF population on the Silver Creek Ranch was not observed. Therefore, an estimated 30+ individuals are expected to use the Silver Creek Ranch (Table G-3).

TABLE G-8. MITIGATION AND IMPACT ASSESSMENT BREAKDOWN FOR THE SJKF AT THE PROJECT

	Impacted Lands (Acres)	Mitigation Ratio (X:1)	Mitigation Required (Acres)	Silver Creek Ranch (Acres)	Total Conservation Lands (Acres)	Delta Acres
Species - Take Authorized						
Direct*	2,203.00	4	8,812.00			
50% of 4:1 Mit. on 0-5% Slopes			4,406.00	3,054.88	5,967.49	1,561.49
50% of 4:1 Mit. on 5.01-11% Slopes			4,406.00	2,709.75	4,813.70	407.70
Mit. On 11.01-21% Slopes			0.00	2,412.33	5,601.49	5,601.49
Mit. On 21.01-35% Slopes			0.00	1,765.93	5,115.73	5,115.73
Indirect**	610.00	1	610.00			
Mit. On 0-11% Slopes (Of Acreage After Direct Impacts Mitigated For)			610.00		1,969.19	1,359.19
Total	**2,813.00**					**14,045.60**

*For Direct Impacts: Slope acreage breakdown identified in the FEIR for the 4:1 mitigation ratio states that 50% of that ratio must include slopes of 5% or less and 50% must include slopes of 15% or less. Our acreage breakdown is 0-5% and 5.01-11%, a much more conservative breakdown, but still exceeds the required acreage for these two categories. Additionally, prorated values for slope categories of 11.01-21% and 21.01-35% are included, as empirical data collected on the Project Site, Valley Floor Conservation Lands, and Valadeao Ranch Conservation Lands show SJKF use on lands with up to 35% slopes.
**For Indirect Impacts: Slope acreage breakdown identified in the FEIR for the 2:1 mitigation ratio states that 100% of that ratio must include Slopes less than or equal to 11%. The amount in the 'Total Conservation Lands' column is the leftover acreage after Direct Impacts have been mitigated for.

4 CONCLUSIONS

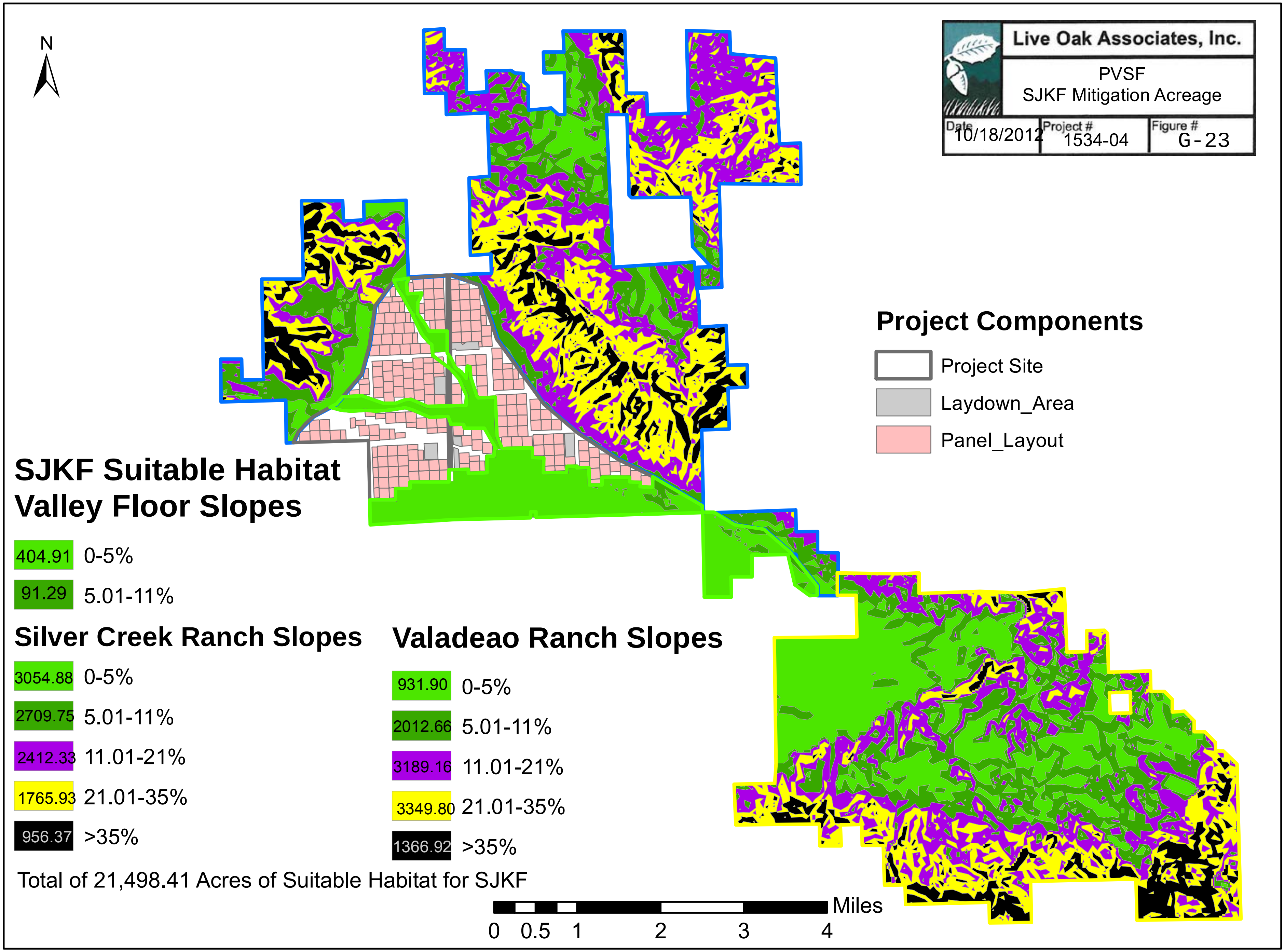
LOA conducted focused BNLL and GKR surveys, as well as SJKF spotlight and camera trap surveys on the Silver Creek Ranch Conservation Lands in order to assess the current conditions of special status species on the Ranch. According to the results of these surveys, the Silver Creek Ranch Conservation Lands support BNLL, SJAS, GKR, and SJKF in high densities.

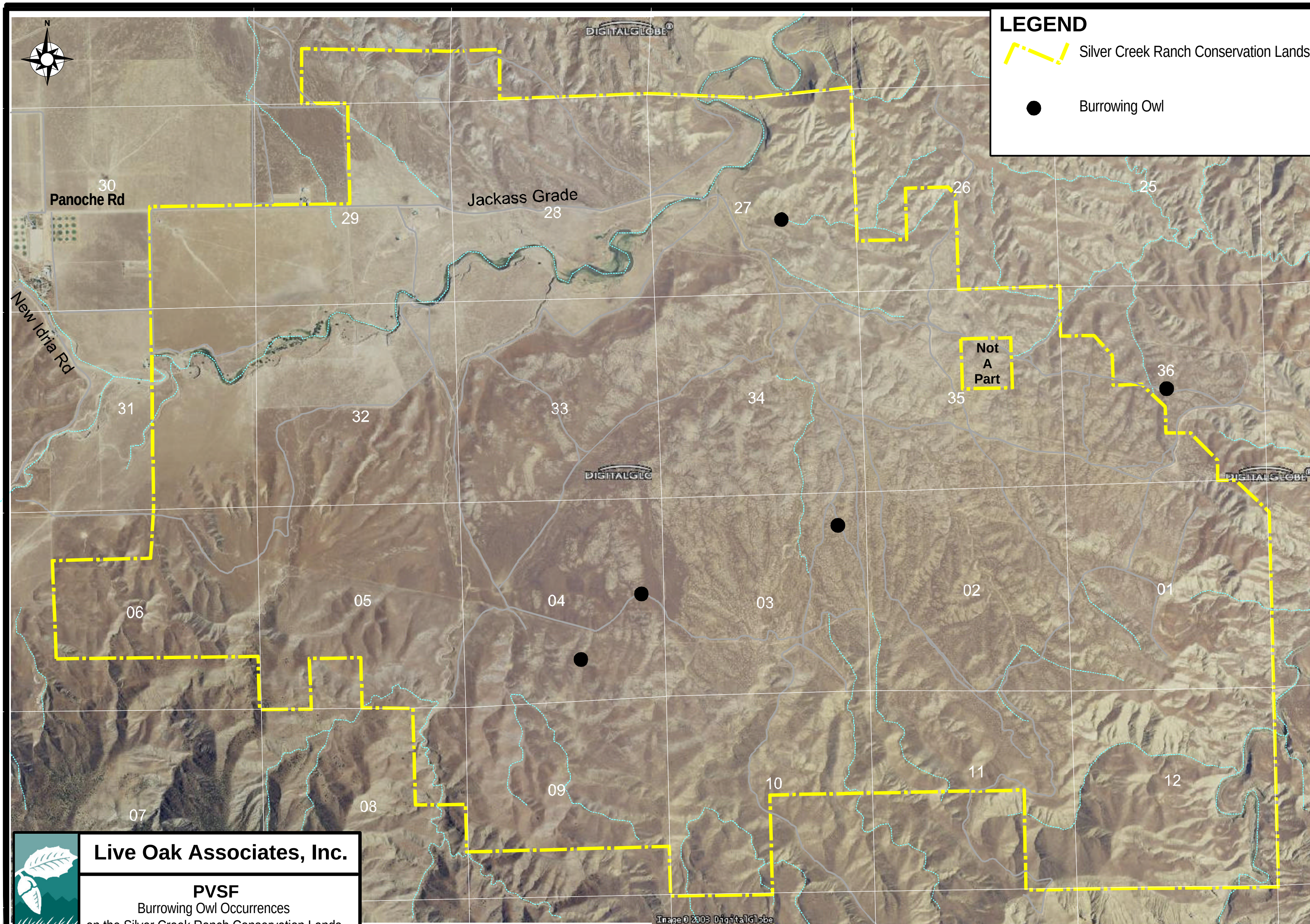
GKR colonies defined by Williams et al. (1995) were confirmed both on the Silver Creek Ranch and on the Valley Floor Conservation Lands. Williams et al. (1995) identified larger and more GKR colonies on the Silver Creek Ranch than on the valley floor in the 1992-1993 study, and this is still true today, as was shown by the results of the 2010 surveys on the valley floor and 2012 surveys on the Silver Creek Ranch. BNLL are also more prevalent on the Silver Creek Ranch than on the valley floor per LOA’s 2010 and 2012 surveys, and BNLL appear to use more complex topography on the Silver Creek Ranch than they do on the valley floor, which appears to be limited habitat of the washes of Panoche and Las Aguilas Creeks. SJKF are also more prevalent on the Silver Creek Ranch than on all of the other lands together including the Project site, Valadeao Ranch Conservation Lands, and the Valley Floor Conservation Lands, as a total of 22 individual SJKF were detected on these lands in 2010 via scat-sniffing dog surveys and genetic analysis, and there were 137 detections of SJKF (a maximum of ten individuals in one night for both the eastern and western halves of the Silver Creek Ranch) during spotlighting surveys in 2012 and detection of SJKF at 17 of 20 camera trap stations on the Silver Creek Ranch in 2012. The conservation value of the Silver Creek Ranch exceeds the conservation value of the valley floor, with higher species diversity and greater relative distribution and abundance on the Silver Creek Ranch.

Additional special status species were detected during these surveys, including five detections of western burrowing owl (detected during the GKR and BNLL surveys, spotlighting surveys, and camera trap surveys; Figure G-24), 119 detections of SJAS (detected during the two-week long focused surveys for BNLL and GKR), and five detections of American badger (detected during spotlighting surveys and camera trap surveys), two of which were detections of a badger traveling with a SJKF.

The current community composition appears to be healthy, with a high species diversity (Figure G-25) and more complex vegetation and topography than the valley floor. Moderate to heavy stocking rates have been found to benefit all of these species (Barry et al. 2011; Germano et al. 2011), and the current moderate to heavy stocking rates on the Silver Creek Ranch appears to be acceptable and beneficial to these species.

The secured Silver Creek Ranch Conservation Lands include 10,889 acres of habitat located southeast of and contiguous to the Proposed Project. The Silver Creek Ranch is specifically identified in the Recovery Plan for Upland Species of the San Joaquin Valley (USFWS 1998) and the Recovery Plan 5-year Reviews (USFWS 2010a, 2010b, 2010c), as an area with high habitat value for the Special Status Species such as the BNLL, GKR, SJKF, as well as several other Species of Concern in the Ciervo-Panoche Natural Area. The Recovery Plan (USFWS 1998:19) also identifies that the BLM has a program of acquisition in which the Silver Creek Ranch is one of the two main ranches that the BLM has a goal of purchasing. Based on the consistency of the Silver Creek Ranch Conservation Lands with the published recovery plans, the establishment of the Silver Creek Conservation Lands (and the other dedicated project Conservation lands) as a system that provides important linkages to other lands supporting the Special Status Species, and the field confirmation of the Special Status Species on the Silver Creek Ranch, these lands help to fully mitigate impacts to the listed species by improving the existing conservation value of the Proposed Project.


N
Live Oak Associates, Inc.
PVSF
SJKF Mitigation Acreage
Date 10/18/2012
Project # 1534-04
Figure # G-23
Project Components
Project Site
Laydown_Area
Panel_Layout
SJKF Suitable Habitat
Valley Floor Slopes
404.91 0-5%
91.29 5.01-11%
Silver Creek Ranch Slopes
3054.88 0-5%
2709.75 5.01-11%
2412.33 11.01-21%
1765.93 21.01-35%
956.37 >35%
Valadeao Ranch Slopes
931.90 0-5%
2012.66 5.01-11%
3189.16 11.01-21%
3349.80 21.01-35%
1366.92 >35%
Total of 21,498.41 Acres of Suitable Habitat for SJKF
Miles
0 0.5 1 2 3 4



Live Oak Associates, Inc.

PVSF

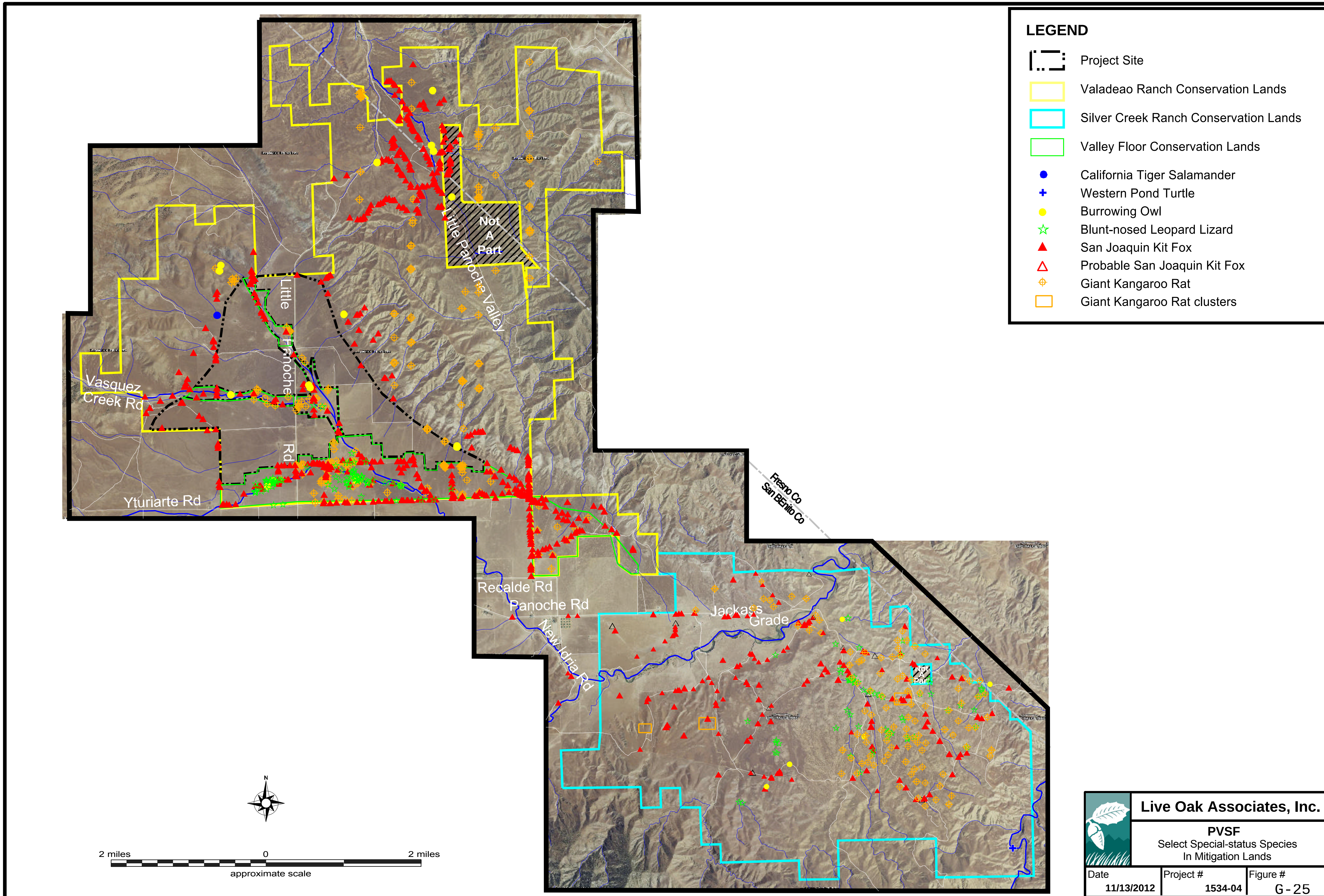
Burrowing Owl Occurrences
on the Silver Creek Ranch Conservation Lands

Date	Project #	Figure #
11/14/2012	1534-04	G-24

2 miles | 0 | 1 mile | 2 miles

approximate scale

Aerial photo courtesy of Digital Globe


LEGEND
Project Site
Valadeao Ranch Conservation Lands
Silver Creek Ranch Conservation Lands
Valley Floor Conservation Lands
California Tiger Salamander
Western Pond Turtle
Burrowing Owl
Blunt-nosed Leopard Lizard
San Joaquin Kit Fox
Probable San Joaquin Kit Fox
Giant Kangaroo Rat
Giant Kangaroo Rat clusters
Not A Part
Little Panoche Valley
Little Panoche Rd
Vasquez Creek Rd
Yturiarte Rd
Recalde Rd
Panoche Rd
New Idria Rd
Jackass Grade
Fresno Co
San BEnito Co
N
2 miles
0
2 miles
approximate scale
Live Oak Associates, Inc.
PVSF
Select Special-status Species
In Mitigation Lands
Date
11/13/2012
Project #
1534-04
Figure #
G-25

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Appendix H – California Tiger Salamander Mitigation Plan

July 20, 2012

PANOCHE VALLEY SOLAR, LLC

Panoche Valley Solar Farm

California Tiger Salamander Mitigation Pond Proposal

PROJECT NUMBER:
127165

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POWER ENGINEERS

California Tiger Salamander Mitigation Pond Proposal

PREPARED FOR: PANOCHE VALLEY SOLAR, LLC
PREPARED BY: BEN BAINBRIDGE

TABLE OF CONTENTS

1.0 PROJECT DESCRIPTION **1**
1.1 PROPOSED MITIGATION 3
2.0 EXISTING CONDITIONS **5**
2.1 CTS SPECIES ECOLOGY 5
2.2 SURVEYS COMPLETED 6
2.2.1 Pond 12 6
3.0 PROPOSED MITIGATION PONDS **8**
3.1 VALADEAO RANCH POND SITE 3 9
3.2 VALADEAO RANCH POND SITE 4 9
3.3 SILVER CREEK POND SITE 1 10
4.0 CONCLUSIONS **13**
5.0 LITERATURE CITED **14**

FIGURES:

FIGURE 1 VALADEAO RANCH MITIGATION PONDS 11
FIGURE 2 SILVER CREEK POND SITE 1 12

APPENDICES:

APPENDIX A MITIGATION POND AND POND 12 WATER BUDGET ANALYSIS 15

ACRONYMS AND ABBREVIATIONS

AC	alternating current
BLM	Bureau of Land Management
cm	centimeters
CNDDB	California Natural Diversity Database
Control Plan	Noxious Weed and Invasive Plant Control Plan
CTS	California tiger salamander
DC	Direct Current
ºF	degrees Fahrenheit
FEIR	Final Environmental Impact Report
kV	kilovolt
LOA	Live Oak Associates
MW	megawatts
NRCS	National Resource Conservation Service
O&M	operations and maintenance
PG&E	Pacific Gas & Electric
POWER	POWER Engineers, Inc.
Proposed Project	Panoche Valley Solar Farm Proposed Project
PV	photovoltaic
USFWS	United States Fish and Wildlife Service

1.0 PROJECT DESCRIPTION

Panoche Valley Solar, LLC proposes to construct and operate the Panoche Valley Solar Farm (Proposed Project), a 399 megawatt (MW) solar photovoltaic energy generating facility. Because the Proposed Project will be placed adjacent to occupied California tiger salamander (CTS; *Ambystoma californiense*) breeding ponds, and will impact other potential, unoccupied breeding ponds, Panoche Valley Solar, LLC will construct new additional breeding ponds located outside of the footprint of the Proposed Project. This document presents three potential locations for new breeding ponds located on conservation lands associated with the Proposed Project. Two potential locations occur on the Valadeao Ranch Conservation Lands in close proximity to a known CTS breeding pond. One potential location occurs on Silver Creek Ranch Conservation Lands in close proximity to other existing potential CTS breeding ponds.

The Proposed Project site comprises approximately 4,885 acres in the Panoche Valley of eastern San Benito County, CA. The Proposed Project will be constructed in five phases with the first phase being 20 MW, and each subsequent phase consisting of approximately 100 MW each. The Proposed Project would be located on heavily grazed rangeland and would generally include development of the following components on 2,203 of the 4,885 acres (approximately 50% of site):

- Installation of approximately three to four million photovoltaic (PV) panels
- PV module steel support structures
- Electrical inverters and transformers
- An electrical substation with switchyard
- Buried electrical collection conduit
- An operations and maintenance (O&M) building
- A septic system and leach field
- Wastewater treatment facility/demineralization pond
- On-site access roads
- Security fencing
- Transmission support towers and line(s) to interconnect with a Pacific Gas & Electric (PG&E) transmission line that passes through the Project site

The Proposed Project would be installed over an area of approximately 4,885 acres (7.6 square miles). However, the proposed design confines the solar arrays, substation (including the O&M building and transmission interconnection towers), and on-site access roads to a footprint of approximately 2,203 acres. The remaining approximately 2,682 acres within the Project boundary would be left undisturbed. Interstitial space between rows of panels, access roads, and O&M facilities would incorporate approximately 610 acres. Undisturbed areas would include on-site drainages and riparian buffer zones totaling 389 acres, as well as approximately 1,683 acres of open space in the southern portion of the Project Area. These undisturbed areas would remain as open space, and would be managed as on-site conservation areas to maintain and enhance habitat conditions for listed species. On-site conservation areas would incorporate approximately 2,072 acres.

Project construction would occur in five phases over a total of approximately five years, at one year per phase. Approximately 18 percent of the site would be temporarily disturbed at any one time during construction and would be restored in accordance with a revegetation plan. Revegetation will be conducted on areas temporarily disturbed during construction to restore vegetative cover to similar pre-construction condition or, if requested, to meet other reasonable landowner requests, once site work is completed. Disturbed areas will be reclaimed by appropriate contouring, where appropriate, and replanting with an approved seed mix. All seed mixtures will be certified “weed free.” Noxious weeds will be controlled through implementation of the Noxious Weed and Invasive Plant Control Plan (Control Plan). Within the Control Plan, herbicides will be used in accordance with the Bureau of Land Management (BLM) Approved Adjuvant and will follow federal and state regulations.

In general, each PV panel will be approximately two by four feet; however as technology changes during the life of the Project, larger panels may be used. All panels will be oriented toward the south and southwest, and angled upward at a degree that would maximize solar resource efficiency. Panel faces will be non-reflective and black or blue in color. The normal operating temperature of the PV panel face would be 10-15 degrees Fahrenheit (°F) above ambient temperature, and a typical summer day at 82°F would result in panel face temperatures of approximately 100°F. Panels will result in shading of the area below, providing a cooling effect beneath each structure. The PV solar panels will be mounted on direct-driven steel support structures that are between four and 25 feet in height. The steel support structures will be constructed of corrosion-resistant and galvanized steel. Concrete foundations will not be required for PV panel mounts.

The direct electrical current (DC) generated by the panels will be converted to alternating current (AC) by individual inverters, stepped up by transformers, and transmitted to a new substation via 34.5 kilovolt (kV) (AC) medium-voltage collection lines. The medium voltage collection lines will begin at the inverter transformers and will be located in trenches until the output from between 10 and 15 power blocks is terminated in the collection breaker of the substation. The electrical substation will convert power from 34.5 to 230 kV. The substation will be located directly adjacent to the existing PG&E transmission line.

The main access road, which will be a 24-foot-wide gravel road with a gate, will enter the site from the east or west from Little Panoche Road. The interior access roads will be 12-foot-wide gravel roads. Main site access roads will be graded and compacted using existing soil with a cover of gravel. Maintenance roads will be graded and compacted using existing soil with no gravel. Access roads will cross the onsite washes during construction and operation of the Proposed Project to provide adequate ingress and egress to and from the Project site for vehicles in the event of an emergency.

A six-foot-high smooth-top chain link fence will be placed around the blocks of panels. Fencing around the blocks of panels will be 5.5 feet of chain link with a 24 inch gap from ground surface to fence bottom to allow for wildlife movement.

Panel assembly will occur on-site. Panel components, such as the PV panels and racks, will be transported to laydown areas, where steel rack assemblies will be constructed at each block, and PV panels will be lowered onto the racks with final fastening being performed at the block. All items will be transported by container truck. A pre-fabricated racking system will arrive on site at a rate of approximately 10 to 20 MW per month to be assembled and grounded at the site. Pre-assembled PV panels will arrive on site and be placed in a staging area inside shipping containers. Panels will be put in place manually and secured to the rack per vendor specifications. The rack will be populated with panels, wired in series, and connected to a DC combiner box, which will deliver DC power to the local inverters.

1.1 Proposed Mitigation

The following identifies mitigation measures described in the Proposed Project Biological Assessment (10/26/2010) and associated Addendum (9/16/2011), and the Final Environmental Impact Report (FEIR; 9/30/2010) which the Proposed Project will utilize with the specific aim of reducing impacts to CTS:

- Project components were designed to avoid impacts to known CTS breeding ponds.
- All activities that will result in permanent or temporary ground disturbance shall be preceded by a preconstruction survey conducted by a qualified biologist. If CTS are observed during burrow excavation or during construction activities, all work will be suspended within the immediate area until such time a designated biologist with appropriate federal and state permits to handle CTS moves the individual.
- Suitable rodent burrows occurring within 0.4 mile of the four breeding ponds where CTS could reasonably be expected to aestivate, will be excavated if Project construction is to occur within 25 feet of a suitable burrow.
- CTS found during preconstruction surveys will be relocated to suitable small mammal burrows on areas of the Project site which will remain undisturbed.
- As required by the FEIR, breeding habitats and suitable upland habitat disturbed within 2,100 feet of a known or potential breeding pond will be mitigated at a 3:1 acreage ratio; suitable upland habitat located between 2,100 feet and 2,640 feet (0.5 mile) of a breeding pond will be mitigated at a 2:1 acreage ratio; and suitable upland habitat located between 2,640 feet and 6,636 feet (1.2 miles) of a breeding pond will be mitigated at a 1:1 acreage ratio. Temporary impacts will be mitigated at a 0.5:1 acreage ratio. Preserved habitat shall be the same quality or better quality than the habitat disturbed.
- Additional suitable breeding ponds within suitable aestivation habitat will be created on off-site conservation lands to mitigate the loss of potential breeding ponds on the Project Area.

One component of proposed mitigation which will have a positive effect on most species found in the vicinity of the Project Area is the permanent preservation, enhancement and management of approximately 21,000 acres of land directly adjacent to the Project Area. These 21,000 acres of off-site conservation lands are broken up into two areas. To the north, northeast and west of the Project Area is approximately 10,000 acres formerly known as the Valadeao Ranch. The Valadeao Ranch is a combination of rough, rugged hills and a portion of the Little Panoche Valley. The Little Panoche Valley is a lightly sloping valley with native grasses, and provides occupied habitat for San Joaquin kit fox, giant kangaroo rat, American badger, golden eagle, mountain plover, and burrowing owl.

To the southeast of the Project Area is approximately 11,000 acres formerly known as Silver Creek Ranch. Silver Creek Ranch is less sloped and rugged than the Valadeao Ranch, and is predominantly situated within the Panoche Valley. Full surveys have yet to be performed on Silver Creek Ranch, but previously documented surveys indicate it provides suitable habitat for blunt-nosed leopard lizard, golden eagle, mountain plover, burrowing owl, San Joaquin antelope squirrel, giant kangaroo rat, San Joaquin kit fox, and American badger. The key value of Silver Creek Ranch as conservation lands is that it is within the same valley and largely the same habitat type as the Project Area. The Recovery Plan for Upland Species of the San Joaquin Valley, California (USFWS 1998) specifically identified the natural lands in association with Silver Creek Ranch as areas of priority for habitat protection to conserve occupied habitat for Panoche Valley populations of blunt-nosed leopard lizard and giant kangaroo rat (USFWS 1998: pp 95 and 122).

Monitoring of conservation lands will permit an adaptive management program, such as modification of grazing regime to favor species on site. These off-site lands will be managed by a third party such as the BLM or California Rangeland Trust.

In addition to the off-site conservation lands, the Proposed Project will incorporate approximately 2,000 acres of on-site conservation lands, referred to as Valley Floor Conservation Lands. These lands include the southern portion of the Project Area and the major washes purposely avoided by the Project design. The southern portion of the Project Area which will be included in the on-site conservation lands, incorporates all of the blunt-nosed leopard lizard sightings to date on the Project Area; the majority of high-suitability giant kangaroo rat habitat; a large majority of the San Joaquin kit fox sightings; and evidence found by scat-sniffing dogs.

When Valley Floor, Valadeao Ranch, and Silver Creek Ranch Conservation Lands are combined, the Proposed Project would permanently conserve over 23,000 acres of potential habitat for botanical and wildlife species. These lands would go toward meeting mitigation ratio criteria for special status species which would be impacted by the Proposed Project.

On June 28, 2012, a site visit to the Proposed Project site, Valadeao Ranch Conservation Lands, and Silver Creek Ranch Conservation Lands was completed to identify potential locations to create CTS breeding ponds to comply with the final mitigation bullet point listed above. Attendees at this site visit included biologists from POWER Engineers, Inc. (POWER) and Live Oak Associates (LOA), and one hydrologist from WH Pacific to identify potential locations in the field. The site visit on the Valadeao Ranch Conservation Lands focused on the lower slopes and flatter landscape surrounding the known CTS breeding pond to the west of the Proposed Project. By placing a potential breeding pond within close proximity to the known breeding pond, the Proposed Project would create a breeding pond complex to better serve the species. The site visit to the Silver Creek Ranch Conservation Lands focused on the lower slopes and flatter landscape to the north of Panoche Creek. Results of this site visit are described in Section 3.0 below.

2.0 EXISTING CONDITIONS

2.1 CTS Species Ecology

The CTS originally inhabited most of central California, and remains in remnant populations throughout much of its original range. California Natural Diversity Database (CNDDB) records for CTS show its distribution encompasses portions on Alameda, Amador, Calaveras, Contra Costa, Fresno, Kern, Kings, Madera, Mariposa, Merced, Monterey, Sacramento, San Benito, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Tulare, Tuolumne, and Yolo Counties (NatureServe 2009). About 80% of all extant occurrences are in Alameda, Contra Costa, Madera, Merced, Monterey, San Benito, and Santa Clara counties, with 30% of all occurrences in Alameda County (NatureServe 2009). The use of vernal pools and other temporary bodies of water for breeding limits the CTS to areas of low elevation and low topographic relief throughout their range (Stokes et al. 2008). Ephemeral vernal pools which refill with water on a yearly basis, are 40 to 80 centimeters (cm) in depth, and have a surface area of 0.2 hectare (0.5 acre) or more are optimal for breeding CTS, although small, shallower pools will also house breeding CTS (Stokes et al. 2008). Depth of the breeding pool was highly correlated with breeding CTS. Stokes et al. (2008) found no CTS larvae in pools with an average depth of less than 22 cm. Deep pools with permanent water may not be optimal for breeding populations of CTS because they often house predatory fish, crayfish, or bullfrogs that prey upon larval CTS. This creates a narrow window of pool depth where the pool will not completely dry out before CTS have metamorphosed, but also will not contain water year round and house predators. Metamorphosed CTS move out of the vernal pools and into upland habitats. Small mammal burrows are important features of upland habitat. Adult CTS occupy small mammal burrows in grassland, savanna, or open woodland habitats (Trenham and Shaffer 2005).

Activity patterns of adult CTS are not well understood. Adult CTS live their entire lives in the burrows of small mammals such as the California ground squirrel. Adults begin moving toward breeding pools when the first fall rains begin to inundate pools. Breeding adults will continue moving to pools through the winter and spring. Adults can generally be found at breeding pools from October through May, although breeding is highly dependent on the amount of precipitation (Trenham et al. 2001; Trenham and Shaffer 2005). Adult CTS leave the breeding pools in late spring and return to upland habitats. Trenham and Shaffer (2005) used pitfall traps at various intervals away from a pool to determine the extent of upland use. They found that the numbers of adult CTS declined as distance from the pool increased out to 620 meters. Subadults also moved up to 600 meters away from the pools, but most were concentrated between 200 and 600 meters from the pool. This has led managers to suggest preserving upland habitats with suitable small mammal burrows out to 600 meters from breeding pools (Trenham and Shaffer 2005).

CTS may take upward of four to five years to reach sexual maturity (Trenham et al. 2000). Although individuals can live upward of ten years, less than 50% of individuals breed more than once (Trenham et al. 2000). Rainfall can significantly alter adult breeding pool attendance, and production of metamorphs tends to be a boom-or-bust scenario. Typically, greater numbers of breeding adults return to pools during years with greater rainfall (Trenham et al. 2000, 2001; Cook et al. 2006; Stokes et al. 2008). Males are often the first to arrive at breeding pools and remain in the pool longer than females (Trenham et al. 2000). Larvae remain in the pools approximately four months and emigrate from the pools as they dry. Metamorph emigration typically occurs throughout May and is directly related to the pool drying date (Trenham et al. 2000).

Often amphibian populations are used as an example for the metapopulation/source-sink models. The CTS populations at different breeding pools often act in a metapopulation fashion (Trenham et al. 2001). Mark – recapture studies found that while most breeding adults return to their natal pool, 22% dispersed to different ponds (Trenham et al. 2001). It should be noted that Trenham and Shaffer (2005) did not capture any CTS, adult or subadult, more than 620 meters from the pool. Thus, pools more than 1,240 meters from one another may limit dispersal. Breeding CTS have been known to use artificially created pools, and the creation of pools in a stepping-stone fashion has been suggested to aid dispersal between populations (Stokes et al. 2008).

2.2 Surveys Completed

In the winter of 2009 – 2010 biologists from LOA completed Protocol Vernal Pool Branchiopod Surveys in support of the Proposed Project. These vernal pool branchiopod surveys identified larval CTS while surveying other species. Protocol CTS Larval Surveys, performed in March, April and May of 2010, also noted larval CTS. Results of these two surveys identified larval CTS in two ponds. Both ponds were located off the Proposed Project. One pond is in Township 15S, Range 10E, Section 4 just outside the boundary of the Project site. This pond will be referred to as Pond 12 and is further described in Section 2.2.3 below. The second pond is located off-site in Township 15S, Range 10E, Section 17. Additionally, the CNDDB contains historical records of CTS breeding ponds located in the Las Aguillas Creek drainage within the Proposed Project. These historical breeding ponds occur on the Valley Floor Conservation Lands and will not be impacted by the Proposed Project.

It is unknown at this time to what extent the Silver Creek Ranch conservation lands support CTS. Full protocol surveys have not yet taken place on Silver Creek Ranch; however LOA herpetological experts expect several ephemeral ponds on site to be utilized by breeding CTS.

2.2.1 Pond 12

Pond 12 is a man-made pond which contains water behind a push-up dam for the purpose of providing water to cattle on the Valadeao Ranch conservation lands (Figure 1). Area calculations performed using aerial imagery determined that the maximum surface area of water capable of being retained behind the push-up dam is approximately 0.2 acre. During surveys performed for CTS larvae in Pond 12 during the winter and spring of 2010, the maximum surface area of the water was approximately 0.1 acre. Maximum depth recorded during these same surveys was 57 cm (22 inches).

The watershed area for the Pond 12 is approximately 0.63 square mile. The contributing watershed feeds to an incised channel which dissipates when it reaches the low gradient valley floor. After reaching the valley floor, the flow becomes sheet or shallow concentrated flow before reaching Pond 12. Pond 12 was constructed by excavating out the pond and using the cut material to build a berm on the downslope side. The berm is of unknown height, but is assumed to be approximately four feet.

Pond 12 survey data from LOA's CTS surveys in late 2009/early 2010 were analyzed with actual monthly precipitation data from the same period (Appendix A). WH Pacific created a water budget model for potential mitigation ponds using the aforementioned data along with mean monthly evaporation rates, and adjusted the assumed infiltration rate and assumed fraction of rainfall that will reach the pond as runoff to find the best match of the model to known data. The results of this analysis showed that the pond was both filling and emptying much slower than expected, indicating slower infiltration in the pond and a small fraction of rainfall reclaimed as runoff. The infiltration rate, which coupled with mean evaporation rate, created slower than expected emptying of the pond –

approximately 2.5% of the published Natural Resource Conservation Service (NRCS) rate for the soil in the area. The assumed fraction of rainfall that is collected as runoff was approximately 0.2%. The reason for this is likely due to two reasons. The first is that the runoff originates of the hills in a concentrated flow in an incised channel. When it hits the valley floor, the flow goes to sheet flow for approximately 1,000 feet where it can be lost to infiltration and evapo-transpiration before reaching the pond. The second potential reason for the low fraction of rainfall collected is caused by the potential direction of the sheet flow. From examination of vegetation patterns on aerial imagery, it appears as though half of the sheet flow may bypass the pond.

3.0 PROPOSED MITIGATION PONDS

The following goals were placed on potential mitigation pond locations during the water budget analysis:

- Mitigation ponds will be ephemeral, filling in late fall, winter, and spring, and drying out by early June. Critical months of inundation are March – May.
- Mitigation ponds will be approximately three feet deep.
- Mitigation ponds ideal footprint will be equal to that of Pond 12.
- Mitigation ponds are desired to be inundated five out of every ten years, with a minimum of three out of every ten years.

The following sources of data were used to develop water budget parameters for potential mitigation pond locations:

- Pan evaporation rates were obtained for the Little Panoche Detention Dam, 1963 – 1975, from *NOAA Technical Report NWS 34, Mean Monthly, Seasonal, and Annual Pan Evaporation for the United States*.
- Rainfall data was obtained for the Panoche 2W Weather Station from the Western Regional Climate Center website, December of 1949 through April 2012.
- Soil hydrological ratings and infiltration rates were obtained from the NRCS Web Soil Survey website.
- Observations of existing pond depth and surface area obtained from LOA's 2010 CTS survey data.

The water budget analysis utilized to determine the depth, surface area, and inundation period of potential mitigation ponds was based over a year-long timeframe with one month increments using median precipitation values for each month. NRCS Soil Survey data was obtained to determine average exfiltration rates of the various soil types in the areas of pond construction. These soil types showed extremely quick draining soils which would present difficulties in keeping a mitigation pond saturated for the appropriate duration. The Pond 12 depth/surface area ratio was used to make an estimate of infiltration. The pool demonstrated infiltration rates approximately 2.5% of the published NRCS soil data. This is a common scenario in ephemeral ponds where fine silts and clays washed in over time reduces the infiltration rate.

The runoff coefficient described in Panoche Valley Hydrological Study, SolarGen Panoche Valley Solar Farm, Panoche Valley, California prepared by Geologica in mid-2010 was 0.55. This means that approximately 55% of rainfall in the Panoche Valley can be expected to runoff. A HydroCAD analysis performed by WH Pacific showed that this is a reasonable assumption during a large, 100-year type of rainfall event; however, approximately 25% can be expected as runoff during smaller 1-year rainfall events and 15% for six month events. The data for Pond 12 demonstrated a very low runoff capture rate, capturing an estimated 0.2% of the total precipitation for the watershed. Runoff in the Pond 12 watershed progresses from an incised channel at higher, steeper elevations, to a shallow, spread-out sheet flow where much of the water is lost prior to entering the pool. For the purposes of this analysis, it was assumed that 5% of the monthly rainfall can be retained if the mitigation pond is placed near the outlet of an incised channel, and 0.2% when the pond is located far from the incised channel.

Six potential mitigation pond locations were marked during the June 28 site visit. After a preliminary water budget analysis, three potential pond locations were carried forward for a more detailed analysis described below. Sections 3.1 through 3.3 below describe the potential breeding pond locations: two on Valadeao Ranch, one on Silver Creek Ranch. These potential ponds are Valadeao Pond Site 3, Valadeao Pond Site 4, and Silver Creek Pond Site 1. As per the mitigation measures described in the Biological Assessment and associated Addendum, and the FEIR, the Proposed Project proposes to construct one mitigation pond on the Valadeao Ranch in close proximity to Pond 12, and one mitigation pond on the Silver Creek Ranch at a later date depending on the results of future CTS surveys on that property. The mitigation ponds may require the construction of shallow diversion canals perpendicular to the slope to capture sheet flow and direct it to the ponds to ensure that the ponds will remain inundated for a sufficient length of time. Exfiltration rates are the ruling factor in sizing the ponds, as these are many times higher than the evaporation rates during winter and spring. To reduce the amount of exfiltration, the rate of the in-situ native soil could be reduced by amending the native soil with a less permeable material such as bentonite or clay.

3.1 Valadeao Ranch Pond Site 3

Valadeao Ranch Pond Site 3 is located at approximately 2,300 feet (720 meters) west-northwest of Pond 12 at Easting 0687567, Northing 4058555 (UTM Zone 10; Figure 1). Valadeao Ranch Pond Site 3 is located near where an incised channel ends and the runoff converts to sheet flow. Based on this location, the pond would expect to collect a higher percentage of the monthly rainfall as runoff. For purposes of the analysis, it was assumed that the pond would capture 5% of the runoff. Valadeao Ranch Pond Site 3 has a drainage area of approximately 0.44 square mile. This area is 70% of the area of Pond 12; therefore, a pond surface area that is 70% of the existing pond surface area, or 0.14 acre would initially be anticipated. However, since we anticipate a higher rainfall as runoff capture ratio for this location, we ran the water budget model using the same size of pond as Pond 12. The water budget analysis shows Valadeao Ranch Pond Site 3 will fill to 0.14 acre, and a bypass spillway would be required to pass water over the dam. Appendix A provides the water budget analysis performed for Valadeao Ranch Pond Site 3.

From examination of aerial imagery, it appears that nearly all the sheet flow coming from the contributing area for Valadeao Ranch Pond Site 3 bypasses the existing breeding pond established in Pond 12, and therefore installation of a mitigation pond at this location would not detrimentally affect Pond 12. Additionally, the model shows that Valadeao Ranch Pond Site 3 will have excess water, assuming the 5% capture rate is correct, and provisions can be made to focus spillway discharge water toward the existing pond.

The NRCS mapping indicates that Valadeao Ranch Pond Site 3 is located in Yolo Gravelly Loam, and has a hydraulic conductivity rating of 12.0 micrometers per second, or 1.7 inches per hour. For purposes of the modeling, 2.5% of the NRCS rate was utilized, which is 0.0425 inch per hour. This was based on the infiltration rate demonstrated by Pond 12.

3.2 Valadeao Ranch Pond Site 4

Valadeao Ranch Pond Site 4 is located approximately 2,000 feet (630 meters) south-southwest of Pond 12 at Easting 0687975, Northing 4057754 (UTM Zone 10; Figure 1). Valadeao Ranch Pond Site 4 is located approximately 1,000 feet down slope of where an incised channel transitions to sheet flow. Therefore, the water budget analysis used the same capture rate as Pond 12 (0.2%). Because the drainage area of Valadeao Ranch Pond Site 4 is approximately half that of Pond 12, it was assumed that the drainage would support a pond of approximately 0.1 acre. The water budget analysis found that the drainage would support a pond of approximately 0.1 acre, with a maximum depth of just over one foot occurring in February. Appendix A provides the water budget analysis performed for Valadeao Ranch Pond Site 4.

A potential design component of Valadeao Ranch Pond Site 4 could include extending the incised channel to the pond location in order to retain water potentially lost as sheet flow, while still capturing sheet flow from surrounding hills which does not accumulate in an incised channel. Another potential design component of Valadeao Ranch Pond Site 4 could include creating diversion dams perpendicular to the direction of sheet flow to better direct flow to the pond location.

Currently, a stock watering trough which is filled by gravity fed piped spring water is located near Valadeao Ranch Pond Site 4. This piped spring water could potentially be used to augment natural runoff collected in the pond during the winter and spring. The piped water could be diverted back to the water trough to ensure that the mitigation pond would dry out in late spring or early summer.

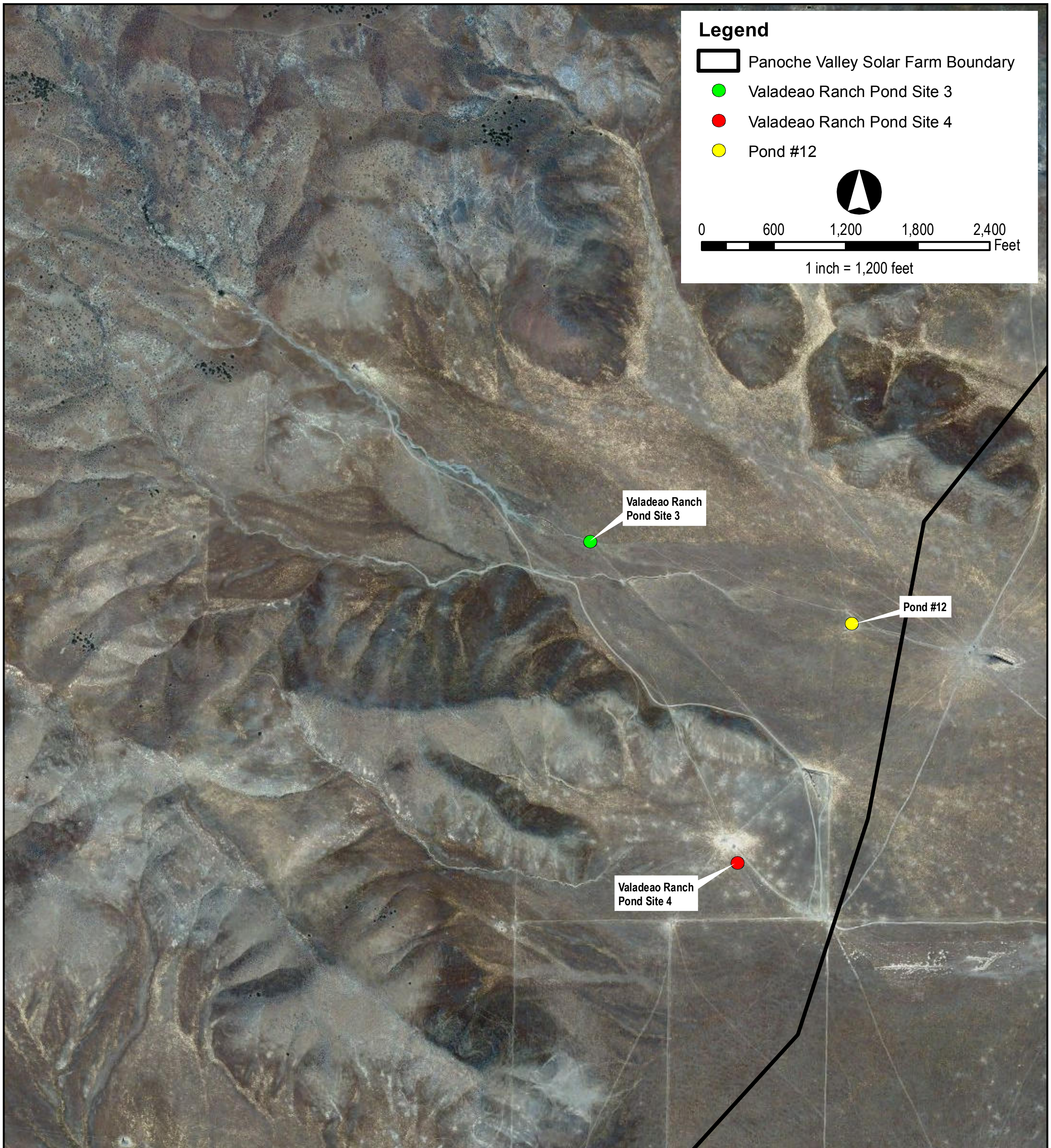
The NRCS mapping indicates that Valadeao Ranch Pond Site 4 is located in Yolo Gravelly Loam, and has a hydraulic conductivity rating of 12.0 micrometers per second, or 1.7 inches per hour. For purposes of the modeling, 2.5% of the NRCS rate was utilized, which is 0.0425 inch per hour. This was based on the infiltration rate demonstrated by Pond 12.

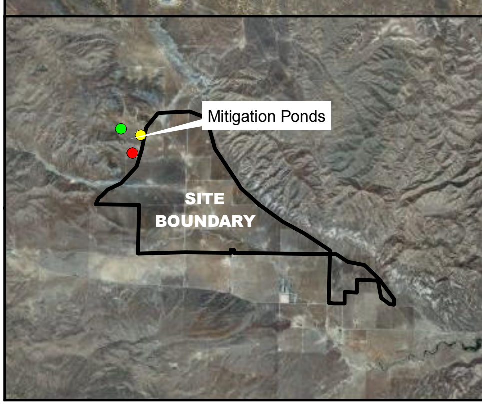
3.3 Silver Creek Pond Site 1

Silver Creek Pond Site 1 is located at the bottom of an incised drainage at Easting 0698859, Northing 4050925 (UTM Zone 10; Figure 2). Based on the June 28, 2012 site visit, Silver Creek Pond Site 1 was identified as a favorable location for a CTS mitigation pond due to the character of the incoming drainage. The drainage basin for Silver Creek Pond Site 1 encompasses approximately 0.2 square mile. Based on the June 28, 2012 site visit, the channel is fully vegetated and is not as deeply incised as those on the Valadeao Ranch. Silver Creek Pond Site 1 is located near the outlet of the vegetated channel; however, due to the unknowns of the watershed characteristics, a conservative rainfall as runoff capture rate of 0.5% was used in the water budget analysis. This runoff capture rate is just over twice the value of Pond 12. The use of a 0.5% runoff capture rate is based on the fact that there will be very little flow which will bypass the pond, and is conservative considering that the pond will be located closer to a concentrating channel.

The water budget for Silver Creek Pond Site 1 was initially modeled using a footprint of 0.06 acre, or 32% of existing Pond 12. The water budget analysis for a pond of 0.06 acre at Silver Creek Pond Site 1 showed that the pond would go dry in June and have maximum depth of approximately two feet in February. Appendix A provides the water budget analysis performed for Silver Creek Pond Site 1.

The NRCS mapping indicates that Silver Creek Ranch Pond Site 1 is located in Panoche Sandy Loam, and has a hydraulic conductivity rating of 12.3109 micrometers per second, or 1.74 inches per hour. For purposes of the modeling, 2.5% of the NRCS rate was utilized, which is 0.0425 inch per hour. This was based on the infiltration rate demonstrated by Pond 12.



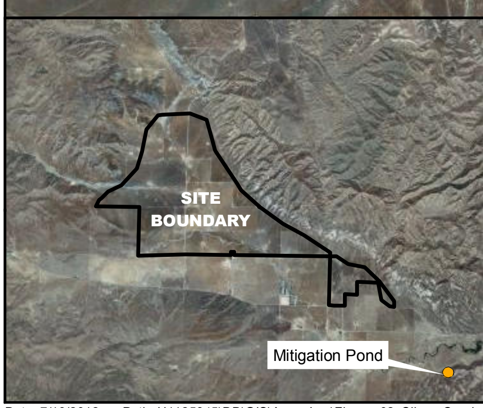


Panoche Valley Solar Farm

Figure 1
Valadeao Ranch Mitigation Ponds

POWER ENGINEERS

Duke Energy Renewables



Panoche Valley Solar Farm

Figure 2
Silver Creek Pond Site 1

4.0 CONCLUSIONS

The Proposed Project proposes to construct one mitigation pond on the Valadeao Ranch in close proximity to Pond 12, and one mitigation pond on the Silver Creek Ranch at a later date depending on the results of future CTS surveys on that property. This is consistent with mitigation measures described in the Biological Assessment and associated Addendum, and the FEIR prepared on behalf of the Proposed Project. By creating a new potential CTS breeding pond in close proximity to the existing breeding pond at Pond 12, the Proposed Project will create a breeding pond complex which may support increased genetic diversity and will provide multiple breeding pond options (Trenham et al. 2001; Trenham and Shaffer 2005). Which Valadeao Ranch pond location would best conserve CTS populations in and around the Proposed Project will be determined through consultation with the U.S. Fish and Wildlife Service and the California Department of Fish and Game.

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APPENDIX A MITIGATION POND AND POND 12 WATER BUDGET ANALYSIS

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Mean Monthly Precipitation[1], in	2.00	1.93	1.50	0.67	0.30	0.06	0.02	0.03	0.25	0.50	1.01	1.58	9.85
Median Monthly Precipitation[2], in	1.65	1.59	1.06	0.53	0.14	0.00	0.00	0.00	0.01	0.29	0.75	1.20	9.00
Average Monthly Pan Evaporation[3], in	1.77	2.87	5.79	8.62	13.66	15.83	17.09	15.65	11.65	7.09	2.95	1.81	104.78

[1]Data for Panoche 2W Weather Station (046675) from 1949-2012, Western Regional Climate Center

[1]Data for Panoche 2W Weather Station (046675) from 1949-2012, Western Regional Climate Center, Median value calculated by WHPacific

[2]Data for Little Panoche Detention Dam, 1963-1975, from NOAA Technical Report NWS 34, Mean Monthly, Seasonal, and Annual Pan Evaporation for the United States

Projected Monthly Water Budgets

Valadeo Ranch

Pond #12 (existing)

Watershed Area= 0.63 mi^2
= 403.2 acres
Assumed fraction of rainfall that will reach pond[4]= 0.00273
Pond soil NRCS unit symbol= YvB
NRCS saturated infiltration rate= 1.7 in/hr
Projected pond infiltration rate= 0.0425 in/hr

Full Surface Area= 0.2 acres = 0.081 Ha
Full Depth Estimate= 3.92 ft
Full Vol Estimate= 0.392 ac-ft
Area x coeff= 0.051
Volume x^2 coeff= 0.0255

[4]Runoff going to existing pond travels as overland sheet flow approximately 1000LF prior to reaching the pond and it is assume it loses quite a bit of volume in order to match the model with observed results.

Month	Runoff Volume (ac-ft)	Pan Evaporation Volume (ac-ft)	Exfiltration Volume (ac-ft)	Cumulative stored volume (ac-ft)	Estimated Stage (ft)	Estimated Surface Area at Stage (ac)	Volume at stage	Solver
September	0.001	0.000	0.001	0.000	0.01	0.000	0.0000	0.0000
October	0.027	0.005	0.021	0.001	0.16	0.008	0.0006	0.0000
November	0.069	0.006	0.059	0.005	0.45	0.023	0.0052	0.0000
December	0.110	0.006	0.097	0.013	0.72	0.037	0.0132	0.0000
January	0.151	0.007	0.132	0.025	0.98	0.050	0.0247	0.0000
February	0.146	0.013	0.129	0.029	1.06	0.054	0.0288	0.0000
March	0.097	0.018	0.096	0.013	0.71	0.036	0.0129	0.0000
April	0.049	0.013	0.046	0.003	0.35	0.018	0.0031	0.0000
May	0.012	0.005	0.011	0.000	0.08	0.004	0.0002	0.0000
June	0.000	0.000	0.001	0.000	0.01	0.000	0.0000	0.0000
July	0.000	0.000	0.000	0.000	0.00	0.000	0.0000	0.0000
August	0.000	0.000	0.000	0.000	0.00	0.000	0.0000	0.0000

Valadeo Site 3

Watershed Area=	0.44	mi^2					
=	281.6	acres					
Assumed fraction of rainfall that will reach pond[5]=	0.05		Full Surface Area=	0.2 acres =	0.081 Ha		
Pond soil NRCS unit symbol=	YvB		Full Depth Estimate=	3.92 ft		Full Vol Estimate=	0.392 ac-ft
NRCS saturated infiltration rate=	1.7	in/hr	Area x coeff=	0.051			
Projected pond infiltration rate=	0.0425	in/hr	Volume x^2 coeff=	0.0255			

[5]Runoff coefficient described in Panoche Valley Hydrological Study, SolarGen Panoche Valley Solar Farm, Panoche Valley, California by Geologica, June 1, 2010 IS 0.55. HydroCAD anaylsis performed by WHPacific shows approximately 15% can be expected during smaller 6-month frequency storms. Note that the pond is located proximally to the end of the incised channel. To be conservative a value of 0.05 is used.

Month	**Runoff Volume (ac-ft)**	**Pan Evaporation Volume (ac-ft)**	**Exfiltration Volume (ac-ft)**	**Cumulative stored volume (ac-ft)**	**Estimated Stage (ft)**	**Estimated Surface Area at Stage (ac)**	**Volume at stage**	**Solver**
September	0.012	0.003	0.008	0.000	0.06	0.003	0.0001	0.0000
October	0.340	0.050	0.221	0.069	1.65	0.084	0.0692	0.0000
November	0.880	0.049	0.509	0.391	3.91	0.200	0.3908	0.0000
December	1.408	0.030	0.527	0.392	3.92	0.200	0.3918	0.0000
January	1.936	0.029	0.527	0.392	3.92	0.200	0.3918	0.0000
February	1.866	0.048	0.476	0.392	3.92	0.200	0.3918	0.0000
March	1.244	0.096	0.527	0.392	3.92	0.200	0.3918	0.0000
April	0.622	0.140	0.499	0.375	3.83	0.196	0.3746	0.0000
May	0.158	0.125	0.290	0.118	2.15	0.110	0.1183	0.0000
June	0.000	0.038	0.073	0.008	0.56	0.029	0.0080	0.0000
July	0.000	0.003	0.005	0.000	0.04	0.002	0.0000	0.0000
August	0.000	0.000	0.001	0.000	0.00	0.000	0.0000	0.0000

Valadeo Site 4

Watershed Area=	0.3	mi^2				
=	192	acres				
Assumed fraction of rainfall that will reach pond[6]=	0.00273		Full Surface Area=	0.1 acres =	0.040 Ha	
Pond soil NRCS unit symbol=	YvB		Full Depth Estimate=	4.00 ft	Full Vol Estimate=	0.200 ac-ft
Projected pond infiltration rate=	1.7	in/hr	Area x coeff=	0.025		
Projected pond infiltration rate=	0.0425	in/hr	Volume x^2 coeff=	0.0125		

[6]Pond site is approximately 1000LF from incised channel, similar to existing. Used same proportionality as existing.

Month	Runoff Volume (ac-ft)	Pan Evaporation Volume (ac-ft)	Exfiltration Volume (ac-ft)	Cumulative stored volume (ac-ft)	Estimated Stage (ft)	Estimated Surface Area at Stage (ac)	Volume at stage	Solver
September	0.000	0.000	0.000	0.000	0.01	0.000	0.0000	0.0000
October	0.013	0.002	0.010	0.000	0.15	0.004	0.0003	0.0000
November	0.033	0.003	0.028	0.002	0.44	0.011	0.0024	0.0000
December	0.052	0.003	0.046	0.006	0.70	0.017	0.0061	0.0000
January	0.072	0.004	0.063	0.011	0.96	0.024	0.0115	0.0000
February	0.069	0.006	0.061	0.013	1.03	0.026	0.0133	0.0000
March	0.046	0.008	0.045	0.006	0.69	0.017	0.0059	0.0000
April	0.023	0.006	0.022	0.001	0.34	0.008	0.0014	0.0000
May	0.006	0.002	0.005	0.000	0.08	0.002	0.0001	0.0000
June	0.000	0.0002	0.0003	0.000	0.01	0.000	0.0000	0.0000
July	0.000	0.000	0.000	0.000	0.00	0.000	0.0000	0.0000
August	0.000	0.000	0.000	0.000	0.00	0.000	0.0000	0.0000

Silver Creek Ranch

Silver Creek Pond1

Watershed Area= 0.2 mi^2

= 128 acres

Assumed fraction of rainfall that will reach pond[4]= 0.005

Pond soil NRCS unit symbol= PkA

Projected pond infiltration rate= 1.74 in/hr

Projected pond infiltration rate= 0.0435 in/hr

Full Surface Area= 0.06 acres = 0.024 Ha

Full Depth Estimate= 4.00 ft

Full Vol Estimate= 0.120 ac-ft

Area x coeff= 0.015

Volume x^2 coeff= 0.0075

[4]Due to unknown specifics of the watershed, a conservative value that is roughly double that of the existing Valadeo Ranch pond was used.

Month	Runoff Volume (ac-ft)	Pan Evaporation Volume (ac-ft)	Exfiltration Volume (ac-ft)	Cumulative stored volume (ac-ft)	Estimated Stage (ft)	Estimated Surface Area at Stage (ac)	Volume at stage	Solver
September	0.001	0.000	0.000	0.000	0.01	0.000	0.0000	0.0000
October	0.015	0.003	0.012	0.001	0.30	0.004	0.0007	0.0000
November	0.040	0.003	0.032	0.005	0.83	0.012	0.0052	0.0000
December	0.064	0.003	0.053	0.013	1.32	0.020	0.0130	0.0000
January	0.088	0.004	0.073	0.024	1.80	0.027	0.0243	0.0000
February	0.085	0.007	0.072	0.029	1.98	0.030	0.0295	0.0000
March	0.057	0.011	0.059	0.016	1.47	0.022	0.0161	0.0000
April	0.028	0.009	0.031	0.005	0.79	0.012	0.0047	0.0000
May	0.007	0.003	0.008	0.000	0.20	0.003	0.0003	0.0000
June	0.000	0.0002	0.0004	0.000	0.01	0.000	0.0000	0.0000
July	0.000	0.000	0.000	0.000	0.00	0.000	0.0000	0.0000
August	0.000	0.000	0.000	0.000	0.00	0.000	0.0000	0.0000

Appendix I – San Joaquin Kit Fox Scat-sniffing Dog Surveys

LIVE OAK ASSOCIATES, INC.
an Ecological Consulting Firm

SJKF SCAT-SNIFFING DOG SURVEY RESULTS

PANOCHE VALLEY SOLAR FARM BIOLOGICAL ASSESSMENT

Prepared for:
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October 19, 2012 PN: 1534-04

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Transects totaling approximately 176.2 km (approximately 109.5 miles) were surveyed twice by Working Dogs for Conservation from 30 July and 15 September 2010, walking 53.4 km of non-random transects on the valley floor, including the Project site and the Valley Floor Conservation Land, and 122.8 km on the Valadeao Ranch Conservation Lands. During these surveys, 52 fresh (< 8 days old) and 311 old scats (> 8 days old) were collected from the valley floor and 42 fresh and 240 old scats were collected from the Valadeao Ranch Conservation land, for a total of 252.4 total km surveyed, collecting and marking locations of 94 fresh scat, and marking locations of 551 additional old scat (see Appendix A for Working Dogs for Conservation report). Individual SJKF mark their territory with urine and feces, as well as use latrines. Ninety-four of the scats collected during these surveys were sent to the Smithsonian to have DNA analyzed (see Appendix B for the Smithsonian report). By using mtDNA, microsatellite genotypes, and microsatellite markers, 69 scat were identified and used in the analysis. Please refer to the Smithsonian report entitled “Using non-invasive fecal DNA analysis to estimate the presence and distribution of endangered San Joaquin kit foxes in the Solargen Solar Farm Project Area” for a discussion of laboratory methods and full results of the DNA analysis.

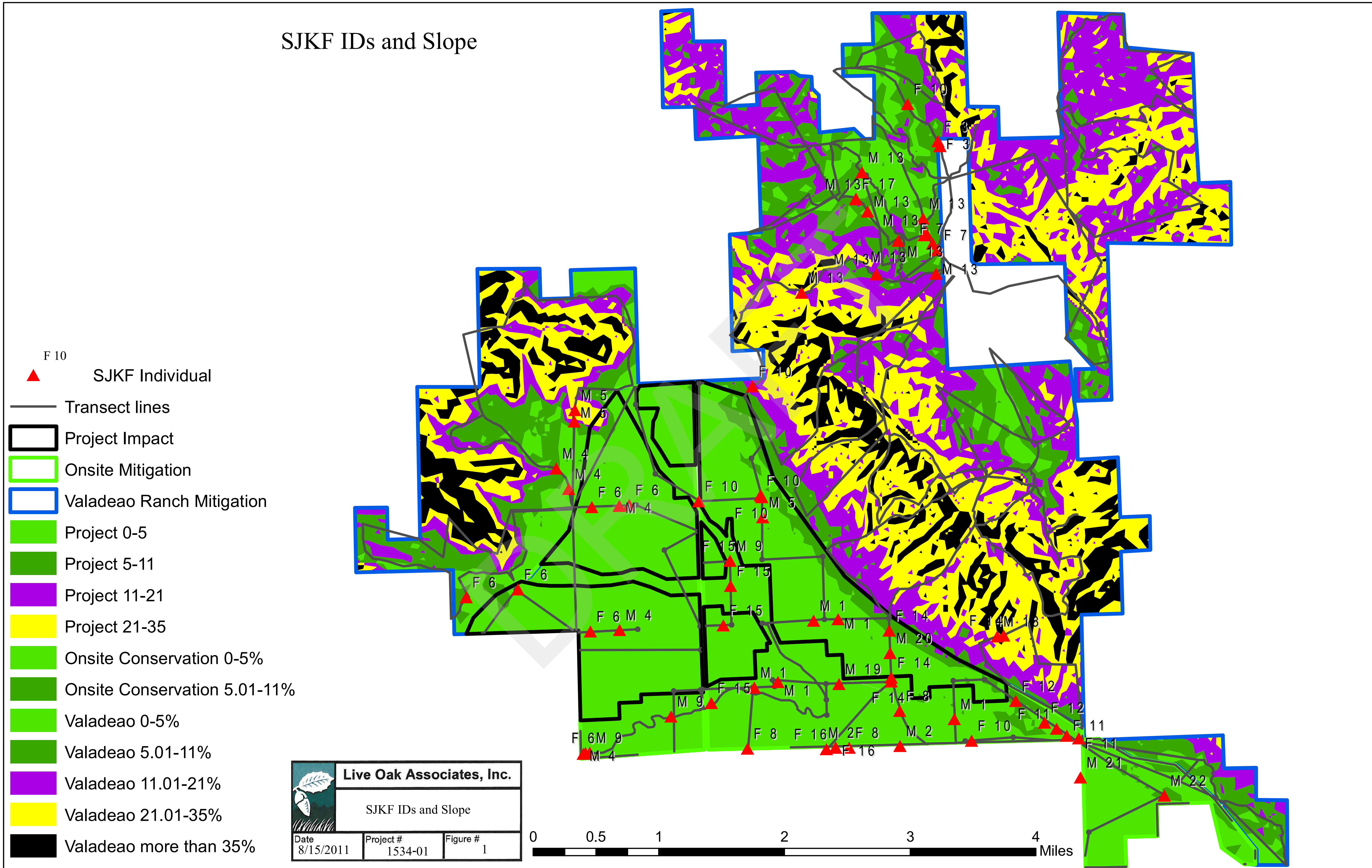
Overall, steeper slopes were under-sampled and shallower slopes were over-sampled, especially when considering the Valadeao Ranch Conservation Lands (Table 1, Figure 1). SJKF scat was found on up to 35% slopes on the Valadeao Ranch, however, steeper slopes (21-35% and >35%) were severely under-sampled by 26.06% and 52.38% respectively (Table 2), therefore, it can be assumed that SJKF may use steeper slopes throughout the Valadeao Ranch than previously recorded in other regions of their range.

Table 1. Percent of transects sampled within slope ranges.

Slope Range	Project Site Transect %	Valley Floor conservation Transect %	Valadeao Ranch Transect %	Total Transect %
0-5%	91.96	92.36	13.91	66.08
5-11%	8.04	7.64	27.23	14.30
11-21%	N/A	N/A	30.03	10.01
21-35%	N/A	N/A	22.82	7.61
>35%	N/A	N/A	6.00	2.00
Total %	100	100	100	100

Table 3. Percent slope ranges undersampled and oversampled.

Slope Range	Project Site	Valley Floor conservation	Valadeao Ranch	Total % Under/Over
0-5%	-1.40%	-2.12%	62.00%	1.03%
5-11%	28.41%	35.45%	46.83%	40.94%
11-21%	N/A	N/A	2.16%	1.05%
21-35%	N/A	N/A	-26.06%	-26.43%
>35%	N/A	N/A	-52.38%	-52.38%


SJKF IDs and Slope
F 10
SJKF Individual
Transect lines
Project Impact
Onsite Mitigation
Valadeao Ranch Mitigation
Project 0-5
Project 5-11
Project 11-21
Project 21-35
Onsite Conservation 0-5%
Onsite Conservation 5.01-11%
Valadeao 0-5%
Valadeao 5.01-11%
Valadeao 11.01-21%
Valadeao 21.01-35%
Valadeao more than 35%
Live Oak Associates, Inc.
SJKF IDs and Slope
Date
8/15/2011
Project #
1534-01
Figure #
1
0
0.5
1
2
3
4
Miles

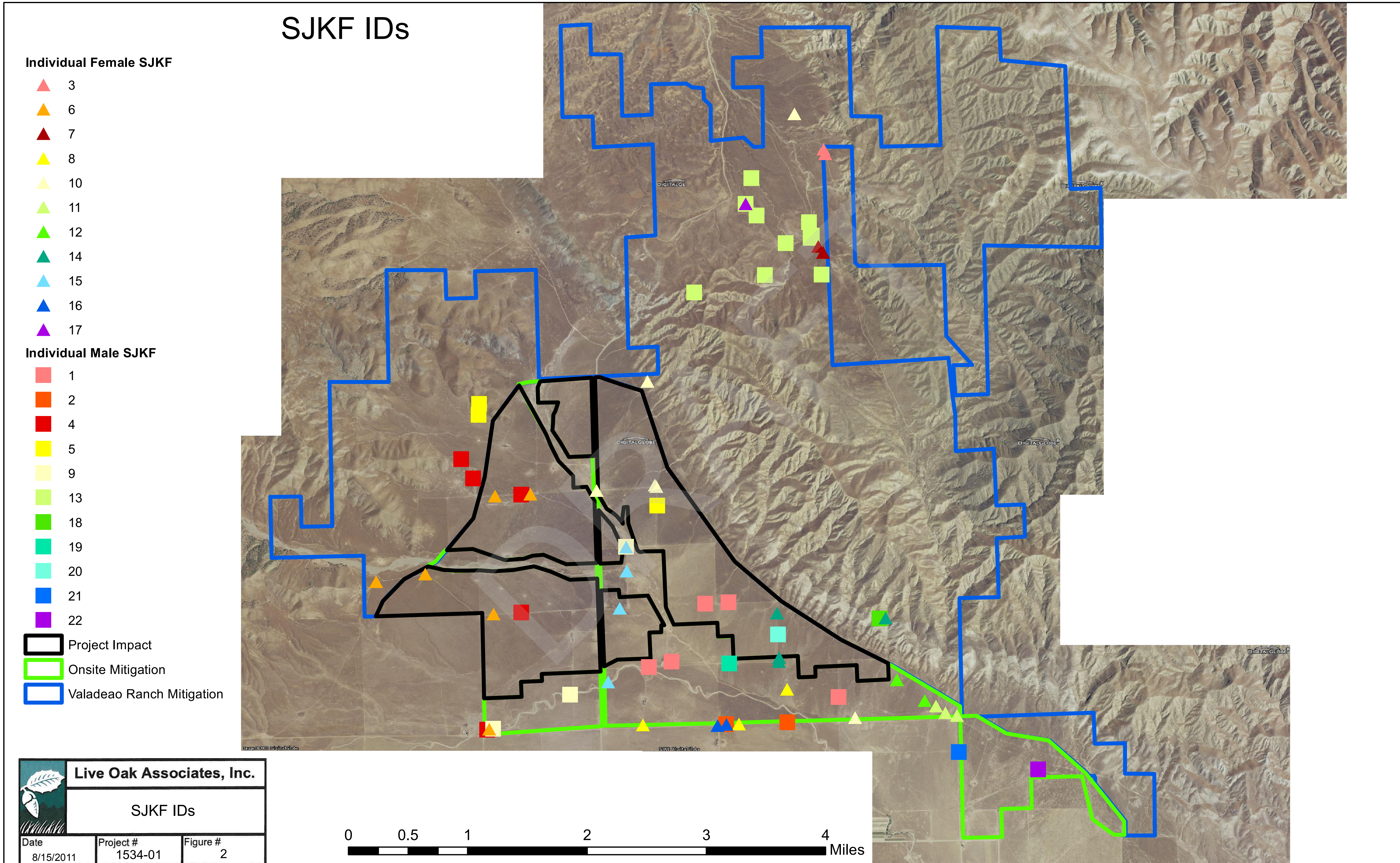
Twenty-two individuals, 11 males and 11 females, were identified by genetic analysis of 69 scat (Table 3, Figure 2). Although nine individuals were found on the Project site, only one individual #20 (male) was located exclusively within the Project boundary; however this was based on the location of only one individual scat. This scat was about ¼ mile from the boundary, and therefore, his home range most likely extends outside of the Project area. Eight separate individuals were located on both the Project and the conservation lands. Thirteen individuals were located exclusively on the conservation lands. See the Minimum Convex Polygon map (Figure 3) and Table 3 for a minimum home range approximation for each individual. These polygons were created by connecting the outer-most scats of an individual. Because these polygons are based on scat located along transects, several individuals' polygons are based on small amounts of scat. Actual home ranges are expected to be larger, and may fluctuate season to season and year to year based on food availability.

Table 3. Minimum Convex Polygon Acres.

ID	Gender	# Scat	Minimum Convex Polygon Acres
1	M	5	362.1
2	M	2	6.76
3	F	2	0.04
4	M	5	435.27
5	M	3	45.28
6	F	6	799.03
7	F	2	1.43
8	F	3	74.47
9	M	3	212.26
10	F	6	3260.18
11	F	3	1.13
12	F	2	2.69
13	M	11	359.95
14	F	4	117.57
15	F	4	11.8
16	F	2	0.72
17	F	1	0.04
18	M	1	0.01
19	M	1	0.02
20	M	1	0.02
21	M	1	0.01
22	M	1	0.01

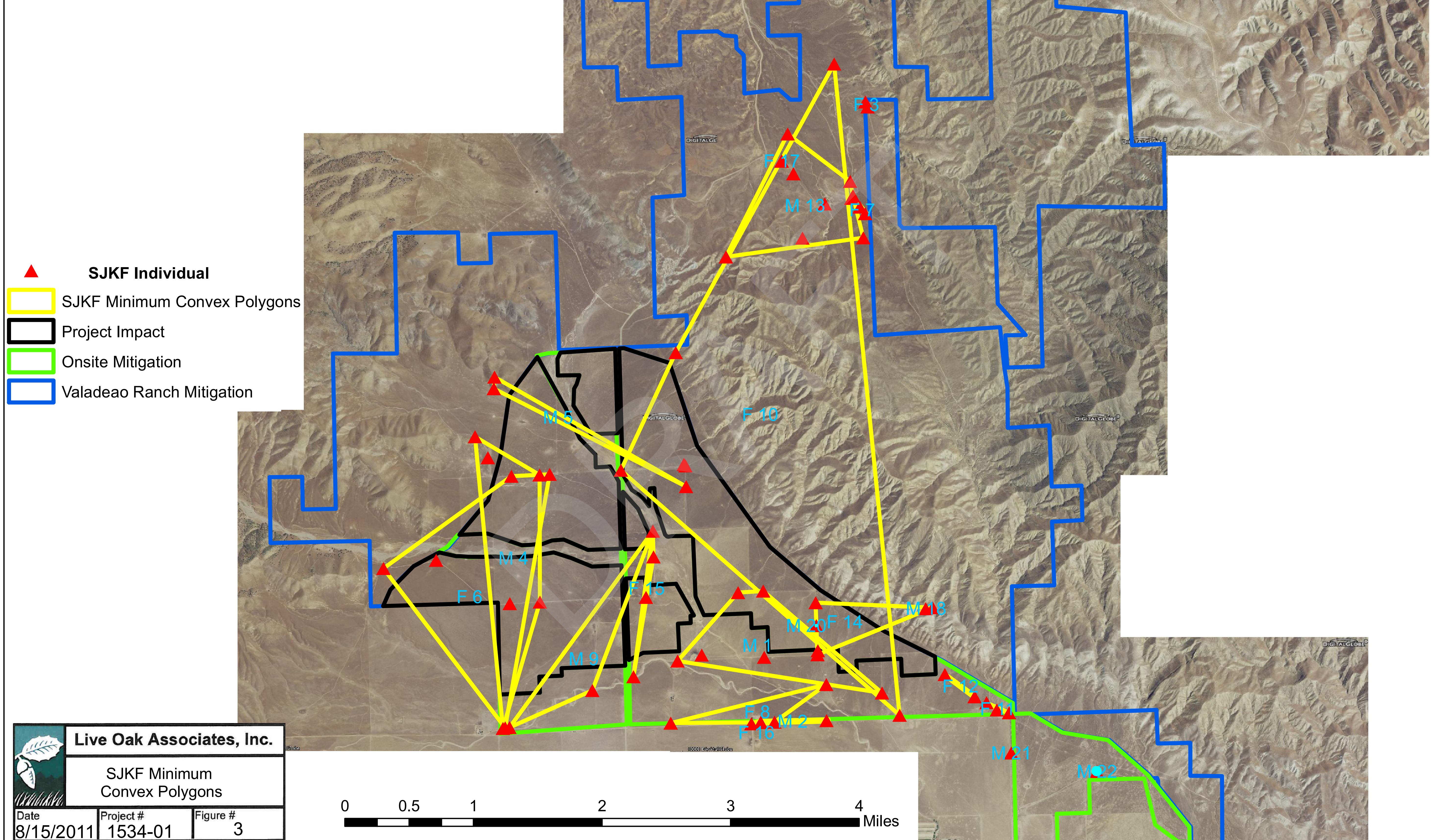
Individual #10 is of particular interest, as her scats were located on the Project site, Valley Floor Conservation, and Valadeao Ranch Conservation lands with an enormous minimum home range of 3260.18 acres. It is unknown whether this is a juvenile or an adult, and therefore, we cannot determine whether this indicates a dispersal movement or regular home range movement.

According to Cypher, et al. (Wildlife Society 2000), who conducted a 15-year study (1981 to 1995) on the Naval Petroleum Reserves (NPR) in California, an area known for its high density of SJKF, the number of individual SJKF per square kilometer ranged from 0.21 to 1.68. This wide fluctuation in number of individuals in the same area over 15 years is evidence of a species



SJKF IDs
Individual Female SJKF
3
6
7
8
10
11
12
14
15
16
17
Individual Male SJKF
1
2
4
5
9
13
18
19
20
21
22
Project Impact
Onsite Mitigation
Valadeao Ranch Mitigation
Live Oak Associates, Inc.
SJKF IDs
Date
8/15/2011
Project #
1534-01
Figure #
2
0
0.5
1
2
3
4
Miles

SJKF Minimum Convex Polygons



whose populations vary greatly over the years, based to a large extent on prey base and climatic changes. Based on this study in Kern County, the number of individuals on 2813 acres of the Project Site encompassed by the Project, could range anywhere between 2.7 and 21.8, given the site supports approximately 13 square kilometers of suitable habitat for SJKF. The degree to which the Ciervo-Panoche region supports densities as high as reported for NPR, one of the species' most prolific regions, is currently unknown, but for purposes of the ITP, it is assumed that the Project could affect the use of the site of 3 to 22 individuals, depending on episodic fluctuations of the species.

Appendix J – San Joaquin Kit Fox Scat-sniffing Dog Surveys and Genetic Analysis

Final Report to Solargen Inc.

Using non-invasive fecal DNA analysis to estimate the presence and distribution of endangered San Joaquin Kit foxes in the Solargen Solar Farm Project area.

By

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Project objectives

Traditionally, biologists have gathered basic information about carnivores by trapping, drugging, and then putting radio-collars on them. We have developed reliable non-invasive methods of gathering information that uses trained dogs to find carnivore scats (feces) and then analyzing the carnivore DNA in the scats. Our work on San Joaquin kit foxes (*Vulpes macrotis mutica*) has shown that the trained dogs are highly effective and highly accurate at finding kit fox scats (Smith et al. 2001; Smith et al. 2003). Furthermore, we have developed DNA protocols that allow us to accurately distinguish kit foxes scats from that of other sympatric canids (Bozarth et al. 2010; Smith et al. 2005). In addition we have developed reliable methods for gender determination using canid scats (Ortega et al. 2004 and Ralls et al. 2010). Thus, by periodically collecting fox scats and analyzing the DNA extracted from them, we can determine which individual foxes are present on a given area at a given time, acquiring the same data yielded by trapping and radiotelemetry (Smith et al. 2006). The primary objective of this study was to conduct research on the presence, number of individuals, distribution, recapture rates, for kit foxes in the Solargen Solar Farm project area using genetic analysis of non-invasively collected scat samples.

Materials and Methods

Field collection of scat samples

Canid scat was collected by personnel from the Working Dogs for Conservation Foundation (WDCF). Canid scat can persist in the field for several months, depending on the content of the scat and weather conditions. Thus, scat found in the field is not necessarily fresh. It is more difficult to obtain viable DNA from older scat. Therefore, the personnel from WDCF made every effort to collect as many scat samples as the dogs detected but only fresh scat samples were sent for genetic analysis. It is also necessary to be able to approximate the date of scat deposition to track the movements of individual kit foxes and efforts were undertaken to collect and ship only fresh scat. Sample locations were recorded using GPS units. The samples were stored in zip lock bags with silica gel for short-term preservation and for shipping to our lab.

Mapping

X-Y coordinates of each transect and the location where each scat was found were entered into a GIS (Geographical Information System) and plotted over an aerial photograph with project boundary lines indicated. All of the mapping of transects, of collected samples, and of individuals identified by the genetic analysis was conducted by personnel at Live Oak Associates Inc.

Fecal sampling during two periods of scat collection, August and November 2009

Search routes were established along multiple transects running throughout the study site (Figure 1). Fresh scat was collected during two surveys at each of two locations, for a total of 94 samples overall. Details of sampling protocols were provided in a separate report to Solargen by WDFC.

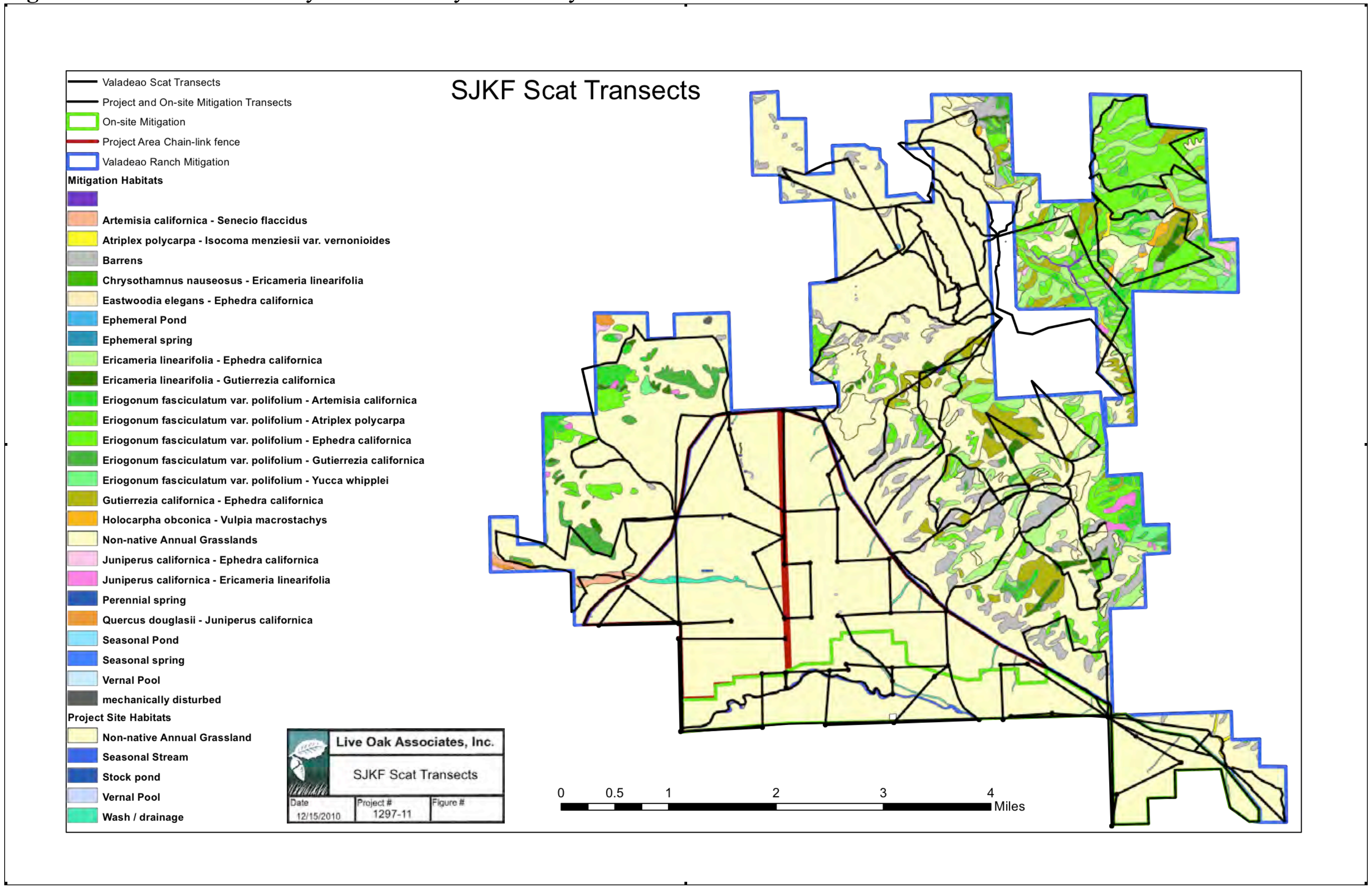
DNA Extraction

Upon arrival of the fresh scat samples at the Genetics Lab, DNA was extracted using the QIAamp DNA stool mini kit (QIAGEN®) using modifications from manufacturer's protocol as in Eggert et al. (2005). Extractions were carried out in a separate room under quasi-sterile conditions to prevent contamination. Each sample was isolated a minimum of two times and tested. Negative controls (no scat material added to the extraction) accompanied each set of extractions and were used to check for contamination.

Species Identification

Most studies using fecal analysis have used methods such as PCR-RFLP and/or sequencing as species-specific markers (Kohn et al. 1999; Paxinos et al. 1997). These methods might be affordable, but can prove to be time consuming and laborious. We have improved on previous method by designing a faster and more reliable method that is simple and economical enough for routine application with a large number of samples (see Bozarth et al. 2010). This new method for species identification for fecal analysis uses internal primers KFSPID-F and KFSPID-R to amplify a small fragment of the mitochondrial control region (250-290 bp) as a species-specific marker. By amplifying a smaller fragment of this gene that differs in size between all other canid species that can potentially overlap in ranges with kit foxes, we were able to determine the species identification of the scat by simply running the PCR products directly onto an ABI Prism 3100 Genetic Analyzer. Fragment sizes are approximately 236 base pairs (bp) and 252 bp for kit fox, 258 bp for red fox, 278 bp for coyote, 284 bp for domestic dog and 286 bp for gray fox.

Figure 1. Location of the study area boundary and survey transects.



The PCR reactions were set up as follows: A 22μL volume of master-mix consisting of 6.8μL of PCR water, 2.5μL of 10x PCR buffer (No $MgCl_2$), 2.5μL of 10μM DNTP (2.5μM each), 1.0μL of primer KFSPID-F and 1.0μL of primer KFSPID-R , 2.0μL of $MgCl_2$ (25mM), 2.0μL of BSA (100X of 10mg/ml), 0.2μL of AmpliTaq Gold, and 4.0μL of substrate DNA. Reactions were denatured at 96° for 10 minutes; then 34 cycles of 94°C denaturing for 1 minute, 53°C annealing for 1 minute, and 72°C extension for 1 minute and 30 seconds; then a final extension of 72°C for 5 minutes; and lastly stored at 4°C forever. To measure base size differences, 1.0μL of PCR product was added to 9.0μL of 5:100 mix of Gene Scan ROX-500 (Applied Biosytems) and Hi-Di Fomamide (Applied Biosystems). Once the mtDNA fragment is amplified, samples were loaded on an ABI PRISM* Genetic Analyzer 3130 and genotyped using Genemapper® software to determine the base call size of the fragment.

Molecular Sexing

Many molecular techniques have been created over the years to aid in sexing samples. One of the most popular methods has been using the SRY (Sex Determining Region, Y) for sexing mammals. However, there are a few problems associated with using this technique on DNA from scat. One problem is that because the test is based on the presence or absence of a PCR product it can yield a false sex identification if the PCR reaction does not work. Another problem when working with carnivores is that it can be difficult to differentiate between a true male sample or a false positive (a female that consumed a male animal). To get around this problem we have developed a technique that yields PCR products for both males and females and with a greater specificity for canids. We have developed primers that amplify a section of the zinc finger protein gene, found in both X and Y chromosomes (Ortega et al. 2004 and Ralls et al. 2010). These primers are canid specific, so the problem of a female animal eating a male animal and then being falsely identified as male will only be a problem if the prey was canid.

Restriction Fragment Length Polymorphism (RFLP) analysis of zinc finger (ZF) protein genes that are found in both X and Y-chromosomes have been widely used in molecular sexing (Fernando and Melnick 2001). This method identifies polymorphic positions between the ZFX and ZFY sequences based on the presence of double peaks in a chromatogram after direct sequencing of Polymerase Chain Reaction (PCR) products from males. In this way it is simple to find unique restriction sites for the Y fragment.

In the analysis of a 412 bp sequenced for the male and the female fragments from several canids, we determined that the males alone had a site where the Taq I restriction enzyme would cut. We then designed a set of internal primers (ZFKF203L and ZFKF195H) to amplify a 195 bp fragment that contains the Taq I digestion site from scat samples that had already been species ID as kit fox. The PCR products were then digested with a Taq I restriction enzyme yielding a clear pair of bands for males and a single uncut band for females (Ortega et al. 20004). To increase efficiency of screening many fecal samples and to improve our ability to detect fragments, we modified the original protocol by adding a carboxyfluorescein label to the forward primer (ZFKF 203L) designed by Ortega et al. (2004) and by running the digested PCR fragments directly onto an ABI PRISM* 3100 Genetic Analyzer (Applied Biosystems Inc., Foster City, CA) (Ralls et al.

2010).

Genotyping and Identification of Individual kit foxes.

Once samples were positively identified as kit foxes they were genotyped for individual identification using six microsatellite tetra-repeat loci that have been developed from domestic dogs (Francisco et al. 1996) and proven to reliably work for kit foxes in our lab (Smith et al. 2006) (Table 1).

Table 1. List of six tetranucleotide microsatellite loci that were resolved kit fox scat samples from Solargen project area. Included are primer sequences, and published size ranges of PCR products for these loci in kit foxes.

Locus	Primer Sequences	Size
FH2535	L 5'-GTCATTGACAGACTACAAATCTCC-3' H 5'-ACAGACTTGCAGTATTTTGTCTG-3'	145-177
FH2137	L 5'-GCAGTCCCTTATTCCAACATG-3' H 5'-CCCCAAGTTTTGCATCTGTT-3'	179-247
FH2140	L 5'-GGGGAAGCCATTTTTAAAGC-3' H 5'- TGACCCTCTGGCATCTAGGA-3'	107-161
PEZ19	L 5'-GACTCATGATGTTGTGTATC-3' H 5'-TTTGCTCAGTGCTAAGTCTC-3'	195-211
FH2226	L 5'-GGACTACCCCATTGCATTTG-3' H 5'- GAATCGAGTCCCATATCGGG-3'	129-181
FH2561	L 5'-TGCTCAAGGTTGAATAAATATGC-3' H 5'-TTTATGGCCTGTGGGCTC-3'	212-272

Each DNA extract was subjected to at least 5 independent PCR amplifications for each locus for homozygous individuals for allele size verification and to be able to detect allelic drop out rates. Heterozygotes were ran a minimum of two times. PCR amplifications were done in a programmable thermocycler (MJ Research PTC-200 DNA engine). Final amplification reagents in 25 µl volumes were: 1X reaction buffer (Perkin-Elmer), 2.5 mM $MgCl_2$, 200 µM each deoxynucleotide (dNTP), 1.7 mg/ml fraction-V BSA, 2 units Taq polymerase (Perkin-Elmer), and 1 µM of each primer. The reaction for scat extracts as well as extract and PCR negative controls (reaction reagents without template) were cycled 35 times following an initial hot start using the following profile: 94° C for 1 min, 58° C for 1 min, and 72° for 1.5 min. These samples were then run on an ABI3130xl genetic analyzer, which allows for a plate of the 384 PCR reactions to be loaded at once. Each amplified microsatellite was visualized and checked for polymorphism by utilizing fluorescent dye-conjugated primers (TET, HEX or FAM) in the PCR reaction. Microsatellite allele sizes were estimated by comparison to the Genescan-500 ROX size standard and using Genemapper® software to determine the base call size of the fragment.

In order to determine the ability of our six microsatellites to distinguish between individuals, the probability of identity (*P*ID) (i.e. the probability of different individuals sharing an identical genotype at random; Mills et al. 2000; Waits et al. 2001) and the *P*ID between siblings was estimated in a set of 56 tissue samples from live-trapped foxes in a previous study conducted in the Carrizo plains are using methods of Waits et al. (2001) (See Smith et al. 2006).

Genotypes were compared using the Excel Microsatellite Toolkit (Park 2001, http://animalgenomics.ucd.ie/sdepark/ms-toolkit/) and those that matched were designated as being the same individual. We also identified genotypes that differed at only one or two loci, checked them for accuracy of genotype and data entry and, when necessary, made corrections to avoid identifying individuals or recaptures based on incorrect genotypes.

Population genetic variability

In order to compare the levels of genetic diversity of individuals in this area we compared them to a reference sample of 29 individuals from the Carrizo Plains National Monument (CPNM) and that we have previously been typed for the same markers. Genotypes from the unique individuals from both sites were then tested for deviation from Hardy-Weinberg expectations and for linkage disequilibrium between loci using GENEPOP (Raymond and Rousset 1997). This program was also used to determine allelic diversity and expected and observed heterozygosity values at each locus.

Results and Discussion

Scat samples collected

Scat samples presumed to be from kit fox were detected by efforts of WDCF at the Solargen Solar Farm project site undertaken from 9 September – 15 September 2010 (Figure 2). Of these, 94 fresh scat samples were selected during two consecutive surveys at a mitigation and a building site and were shipped to our laboratory by WDCF (Table 1).

Species identification

Because there are multiple copies of the mitochondrial genome in each cell and only one copy of the nuclear genome, it is more difficult to amplify nuclear DNA than mitochondrial DNA from the small amount of DNA present in scats. Therefore, we were able to confidently determine mitochondrial DNA and microsatellite genotypes based on all 6 loci for 63 of the 94 scat samples that were sent to our lab for genetic analysis (Table 2). This is a success rate of 67 %, is similar to that of other studies based on DNA from scats (Taberlet et al. 1997; Woods et al. 1999; Kohn et al. 1999). Furthermore, of the 94 samples, we were able to amplify 81 for the mtDNA species id marker (86.2% amplification success rate) and they were all positively identified as kit foxes. Samples were identified as having one of two mitochondrial haplotypes, which differ by a 16bp deletion and are designated by lengths of 236bp and 252bp.

Although 13 samples could not be identified as kit fox through the mitochondrial DNA species identification, 9 of these samples were successfully genotyped using microsatellite markers and carried alleles consistent with our other kit fox samples in that population. However, because we did not have complete data for these samples they were excluded from any of the analyses and only the genotype data from 69 individuals was used in the final analyses.

Probability of Identity

With six microsatellites in a tissue sample set of 56 foxes from the CPNM, we estimated that the probability of a random match between unrelated individuals for all multilocus genotypes was 2.03 10^{-6} (*PID* unbiased), and the probability of a random match between siblings for all multilocus genotypes was 7.95 10^{-3} (*PID* sibs) (Smith et al 2006). Thus, the overall *Probability of Identity* was low suggesting that our selected microsatellites were adequate to differentiate between individual foxes, including relatives. In addition, information on gender from sex marker allowed to further differentiate closely related individuals.

Table 1. Percentage of scats identified as kit fox from two surveys at the building and mitigation sites. The absolute frequencies of the two kit fox haplotypes (KF-236 and KF252) that were detected in the site are also shown.

Building Site:	No. Samples:	KF – 236bp	KF – 252bp	% Identified Kit Fox
Survey 1	23	14	8	95.7%
Survey 2	29	11	9	69.0%
Mitigation Site:	No. Samples:	KF – 236bp	KF – 252bp	% Identified Kit Fox
Survey 1	20	16	1	85.0%
Survey 2	22	19	3	100%
Overall:	94	60	21	86.2%

Number of individuals and sex ratios detected

The results of our microsatellite genotyping analysis for the 69 samples that had complete microsatellite data confirmed the presence of a total 22 individual kit foxes in the mitigation and building sites of the Solargen project area (Table 2). We found a 1:1 ratio of males (n=11) to females (N=11) in the area. In addition, it is important to note that 16 of the individuals identified using our genotyping protocol were recovered in multiple scats (2-11 times) and only 6 individuals were represented in one scat sample. (Table 3 and Figure 3). In addition, most individuals were recapture in the same transect or in adjacent transects separated by less than a mile from each other. This also supports our conclusion that at least 16 individuals that were recaptured multiple times may be residents of the area as individuals tend to be spaced throughout the project area.

Table 2. Scat ID numbers, genotype numbers, sex for the 22 individual detected in a total of 69 scat samples using our 6 microsatellite loci and ZFxy sexing markers.

Individual	Gender	Sample	Easting	Northing	Survey	Site
1	male	FD1405	691612	4056191	R	Building
1	male	FD1406	691296	4056171	R	Building
1	male	Fh1504	690843	4055389	I	Building
1	male	FR1301	693098	4054912	R	Building
1	male	Fh1502	690538	4055315	I	Building
2	male	Fh1403	692403	4054568	I	Building
2	male	FD1407	691579	4054545	R	Building
3	female	RF2301	692917	4062248	R	Mitigation
3	female	RF2302	692890	4062310	R	Mitigation
4	male	FD1601	688353	4054469	R	Building
4	male	FD9804	688812	4057642	R	Building
4	male	Fh9801	688814	4056052	I	Building
4	male	RF0503	688003	4058121	R	Mitigation
4	male	RF0504	688164	4057860	R	Mitigation
5	male	Fh1004	690646	4057496	I	Building
5	male	RF0501	688236	4058721	R	Mitigation

5	male	RF0502	688244	4058869	R	Mitigation
6	female	FD9801	688440	4056034	R	Building
6	female	FD1602	688379	4054478	R	Building
6	female	FD9802	687515	4056574	R	Building
6	female	FD9803	688458	4057626	R	Building
6	female	FD9805	688938	4057652	R	Building
7	female	FD2603	692822	4060997	I	Mitigation
7	female	FD2604	692887	4060915	I	Mitigation
8	female	FD1501	690453	4054536	R	Building
8	female	Fh1401	691752	4054548	I	Building
8	female	Fh1405	692400	4055018	I	Building
9	male	FD1002	690227	4056938	R	Building
9	male	Fh1603	689472	4054945	I	Building
9	male	Fh1602	688434	4054481	I	Building
10	female	FD3404	690515	4059175	I	Mitigation
10	female	FD4301	690636	4057755	R	Building
10	female	FR1306	693318	4054636	R	Building
10	female	RF2304	692500	4062787	R	Mitigation
10	female	FD4303	689828	4057700	R	Building
10	female	FD4302	690617	4057775	R	Building
11	female	FAH002	694407	4054791	I	Building
11	female	RF1301	694691	4054665	R	Mitigation
11	female	FR1303	694537	4054701	R	Building
12	female	FAH001	693884	4055146	I	Building
12	female	FR1302	694256	4054866	R	Building
13	male	FD2601	691843	4061568	I	Mitigation
13	male	FD2605	691918	4061912	I	Mitigation
13	male	FD3401	692102	4060607	I	Mitigation
13	male	RF2607	692736	4061138	R	Mitigation
13	male	RF2608	692698	4061320	R	Mitigation
13	male	RF3401	692864	4060612	R	Mitigation
13	male	RF2603	692380	4061037	R	Mitigation
13	male	RF2602	691988	4061411	R	Mitigation
13	male	RF2606	692716	4061107	R	Mitigation
13	male	RF2605	692716	4061108	R	Mitigation
13	male	RF3402	691145	4060371	R	Mitigation
14	female	FD1403	692290	4055394	R	Building
14	female	FD1404	692293	4055445	R	Building
14	female	RF1303	693730	4055982	R	Mitigation
14	female	Fh1407	692266	4056045	I	Building
15	female	FD1003	690228	4056938	R	Building
15	female	Fh1503	689987	4055117	I	Building
15	female	FD1001	690237	4056616	R	Building
15	female	Fh1001	690141	4056113	I	Building
16	female	FD1402	691463	4054528	R	Building
16	female	FD1408	691580	4054545	R	Building
17	female	RF2601	691840	4061573	R	Mitigation
18	male	FD1303	693647	4055971	I	Mitigation
19	male	Fh1408	691621	4055362	I	Building
20	male	FH1406	692276	4055756	I	Building
21	male	FAH003	694716	4054164	I	Building
22	male	FR1304	695788	4053932	R	Building

Table 3. Genotype scores for the 6 microsatellite loci screened, mtDNA haplotype and gender for the 22 individuals identified in the 69 scat samples.

Individual	No Samples	Haplotype	Gender	2137	2137	2140	2140	PEZ19	PEZ19	2226	2226	2561	2561	2535	2535
1	5	251	male	179	183	145	149	199	199	129	129	244	248	150	154
2	2	235	male	179	195	139	145	199	199	129	129	212	248	154	154
3	2	235	female	179	195	149	149	199	199	129	129	208	248	146	150
4	5	235	male	179	199	139	139	199	199	129	129	248	248	146	150
5	3	251	male	179	199	145	159	199	199	129	129	248	260	150	150
6	6	251	female	183	199	145	149	199	199	129	129	244	256	150	154
7	2	235	female	195	199	139	149	199	199	129	129	208	248	150	154
8	3	235	female	195	199	139	139	199	199	129	129	212	212	150	154
9	3	235	male	199	199	139	145	199	199	129	129	212	256	150	154
10	6	235	female	199	199	139	149	199	199	129	129	212	260	150	150
11	3	235	female	195	195	145	149	199	207	129	129	216	248	150	154
12	2	235	female	195	199	139	149	199	203	129	129	248	260	146	150
13	11	235	male	195	199	145	149	199	207	129	167	248	248	150	150
14	4	251	female	179	183	139	149	199	199	129	171	244	248	146	154
15	4	235	female	183	199	149	149	199	207	129	171	248	252	150	150
16	2	251	female	183	211	139	149	207	207	129	129	244	252	150	150
17	1	235	female	195	199	139	149	199	199	129	129	248	252	150	154
18	1	251	male	179	183	139	149	199	199	129	171	248	248	150	154
19	1	251	male	183	199	149	149	199	199	129	171	248	260	150	154
20	1	251	male	183	199	149	149	199	199	129	129	248	248	150	154
21	1	251	male	183	183	145	149	199	199	129	171	244	252	154	154
22	1	251	male	183	195	149	149	199	203	171	171	212	212	146	154

Figure 2. Locations of all scats collected on the transect system in September 2010.

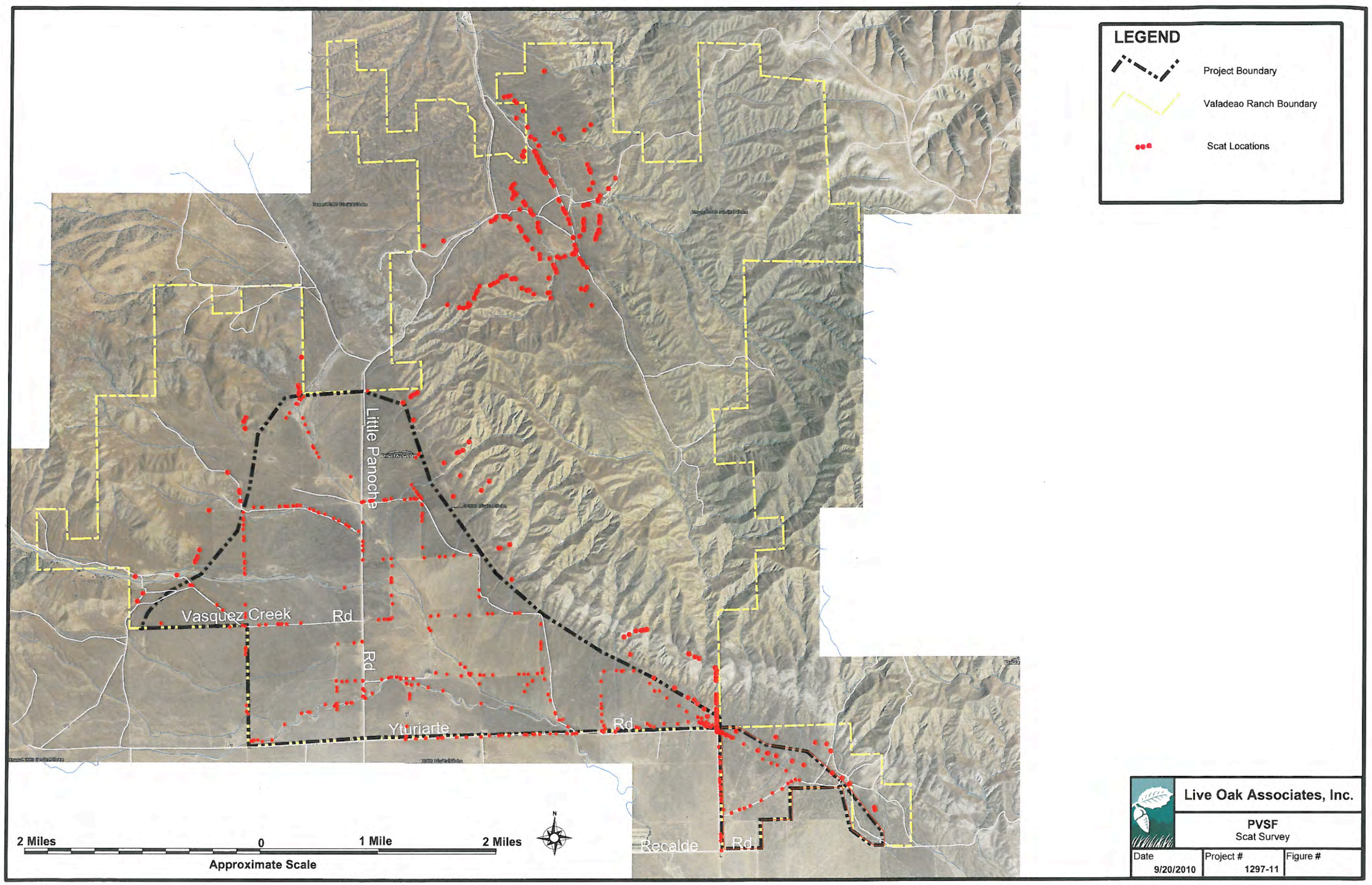
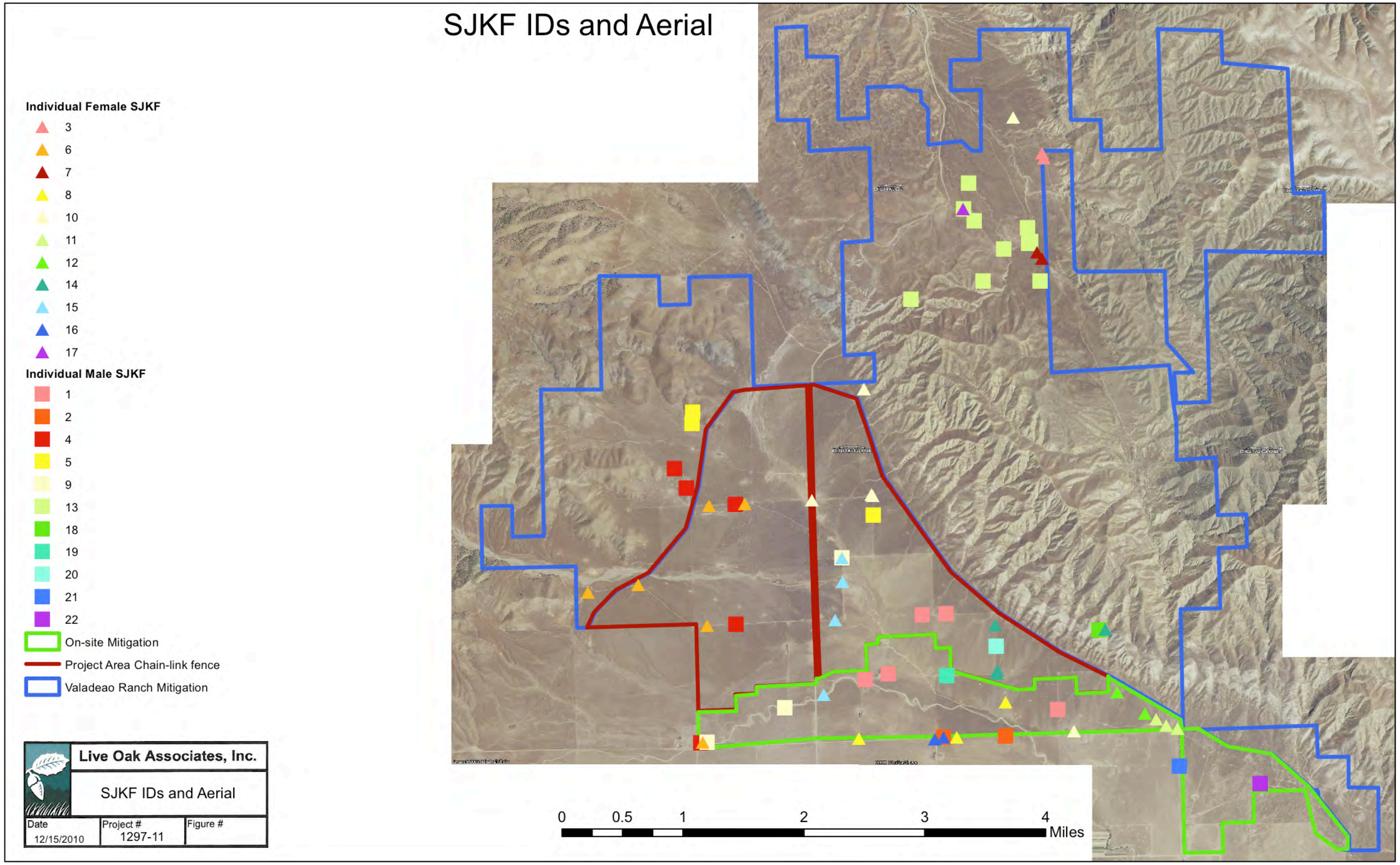


Figure 3. Location of the 69 scat samples that were genotyped and sexed from both surveys. The 22 kit fox individuals are separated by symbols into male and female, and the number of detections for each individual is provided in the legend. The scat collection points are overlaid in the map and scat ID number for those samples which did not work in the DNA analysis are shown. Males are denoted with squares and females with triangles.



Population genetic variability

We registered 26 different alleles with range of 3 - 8 alleles per locus with a mean number of allele of 4.33 (+/- 1.97) per locus in the six microsatellite loci screened for the kit fox population in the Solargen project site. The most polymorphic locus was 2561 with 8 alleles. (Table 4).

Table 4. Allele counts per individual loci for the kit fox population in the Solargen project site.

2137	Count	2140	Count	2226	Count	Pez19	Count	2561	Count	2535	Count
179	7	139	13	129	36	199	37	208	2	146	5
183	11	145	8	167	1	203	2	212	7	150	23
195	10	149	22	171	7	207	5	216	1	154	16
199	15	159	1					244	5		
211	1							248	19		
								252	4		
								256	2		
								260	4		

Analysis in GNEPOP found that all loci were under Hardy-Weinberg Equilibrium (p = 0.9057) and none of the loci showed evidence of linkage disequilibrium. Allelic diversity and heterozygosity were slightly lower but not significantly different than the values found for a control population of kit foxes in the Carrizo plains (n=29). The observed heterozygosities per locus were also not significantly different than the expected values for all loci (Table 5). In addition, the mean unbiased heterozygosity for the Solargen population (He = 0.561; SD=0.088) also did not differ significantly from the Carrizo population (He = 0.660; SD = 0.086). This suggests that the Solargen project area holds a population that has similar population genetics characteristics of a larger widespread population in the Carrizo Plains National Monument.

Table 5. Expected and observed heterozygosity values by locus for both the Carrizo Plains control population and the population in the Solargen project area.

Expected heterozygosities			**Observed heterozygosities**		
	Populations			Populations	
Locus	Carrizo	Solargen	Locus	Carrizo	Solargen
2226	0.63	0.59	2226	0.76	0.68
2561	0.85	0.77	2561	0.72	0.73
Pez19	0.66	0.63	Pez19	0.76	0.61
2137	0.91	0.76	2137	0.96	0.81
2140	0.56	0.64	2140	0.55	0.68
2535	0.32	0.31	2535	0.31	0.27

Conclusions

Using DNA extracted from 94 fecal samples collected by WDFC during the surveys conducted at the Solargen project area, we were able to determine species identity of 81 scat samples using mtDNA markers. We confirmed that all 81 samples were deposited by kit foxes. Kit fox scats were detected throughout the project area. Furthermore, we were also able to obtain complete genotypes from 61 of these samples and detected 22 individuals . Our sexing markers were able to confirm that we had 11 males and 11 females with a 1:1 male to female sex ratio in the area. Sixteen individuals appeared to be occupying the area as they were detected in multiple scats and 6 individuals were detected in a single scat sample.. Levels of genetic variability in the population of kit foxes inhabiting the Solargen project area are not significantly different from levels in the control population in the Carrizo Plains National Monument. In order to be validated, future surveys should be conducted at a similar time of the year. We feel that the number of individuals detected in our genotyping screening accurately reflects the number of individuals present in the area at the time, and future studies using spatially explicit capture-recapture model may help provide estimates the density of kit foxes and the population size at the study site from fecal DNA.

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Appendix K – Dynamic Occupancy Sampling

APPENDIX I. DYNAMIC OCCUPANCY SAMPLING METHODOLOGY – QUANTITATIVE SAMPLING

Modeling for Multi-species Conservation and Sustainability

Private property owners and land managers in the United States are responsible for sustaining native biodiversity and obligated not to put any species at risk of extinction (Noon et al. 2009). In other words, they must manage in a way that benefits and sustains multiple species. However, difficulties arise because the distribution patterns of many species are poorly known, and the quantitative methods and technologies that allow the practical and concurrent evaluation of ≥ 2 species are just now becoming available. These novel methods are significant, but their data requirements and technical challenges typically limit their utility to the untrained conservation manager. In this context, Noon et al. (2009) recently outlined approaches for conserving multiple species on public lands using contemporary statistical tools and models, such as those proposed for this framework.

Similarly, Dickson et al. (in press) implemented a multi-species approach using dynamic (i.e., multi-season) occupancy models and a suite of riparian-obligate bird species in the central Great Basin of Nevada. Specifically, they estimated patterns of detection probability, occupancy, colonization, and local extinction for three species, and used multi-model inference to identify functional relationships between the occupancy of each species and multiple habitat variables. Importantly, results from these approaches can be extended to modeling and mapping the simultaneous and probabilistic occurrence of multiple species across large spatial extents using basic mathematical and geographic information system (GIS) techniques (Noon et al. 2009; Townsend et al. in preparation). Moreover, LOA have linked these outcomes to landscape-scale models of habitat connectivity for multiple sensitive species (e.g., McRae et al. 2008).

Focal species

The species for which this quantitative sampling effort is proposed includes BNLL, BUOW, SJAS, GKR, SJKF and American badger.

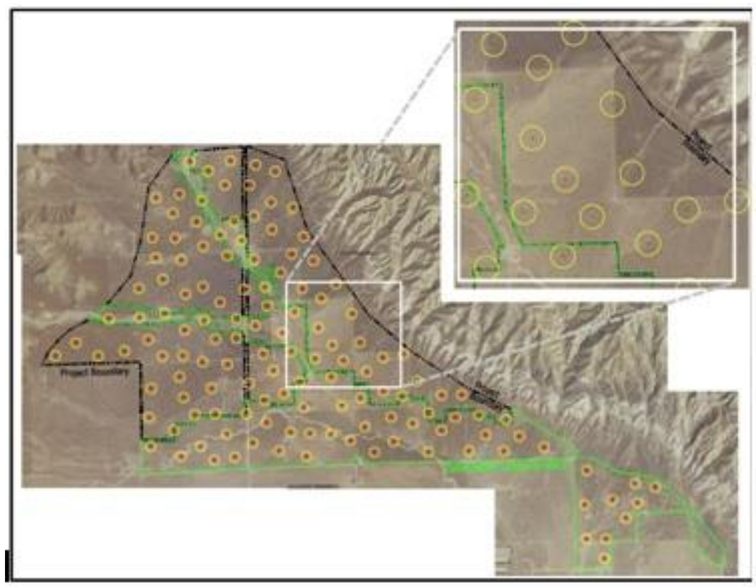
Sampling framework

Within a GIS, LOA will identify random (n = 95) and targeted ($n \leq 45$) survey points on the Panoche Ranch (ca.1910 ha) study area using systematically-located nodes derived from a randomly-placed 350-m lattice and color infrared digital orthophoto quadrangles (CIRDOQs; see Figure F-1). Across the study area, LOA will use the GIS to randomly select 95 nodes for use in the multi-species sampling effort and permanently mark each site using a geographic positioning system. To target additional areas and survey points ($n \leq 45$) for BNLL sampling on the study area, LOA will use spectral signatures derived from CIRDOQs to define and stratify barren habitats where this species is more likely to occur (see *Habitat variable delineation* below). Random and targeted survey points will be separated by ≥ 350 m. LOA will buffer all survey points to encompass a 2.0-hactares (5.0 acres) extent. Throughout this buffered area, LOA will implement comprehensive, expert-designed protocols that permit detection of each focal species or their sign (e.g., dens, burrows, precincts). For example, those methodologies defined by the various protocols to maximize detection (e.g., time of day, temperature, wind, etc.) will be utilized (see summary for BNLL (USFWS 2007)).

For the 2010 period LOA will sample each survey plot during the adult BNLL season from 15 April to 15 July for the focal species. To develop annual detection histories for each focal species at each survey point, LOA will visit all points on five occasions within a season (see *Models of multi-season occupancy* below). These detection histories are necessary to estimate each of the occupancy parameters used in LOA's proposed approach and specified below.

Habitat variable derivation

Within the GIS, LOA will spatially relate survey point locations to digitally derive habitat variables that LOA believe are good a priori predictors of the occupancy of each focal species. Because elevation and spatial location (i.e., longitude, latitude, trend) often represent a suite of abiotic influences on species occurrence, and may constrain the response of at least some species to elements of vegetation structure and composition (Mac Nally et al. 2008), LOA will estimate the elevation (in meters) and slope (in degrees) at each survey point by intersecting the centroids of the survey point locations with spatially explicit grids derived using a 30-m (1:24,000) resolution U.S. Geological Survey digital elevation model. At each survey point, LOA will also compute the square of elevation (a quadratic term) to identify any non-linear response by species to this habitat variable. In addition, LOA will characterize local-scale topographic complexity by computing the standard deviation of slope within the buffer around each survey point. LOA will include spatial terms in the occupancy models, expressed as Universal Transverse Mercator coordinates of the centroid of each survey point, in the form of a second-order polynomial trend surface. LOA will also include a variable indexing each of the two study areas.



To relate occupancy parameters to vegetation condition, LOA will model greenness (i.e., biomass, leaf area) using a continuous Normalized Vegetation Difference Index (NVDI) derived using multi-temporal Landsat Thematic Mapper satellite imagery obtained immediately after each annual sampling effort. In addition, LOA will estimate the distribution of barren areas using spectral signatures derived from color infrared digital orthophoto quadrangles (CIRDOQs) imagery (ca.2005; see Figure F-1) and ground-based information obtained during preliminary surveys and a brief ground-truthing exercise. Barren areas will be treated as a binary variable in the LOA statistical model.

LOA will also collect data on important co-variates such as vegetation cover and vegetation height. For example, at each detection location of a focal species (individual or sign), LOA will characterize the vegetation component by sampling nine, 1-meter quadrates. See Figure F-2, layout below.

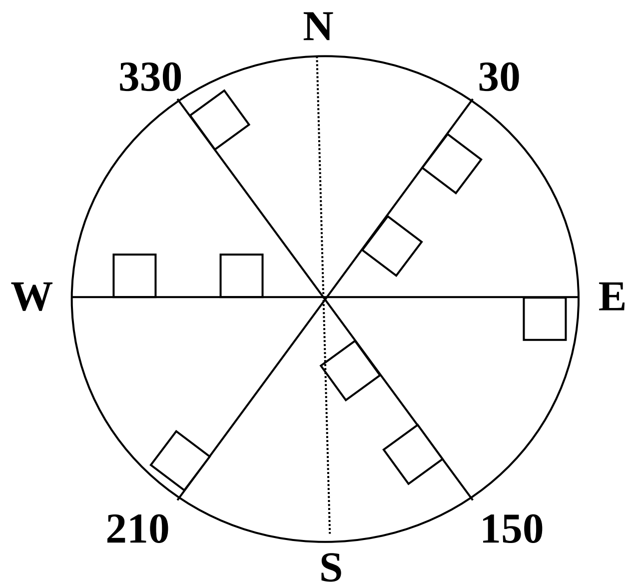


Figure F-2 Layout of Vegetation Sampling Quadrates

Based on a sliding scale of a 1:1 to a 3:1 ratio, the center of a sample location with no detections will be sampled using the spoke design noted above. For example, if the sampling effort produced 30 detections of a focal species, then 30 to 90 vegetation samples will be conducted at the center point of a sample location with no detections. Occupancy or occurrence models are based on resource selection models and thus, it is just as important to characterize sites where the species are not. Other co-variates that will be estimated include an ordinal measure of grazing (1 to 3 scale) and soil texture based on the soil texture key developed by Brewer and McCann (1982).

LOA will standardize values for all continuous variables to a mean of zero and unit variance prior to statistical analysis. Using model-averaged regression estimates and unconditional standard errors, LOA will compute a *Z*-statistic to estimate the magnitude and rank the relative importance of each habitat variable. LOA will consider *Z* values > 2.00 to be indicative of a reasonably strong predictor variable. Since LOA will be applying an information-theoretic approach to model selection and inference, LOA will not compute *P*-values.

Models of multi-season occupancy

Typically, simple (i.e., naïve) estimates of occupancy for a given region are computed by dividing the total number of individual detections by the total number of survey points. When individuals are detected infrequently or imperfectly, as is often the case with rare species, naïve estimates of occupancy will be more biased than estimates that account for detection probability (MacKenzie et al. 2004). Moreover, models that incorporate detection probabilities that were estimated using covariates (e.g., habitat variables) can further improve estimates of occupancy by accounting for among site (survey point) variation in detection probabilities (MacKenzie et al. 2004). LOA agrees with MacKenzie et al. (2005) that when strong inferences about uncommon species are constrained by small sample size, efforts should still be made to estimate detection probabilities and occupancy rates. A sampling design that reasonably maximizes detection probability can also improve inferences about occupancy. An occupancy-based sampling and modeling framework also permits estimation of additional demographic parameters, such as density or abundance.

For the 2010 sampling period (and possibly additional years), LOA will use the multi-season (i.e., multi-year or multiple breeding seasons) occupancy modeling framework of MacKenzie et al. (2003 and 2006) to estimate probabilities of four parameters—detection (p), occupancy (ψ), colonization (g), and local extinction (e)—for each focal species (or their sign), and use this framework to accommodate missing observations (i.e., due to development or habitat loss during the sampling period). After MacKenzie et al. (2006), LOA defines detection probability as the probability of detecting the species at a site (i.e., a randomly-placed or target survey point) if it is present during a visit; occupancy as the expected probability that a given site is occupied by the species; colonization as the probability that an unoccupied site in a given season is occupied by the species in the following season; and local extinction as the probability that a site occupied by a species in a given season is unoccupied in the following season. For colonization and local extinction, LOA assumes that annual changes in these vital rates indicate dispersal and temporary emigration, respectively, at a site. Using annual detection histories (n = 5 visits) for each site, LOA will derive estimates of occupancy for 2010, the initial year of study, and year-specific (i.e., seasonal) estimates for subsequent years by modeling probabilities of colonization and local extinction (MacKenzie et al. 2003). LOA will assume each of the occupancy parameters is constant across visits within each season. LOA will derive estimates for each parameter separately, but always base estimates on "full" models that simultaneously include the most parsimonious model for each of the other parameters. For each parameter, LOA use multi-model inference and Akaike's Information Criterion (AIC; Burnham & Anderson 2002) to identify the "best" model(s) among a candidate set of nested models representing combinations of the habitat covariates defined above. For each species, LOA will draw on the same candidate set. Within the candidate set, LOA will also include models that assume a constant p, ψ, g, or ε. To accommodate model selection uncertainty, LOA will consider candidate models with AIC difference (ΔAIC) values < 4.0 as those that best approximated the data and model-average parameter estimates for variables included in these models (Burnham & Anderson 2002). LOA will conduct all analyses using the multi-season (i.e., multiple years) occupancy estimation module in program PRESENCE (V2.2; Hines 2006).

Prior to running occupancy models, LOA will diagnose multicollinearity among habitat variables using variance inflation factors (VIF), and univariate correlations using a correlation matrix. LOA will eliminate variables with a VIF > 10.0 or a correlation coefficient > 0.60 (Neter et al. 1996).

Not all parameters (e.g., detection probability, occupancy, etc.) can be estimated for all species. For example, those species where detections are based largely on sign (e.g., precincts, burrows, etc.), repeated visits are not expected to provide the kind of additional information that occurs for species based largely on sightings of individuals (e.g., BNLL). The analysis will still be an empirically-based occurrence modeling exercise that permits robust testing of the importance of covariates that likely drive the patterns of space use for the target species. The proposed sampling design will allow us to generate spatially-explicit logistic regression models to predict spatial use patterns over the entire site and areas targeted for conservation and mitigation.

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Appendix L – San Joaquin Kit Fox Vehicle Strike Analysis

SJKF Vehicle Strike Analysis

Background

The proposed Project area of the Panoche Valley Solar Farm (PVSF) is located in Panoche Valley, San Benito County, California. The PVSF is adjacent to approximately 2.5 miles (4 km) of Little Panoche Road, a rural two-lane paved roadway. The Panoche Valley supports San Joaquin kit foxes (SJKF), a special status species. Therefore, in order to minimize the potential of vehicle strikes due to increased traffic volume on the Little Panoche Road during project build-out, minimization measures must be taken. The following is a vehicle strike analysis prepared by Live Oak Associates, Inc. (LOA) for the San Joaquin kit fox, as requested by the CDFG.

Studies in the Literature

Most of the literature addressing SJKF-vehicle strikes refers to the southern region of their range; few studies of SJKF exist in the central to northern regions of their range, and even less literature addresses SJKF-vehicle strikes in the central and northern regions of their range. Therefore, the majority of literature data collected for this analysis is from the southern region of the SJKF range.

Road crossings are often a high percentage of mortality of individuals in other species, but the SJKF seems to attribute only a small percentage of mortality to vehicle strikes with the exception of Bakersfield, California, in which vehicle strikes was the primary cause of death for radio transmitting SJKF (Bjurlin et al. 2005); 90% of those deaths were on roads with a speed limit of greater than 45 miles per hour and 50% were located on roads with posted speeds of 55 mph. Roads with speed limits lower than 45 accounted for only 10% of the vehicle-strike deaths, even though radio transmitting SJKFs crossed low speed roads more than higher speed roads. This high mortality from vehicle strikes (26.9%) is in contrast to all other studies of SJKF in which mortality from vehicle strikes were generally less than 10%, and the majority of mortality was due to predation. Even though Bakersfield SJKF are urban and live in close proximity to people and dense roads in a vastly different environment than SJKF in natural areas, the Bakersfield study does offer additional information about the SJKF that may apply to the PVSF area.

Bjurlin et al. (2005) found that more SJKF-vehicle strikes occurred close to intersections of other roads and linear rights-of-way in Bakersfield. This is in contrast to (Cypher et al. 2005) who found that in a natural setting, SJKF do not cross roads at specific crossing locations and the authors suggested that this may be because of the relative homogeneity of the habitat. Forman et al. (2003) stated that at-grade crossings may reduce deer-vehicle collisions. An at-grade landscape may be an important habitat characteristic for road crossings, therefore, areas where the entire landscape is “at-grade” with roads such as in the LoKern National Area and Panoche Valley, crossings may not occur at specific locations because the entire length of the road may be suitable for crossing. Whereas, in locations with a mosaic of grades and habitats near roads, such as in Bakersfield, SJKF may use specific crossing locations.

In the LoKern Natural Area, no significant effects on demography and ecology, including survival, reproduction, space use, den site selection, prey availability, and foraging patterns, from 2-lane roads with traffic volumes of 800- 1,500 vehicles per day were detected (Cypher et al. 2005, Cypher et al. 2009). Cypher et al. (2009) also found that young kit foxes were more vulnerable to vehicle strikes than adult kit foxes, and that the primary cause of mortality was not from vehicles, but from larger predators, primarily coyotes. Cypher et al. (2005) and Cypher et al. (2009) advise that wildlife fencing could be detrimental to movements and gene flow to SJKF, as they are already successfully crossing the road and that crossing structures would not be affective in this homogeneous landscape. Bjurlin (2003) agrees with this advice and states that in areas where the risk of vehicle strikes is not high, it would be better to not deter movement with fencing in order to maintain existing movement corridors and space use patterns. It may be better to use the information about fence permeability to SJKF in Cypher and Van Horn Job (2009) to design fences to surround the project that will not slow a SJKF's movement when approaching the road rather than to build fencing to exclude SJKF or direct them to a crossing structure.

Studies in the Literature Specific to Panoche Valley

Few studies address SJKF-vehicle strike in the Panoche Valley region, but some reports in the literature may direct actions taken by the PVSF to minimize the probability of a SJKF-vehicle strike.

Constable et al. (2009) conducted a study directed at gaining information about the SJKF population north of Panoche Valley, and found that in Panoche Valley, camera stations captured photos of SJKF 0.4 per 100 camera-nights and track stations captured prints of SJKF 1.5 per 100 station-nights. SJKF were continually observed in these manners. They also observed two road-killed SJKF, one was on Little Panoche Road and one was on Panoche Road; neither of these road-kills were on the Project site, however, one live sighting was either near or on the PVSF site. They observed a lower abundance of coyotes in Panoche Valley; coyotes are a major source of mortality for the SJKF, so this lower abundance may be why the SJKF population is doing better in Panoche Valley than in some other areas.

Smith et al. (2006) conducted a study using scat-sniffing dogs throughout the range of the SJKF. The population in the Panoche Valley is of lower abundance and more difficult to detect than in the southern portion of their range. After searching 12 km in the Ciervo-Panoche Natural Area, only 19 scats were located (1.58 scats/km), in contrast, the least dense area searched in the southern portion of the range that was positive for SJKF, Carrizo Plain National Monument, had 4 km searched and 221 scats located (55.25 scats/km). The overall difference between the central and southern portions of the range was that out of all the transects searched, the central range had a density of 0.24 scats/km and the southern range had a density of 8.02 scats/km. This indicated that the central region of the SJKF range is much less dense than the southern region.

LOA conducted a scat-sniffing dog survey from SJKF on the Project site in 2010; from this information, a minimum of nine SJKF use the Project site, although it is unknown how often these individuals cross the road; of these nine detections, only one individual was found exclusively on the Project site, although it is likely this individual uses off-site land as well.

Overview of Pertinent Information from Literature

Multiple studies suggest that speed limit, traffic volume, and time of traffic pulses are important variables that directly affect the probability of SJKF-vehicle strikes.

Speed: Slow speed limits reduce the probability for SJKF-vehicle strikes. The *USFWS Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance* (2011) states that an on-project speed limit of 20 mph should be observed. This is consistent with Bjurlin et al. (2005), where they found that 90% of road-killed SJKF were located on roads with posted speed limits greater than 45 mph. Speed limit is important for other animal-vehicle strikes as well; Forman et al. (2003) stated that an early study noted that roads with speeds greater than 40 mph had a greater impact on song birds and rabbits.

Traffic Volume: A low traffic volume such as the LoKern study with 800-1,500 vehicles per day (Cypher et al. 2005, Cypher et al. 2009) is not detrimental to the SJKF; as traffic volume and road density increases, detrimental effects become more likely; in Bakersfield, traffic volumes were nearly three times more than that of the LoKern study, and many more mortalities due to vehicle-strikes occurred (Bjurlin et al. 2005).

Time of Vehicle Activity: The *USFWS Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance* (2011) states that night-time construction should be minimized to the extent possible. Forman et al. (2003) also stated that timing of traffic pulses was one of the primary factors affecting animal-vehicle collisions.

Seasonal change of higher vehicle activity may also be important. Orloff et al. (1986) stated that a mother SJKF was killed by a vehicle and that her pups were already weaned (one month after birth) and her mate continued to care for the pups. Lower impacts including vehicle speed, traffic volume, and night-time avoidance during pupping season, particularly when they are still nursing should be encouraged. Bjurlin (2005) also found a peak of male mortality from vehicle strikes in December and January during the beginning of the breeding season, and a smaller peak in SJKF mortality from vehicle strikes from May to September during the beginning of juvenile dispersal.

Species Density: It can be assumed that species density may also affect the probability of SJKF-vehicle collisions. If more individuals are crossing roads, the potential for one of them to be hit by a vehicle will be higher. SJKF density in Panoche Valley is much less than in the southern portion of their range (Smith et al. 2006), and therefore, mortality due to vehicle strikes may be less than in the southern portion of their range as well.

Minimization Measures

Speed: The PVSF will adhere to a strict speed limit of 15 mph during daylight hours and 10 mph during nighttime hours on the Project Site, (which is consistent with speed limits required for other special status species on the site and consistent with the *USFWS Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance* 2011) and will adhere to a strict speed limit of (25 mph) in the vicinity of the Project site when driving on Little Panoche Road and Panoche Road. When driving on unpaved roads within the Project site, a strict speed limit of 15 mph for daylight hours and 10 mph for nighttime hours will be enforced. Construction zone signs will be placed with speed limits (and enforced) along Little Panoche Road to reduce speeds of public vehicles during Project build-out.

Traffic Volume: Current average daily traffic volume on Little Panoche Road in the vicinity of the Project site is 716 vehicle trips per day, and is expected to increase by 298 vehicle trips for a total of approximately 1,014 vehicle trips per day during project build-out, and would be reduced to approximately 816 vehicle trips per day after project build-out is complete, as the proposed project is expected to employ up to 50 full time employees at build-out, including personnel to monitor system operational status, performance, and diagnostics from the main control room, meter reading, and production reporting; additionally, security personnel will be present on the site at all times. These projected traffic volumes are all within the lower range of what Cypher et al. (2005) and Cypher et al. (2009) found to have no significant affect on the SJKF (800-1,500 vehicles/day).

Time of Vehicle Activity: Driving during night-time hours by PVSF workers on the site will adhere to a 10 mph speed limit, and driving during night-time hours by PVSF workers on Little Panoche Road in the vicinity of the site will be minimal.

Training: All workers on the PVSF site will undergo training from a qualified biologist about the special status species in the area, and the risk of vehicle-strikes to the individuals.

Signage: Signage will be posted at the boundary of the Project site along Little Panoche Road to alert drivers both to construction traffic and to the presence of special status species on the site with a posted speed limit. Speed limits should not exceed 15 mph on the site and 25 mph on public roads in the vicinity of the site. Signs will be designed to be both informative and eye-catching, as Forman, et al. (2003) stated that familiar signs such as the typical yellow deer-crossing signs were not effective even when the antlers were placed backwards.

Conclusions

The PVSF will reduce the potential for SJKF-vehicle collisions by implementing these minimization measures to prevent take of SJKF. Should any take of SJKF occur, the PVSF representative will immediately contact the CDFG.

Literature Cited

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PO BOX 1066
HAILEY, ID 83333
PHONE 208-788-3456
FAX 208-788-2082

POWER ENGINEERS

November 13, 2009

Cameron Johnson
South Branch Chief
San Francisco District
US Army Corps of Engineers
1455 Market Street, 16th Floor
San Francisco, CA 94103-1398

Subject: Solargen Energy- Panoche Valley Solar Farm Request for Jurisdictional Determination and Permit Application, San Benito County, California

Dear Mr. Johnson:

On behalf of Solargen Energy, POWER Engineers, Inc. (POWER) is formally requesting a Jurisdictional Determination for the above referenced project. Enclosed you will find the Wetland Delineation Report that POWER prepared following field survey to determine the presence of potentially jurisdictional Waters of the United States (including wetlands) that would likely be subject to regulation by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act.

Project Background

Solargen Energy Inc., proposes to construct and operate a solar photovoltaic energy generating facility, known as the Panoche Valley Solar Farm in eastern San Benito County. Implementation would include the installation of thin film photovoltaic (PV) solar panels on framed single-pole steel support structures and a 12 acre substation with an operation and maintenance facility on approximately 4,900 acres of undeveloped rangeland. Specifically, the project site is located in Sections 3-5, 8-11, and 13-16, of Township 15S, Range 10E and Sections 18-19 of Township 15S, 11E of the Cerro Colorado, Llanada, Mercy Hot Springs, and Panoche USGS 7.5-minute topographical quadrangle maps, respectively.

Also enclosed you will find an Application for Department of The Army Permit (ENG Form 4345) for a Nationwide Permit #12 associated with minor impacts to Panoche Creek and Las Aguilas Creek should you determine that the waters on site are jurisdictional. Construction of project facilities including permanent access roads and underground electric lines will result in minor fill within these drainages as outlined in the enclosed application. Attached to the application you will find the Draft Initial Study which contains project details including sensitive species and cultural resource information.

POWER is respectfully requesting a pre-application meeting with the Corps on-site to review the project area and discuss any permitting requirements. Please notify me of a date and time at your earliest convenience. Should you have any questions or need additional information please contact me directly at (208) 309-3389.

IF ENCLOSURES ARE NOT AS NOTED, PLEASE NOTIFY US AT ONCE.

Thank you in advance for your attention to this matter.

Sincerely,

Kevin Lincoln
Environmental Specialist

Enclosure(s):

c: Eric Cherniss (Solargen Energy)
Dave Sutton (POWER)
117257.03.01.03
PER 02

U.S. Army Corps of Engineers

Permit Application

Panoche Valley Solar Farm Project

List of Attachments:

- Permit Application Form
- Waters Impact Map

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT (33 CFR 325)	OMB APPROVAL NO. 0710-0003 EXPIRES: 31 August 2012

Public reporting burden for this collection of information is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters, Executive Services and Communications Directorate, Information Management Division and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This Information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME: First - Eric Middle - T. Last – Cherniss Company – Solargen Energy E-mail Address – echerniss@solargen-energy.com	8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required) First - Kevin Middle - L. Last – Lincoln Company – POWER Engineers, Inc. E-mail Address – kevin.lincoln@powereng.com
6. APPLICANT'S ADDRESS. Address - 20400 Stevens Creek Blvd. Ste. 700 City – Cupertino State – CA Zip – 95014 Country – USA	9. AGENT'S ADDRESS Address - 3940 Glenbrook Dr. City – Hailey State – ID Zip – 83333 Country – USA
7. APPLICANT'S PHONE NOs. W/AREA CODE. a. Residence b. Business c. Fax (408) 460-8200	10. AGENT'S PHONE NOs. W/AREA CODE a. Residence b. Business c. Fax (208) 309-3389

STATEMENT OF AUTHORIZATION

11. I hereby authorize, Kevin Lincoln to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

APPLICANT'S SIGNATURE DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)

Panoche Valley Solar Farm

13. NAME OF WATERBODY, IF KNOWN (if applicable) Panoche Creek, Las Aguilas Creek	14. PROJECT STREET ADDRESS (if applicable) Address Little Panoche Road Panoche Valley, San Benito County City - State – CA Zip -
15. LOCATION OF PROJECT Latitude: °N 36.643 Longitude: °W -120.873	

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)
State Tax Parcel ID Municipality
Section – Township – Range – See Attached Map

17. DIRECTIONS TO THE SITE

See Attached Map

18. Nature of Activity (Description of project, include all features)

Construction of solar photovoltaic energy generating facility. See attached Initial Study for project details.

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

To support California in meeting the Renewable Portfolio Standard Mandate requiring investor-owned utilities to supply 20% of their total electricity through renewable energy by the year 2010.

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

Construction of all-weather road across Panoche Creek and Las Aguilas Creek including the placement of culverts. Underground electrical cables would be trenched through Panoche Creek.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type Amount in Cubic Yards	Type Amount in Cubic Yards	Type Amount in Cubic Yards
Culvert: 87 Linear Feet Panoche Creek; Culvert: 69 Linear Feet Las Aguilas Creek	Stone Backfill: TBD	Electrical Cable: 39 Linear Feet Panoche Creek

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres

Or

Liner Feet 195 Linear Feet

23. Description of Avoidance, Minimization, and Compensation (see instructions)

Access roads were designed to use existing crossings, or utilize new crossings only where necessary for construction and operation of the project.

24. Is Any Portion of the Work Already Complete? Yes ☐ No ☑ IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list).

Address – 3616 Panoche Rd.

City – Paicines State – CA Zip – 95043

26. List of Other Certifications or Approvals/Denials Received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
San Benito County	Use Permit	UP 1023-09	10-16-09	Pending	

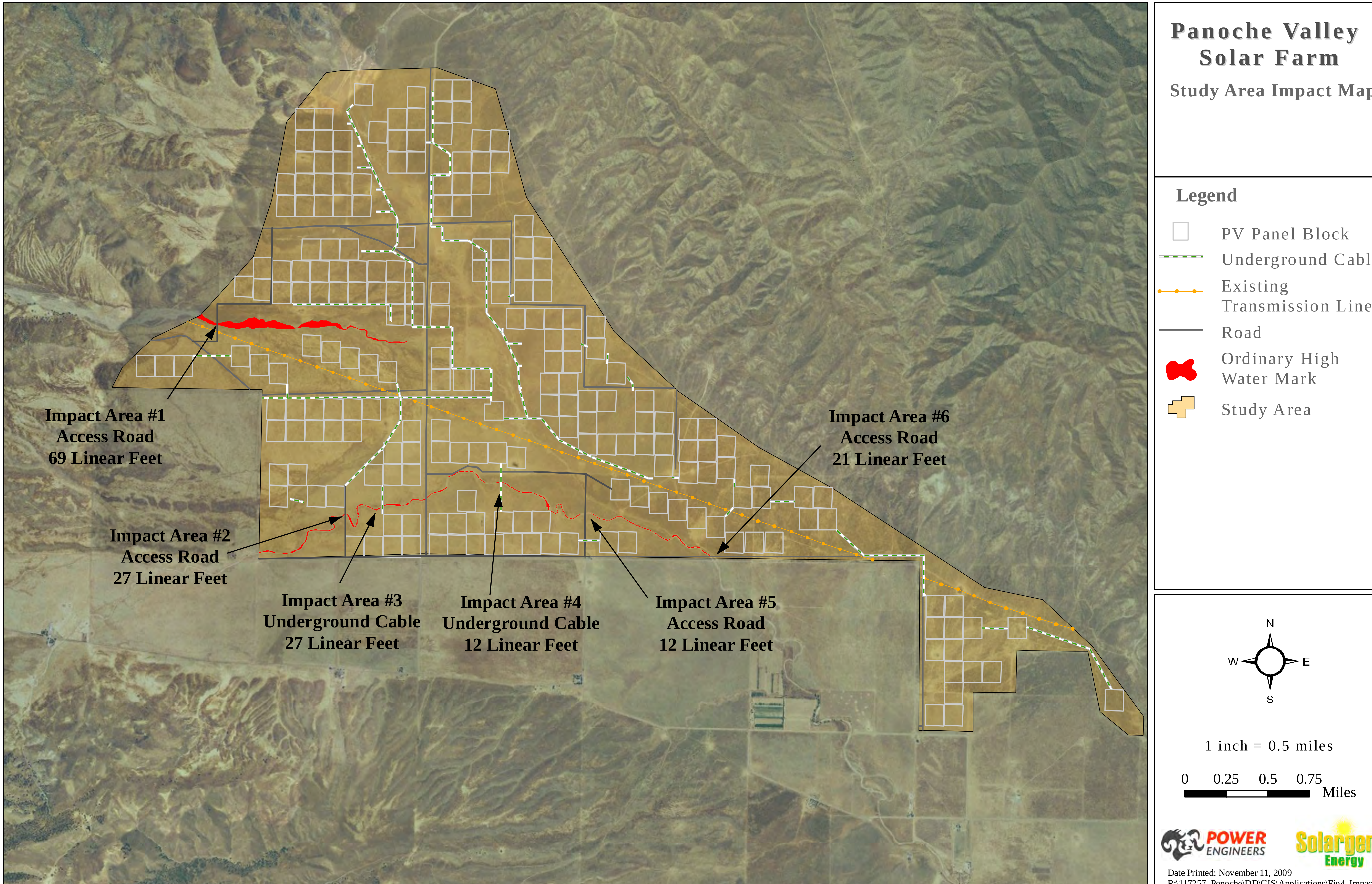
* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.


Panoche Valley Solar Farm
Study Area Impact Map
Legend
PV Panel Block
Underground Cable
Existing Transmission Line
Road
Ordinary High Water Mark
Study Area
Impact Area #1
Access Road
69 Linear Feet
Impact Area #2
Access Road
27 Linear Feet
Impact Area #3
Underground Cable
27 Linear Feet
Impact Area #4
Underground Cable
12 Linear Feet
Impact Area #5
Access Road
12 Linear Feet
Impact Area #6
Access Road
21 Linear Feet
N
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S
1 inch = 0.5 miles
0
0.25
0.5
0.75
Miles
POWER ENGINEERS
Solargen Energy
Date Printed: November 11, 2009
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November 12, 2009

SOLARGEN ENERGY

Panoche Valley Solar Farm

Wetland Delineation Report

PROJECT NUMBER:
117257

PROJECT CONTACT:
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PHONE:
(208) 788-0314

POWER ENGINEERS

Wetland Delineation Report

PREPARED FOR: SOLARGEN ENERGY
PREPARED BY: KEVIN LINCOLN
(208) 788-0314
KEVIN.LINCOLN@POWERENG.COM

REVISION HISTORY		
DATE	REVISED BY	REVISION
11/9/09	POWER	1
11/12/09	K. Lincoln	2

TABLE OF CONTENTS

1.0 INTRODUCTION 1
2.0 METHODOLOGY 1
3.0 SOILS 4
4.0 HYDROLOGIC DATA 4
5.0 CURRENT AND RECENT LAND USE 5
6.0 RESULTS 6
7.0 CONCLUSIONS 12
8.0 REFERENCES 12

FIGURES

FIGURE 1 VICINITY MAP 2
FIGURE 2 TOPOGRAPHIC MAP 3
FIGURE 3 DELINEATED WATERS 7
FIGURE 4 NWI MAPPING 8
FIGURE 5: TYPICAL OHWM OF PANOCHE CREEK 10
FIGURE 6 TYPICAL OHWM OF LAS AGUILAS CREEK 11

TABLES

TABLE 1-1 SOILS TYPES OCCURRING WITHIN THE PROJECT AREA 4
TABLE 1-2 PROBABLE PEAK STREAM FLOW FOR DESIGNATED RECURRENCE INTERVALS 5
TABLE 1-3 PEAK STREAM FLOW FOR PANOCHE CREEK AT INTERSTATE 5 (USGS 11255575) 5

APPENDICES

APPENDIX A: PHOTO LOG 13
APPENDIX B: DATA FORMS 14

1.0 INTRODUCTION

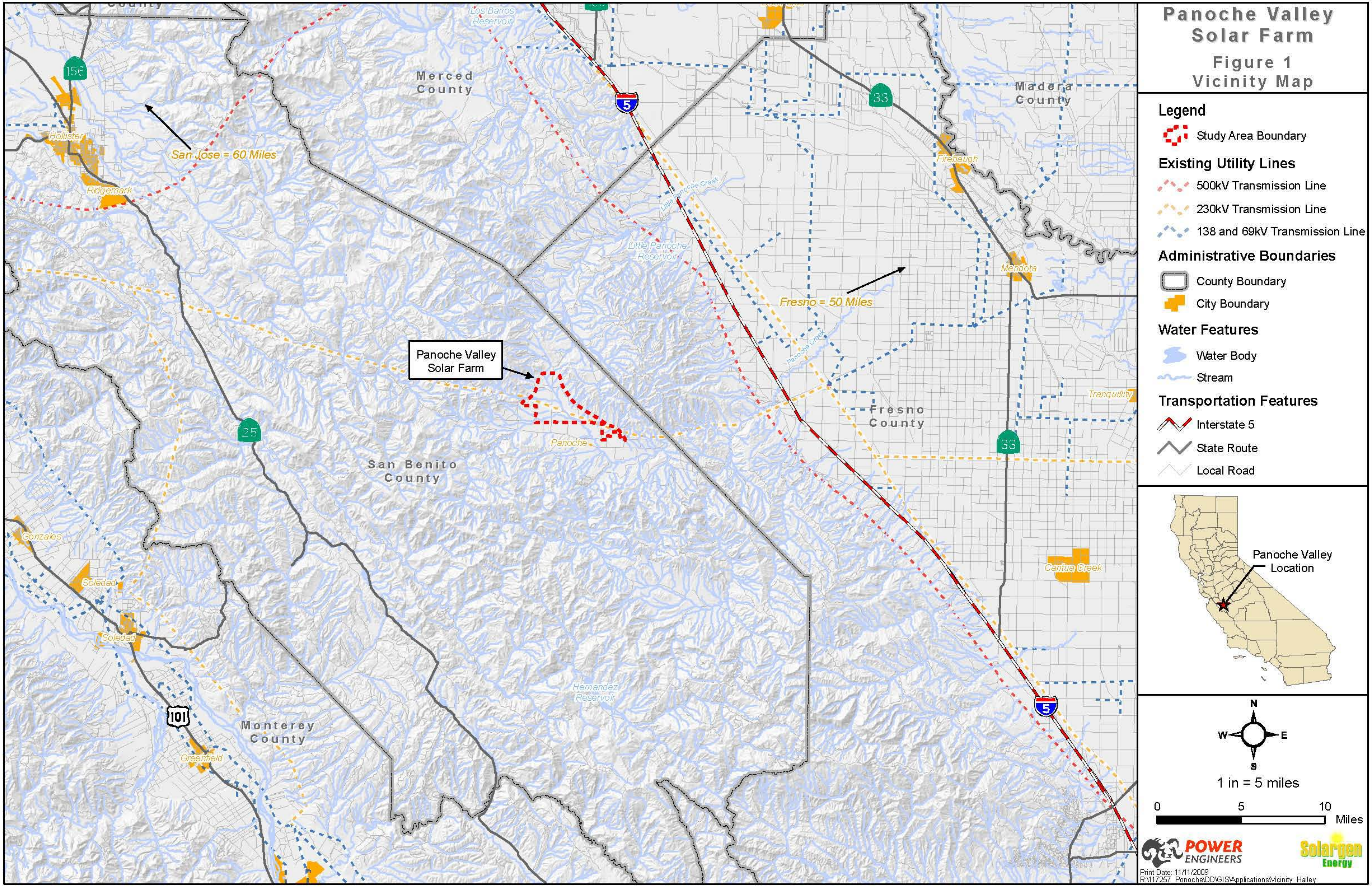
At the request of Solargen Energy, POWER Engineers, Inc. (POWER) conducted a delineation of wetlands and other waters for the Panoche Valley Solar Farm Project site (Study Area). The Study Area is located in eastern San Benito County (Figure 1) approximately 30 miles south of Los Banos. The Study Area encompasses approximately 4900 acres of grazing lands on private property at latitude 36.643 N and longitude -120.873 W (Figure 2).

On October 19 to 23, 2009, environmental specialists from POWER Engineers, Inc. conducted field investigations of the Study Area to determine the presence of potentially jurisdictional Waters of the United States (including wetlands) that would likely be subject to regulation by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act. This report documents the wetland delineation process and results.

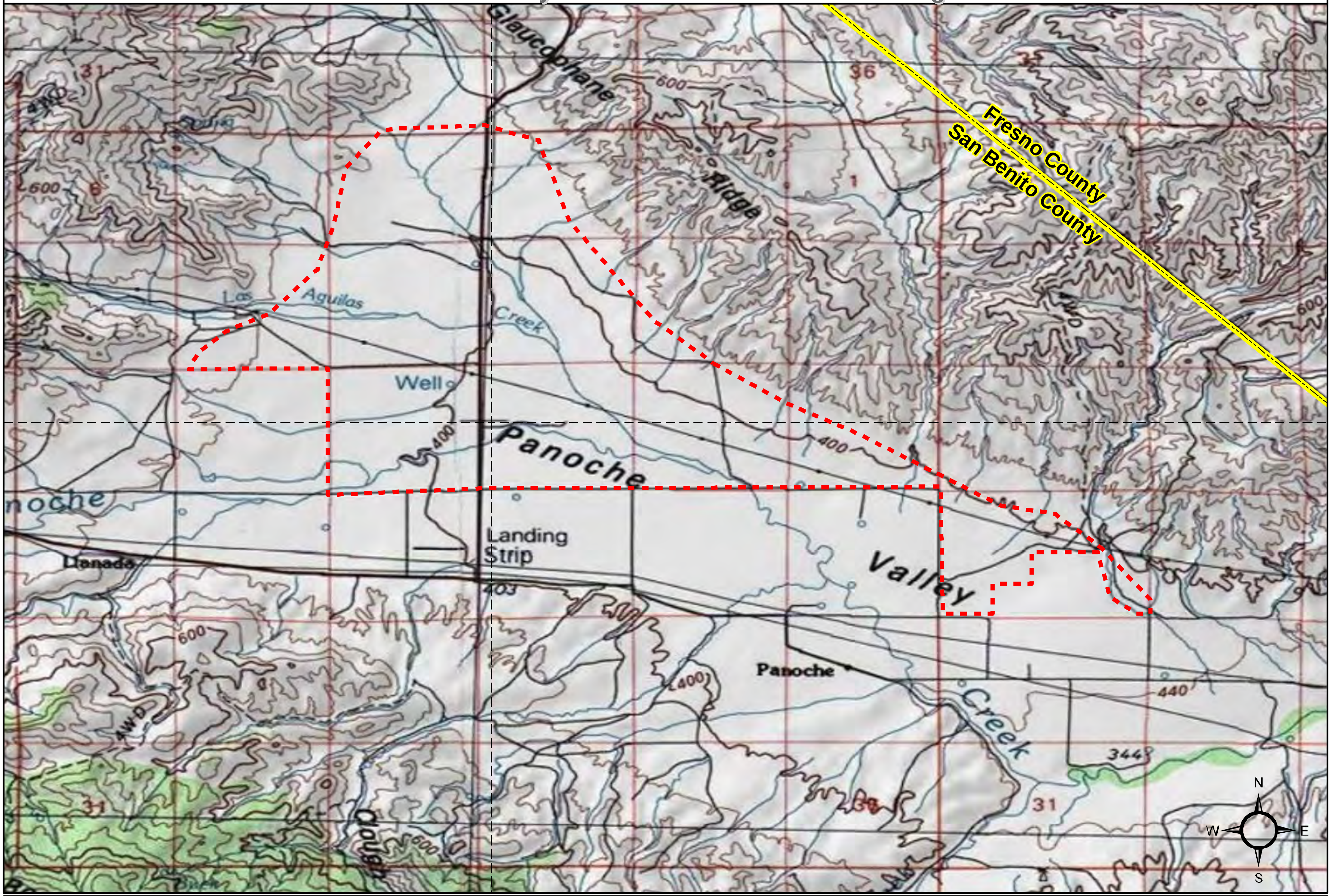
2.0 METHODOLOGY

Prior to conducting the field investigation, USGS topographic maps, aerial photography, National Weland Inventory (NWI) maps, and soil surveys of the Study Area were examined to determine locations of potential areas of Corps jurisdiction. In addition, a statistical analysis of peak discharge associated with Panoche Creek was conducted in accordance with the Corps' *Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (OHWM Manual). The Natural Resources Conservation Service (NRCS) Web Soil Survey was used to identify soil types within the Study Area. Potential jurisdictional areas were evaluated using methodology set forth in the Corps' *1987 Wetland Delineation Manual* (Manual), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (Arid West Manual), and the OHWM Manual.

From October 19 to 23, 2009, POWER environmental specialists Kevin Lincoln, Allison Carver, and Mike Serrano delineated the boundaries of the OHWM of Panoche Creek, Las Aguilas Creek, and other drainages within the Study Area. Analysis of peak discharge data indicated that the OHWM of these drainages in the Panoche Valley generally correspond with the 10-year floodplain. Because, in many areas of the creeks, the streambeds had distinct beds and banks, no soil pits were required to determine OHWM. The OHWMs and stream courses of Panoche Creek and Las Aguilas Creek were surveyed using a Trimble GPS unit with sub-meter accuracy and later mapped using ArcInfo Geographic Information System (GIS).


Panoche Valley Solar Farm
Figure 1
Vicinity Map
Legend
Study Area Boundary
Existing Utility Lines
500kV Transmission Line
230kV Transmission Line
138 and 69kV Transmission Line
Administrative Boundaries
County Boundary
City Boundary
Water Features
Water Body
Stream
Transportation Features
Interstate 5
State Route
Local Road
Panoche Valley Location
N
W
E
S
1 in = 5 miles
0
5
10
Miles
POWER ENGINEERS
Solargen Energy
Print Date: 11/11/2009
Merced County
Madera County
San Benito County
Fresno County
Monterey County
San Jose = 60 Miles
Fresno = 50 Miles
Panoche Valley Solar Farm
Panoche
Hollister
Ridgemark
Firebaugh
Mendota
Tranquillity
Cantua Creek
Gonzales
Soledad
Greenfield
Los Banos Reservoir
Little Panoche Reservoir
Hernandez Reservoir
Little Panoche Creek
Panoche Creek
156
5
33
25
101

Panoche Valley Solar Farm Figure 2



County Boundary | Study Area Boundary | USGS Quads: Cerro Colorado, Mercey Hot Springs, Panoche, Llanada

POWER ENGINEERS

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1:63,360 1 inch=1 mile

0 1 2 Miles

Solargen Energy

3.0 SOILS

The NRCS has mapped the following hydric soil type within the Study Area.

TABLE 1-1 SOILS TYPES OCCURRING WITHIN THE PROJECT AREA				
SOIL NAME	SYMBOL	LANDFORMS	HYDRIC (Y/N)	HYDRIC CRITERIA
Gullied lands	GuE	Drainageways	N	
Kettleman	KeF2	Hill slopes and uplands	N	
Los Banos	LuC, LuF3	Terraces and fan remnants	N	
Panhill	PlA, PlC, PkA, PkC	Alluvial fans and floodplains	N	
Riverwash	Rv	Streams and rivers	Y	4
Shedd	ShE2	Hill slopes	N	
Valllecitos	VrF2	Hill slopes	N	
Yolo	YoC, YvB	Alluvial fans	N	

Riverwash (Rw)

Riverwash consists of mixed water-washed sand and gravel, occurs along streams or rivers and is often flooded during storm events. Within the Study Area, Riverwash is found along both Panoche Creek and Las Aguilas Creek. Riverwash soils are listed as hydric soils within San Benito Coulty based on the following hydric soil criteria: *Criteria 4. Soils that are frequently flooded for long duration or very long duration during the growing season.*

4.0 HYDROLOGIC DATA

Data from the Western Regional Climate Center (WRCC) was available for the National Weather Service Cooperative Station (Co-oP) in Panoche Valley.

The Panoche 2 West Co-op Station in Panoche records an annual average precipitation of 9.75 inches, most of which occurs between November and March. A rainfall event, approximating a 25-year storm event, was recorded at this station on February 3, 1998, when the station recorded 2.98 inches of precipitation during a 24-hour period. Relatively low rainfall levels have been recorded at the Panoche 2 West station since 1998, with only two records of storms approximating 2-year storm events.

Peak streamflow data was obtained from the USGS stream gauge located in Panoche Creek at Interstate 5 (#11255575), approximately 12.5 linear miles downstream of the Study Area. The period of record for this gauge is from December 2007 to current. Historic stream flow records are available for the original Panoche Creek gauging station, which was located in Panoche Creek below Silver Creek, approximately 3.2 miles upstream of the current gauging station. The period of record for this stream gauge is from 1949 through 1970.

Peak stream flow data from both the historic and current stream gauges were used to calculate the expected probable peak stream flow for 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year flood events for lower Panoche Creek (see Table 1-1).

On February 3, 1998, the Panoche Creek stream gauge recorded a peak streamflow of 9,940 cubic feet per second (cfs), roughly equal to a 50-year flood event. Since that time, only three peak streamflows have approximated or exceeded the 5-year flood event (Table 1-2).

TABLE 1-2 PROBABLE PEAK STREAM FLOW FOR DESIGNATED RECURRENCE INTERVALS

FLOOD EVENT	EXPECTED PROBABLE FLOW (CFS)
2-year	162
5-year	974
10-year	2,289
25-year	5,474
50-year	9,337
100-year	14,906

TABLE 1-3 PEAK STREAM FLOW FOR PANOCHE CREEK AT INTERSTATE 5 (USGS 11255575)

DATE	STREAMFLOW (CFS)
February 3, 1998	9,940*
June 25, 1999	17
February 23, 2000	188
March 5, 2001	2,710*
June 29, 2002	30
December 29, 2002	290
February 25, 2004	82
December 31, 2004	1,850*
April 5, 2006	698*
December 7, 2006	0.43
January 27, 2008	281

* Discharge approximating or exceeding the expected probable 5-year flood event

Within the Study Area, Panoche Creek and Las Aguilas Creek are part of the larger Panoche/Silver Creek Watershed (PSCW). The PSCW is located upstream and to the west of Mendota, California, in the Panoche-San Luis Reservoir Watershed (HUC 18040014). The watershed area encompasses approximately 300 square miles upstream of Interstate 5. Rainfall events, as described above, yield erosion and the downslope and downstream transport of sediment. High concentrations of selenium are contained within this sediment. During these runoff events, sediment-loading problems occur in downstream agricultural production areas, Mendota urban areas, irrigation water conveyance structures and streams. During rain events with greater than a five year return period, sediment and selenium are carried into the San Joaquin River and contribute to the river exceeding its water quality objectives. The Panoche alluvial fan is the principal source of selenium from the PSCW to the downstream Grasslands watershed and the San Joaquin River.

5.0 CURRENT AND RECENT LAND USE

The Study Area is currently used for rangeland uses and open space. The Land Use Element of the San Benito County General Plan designates the majority of the Study Area as Agricultural Rangeland. The uses allowed within this category include agriculture, grazing, land in its natural state, wildlife refuges, very low intensity residential, and uses that, by their nature, must be located in undeveloped areas. Conditional uses include mineral extraction, low-density recreational facilities and institutional land uses.

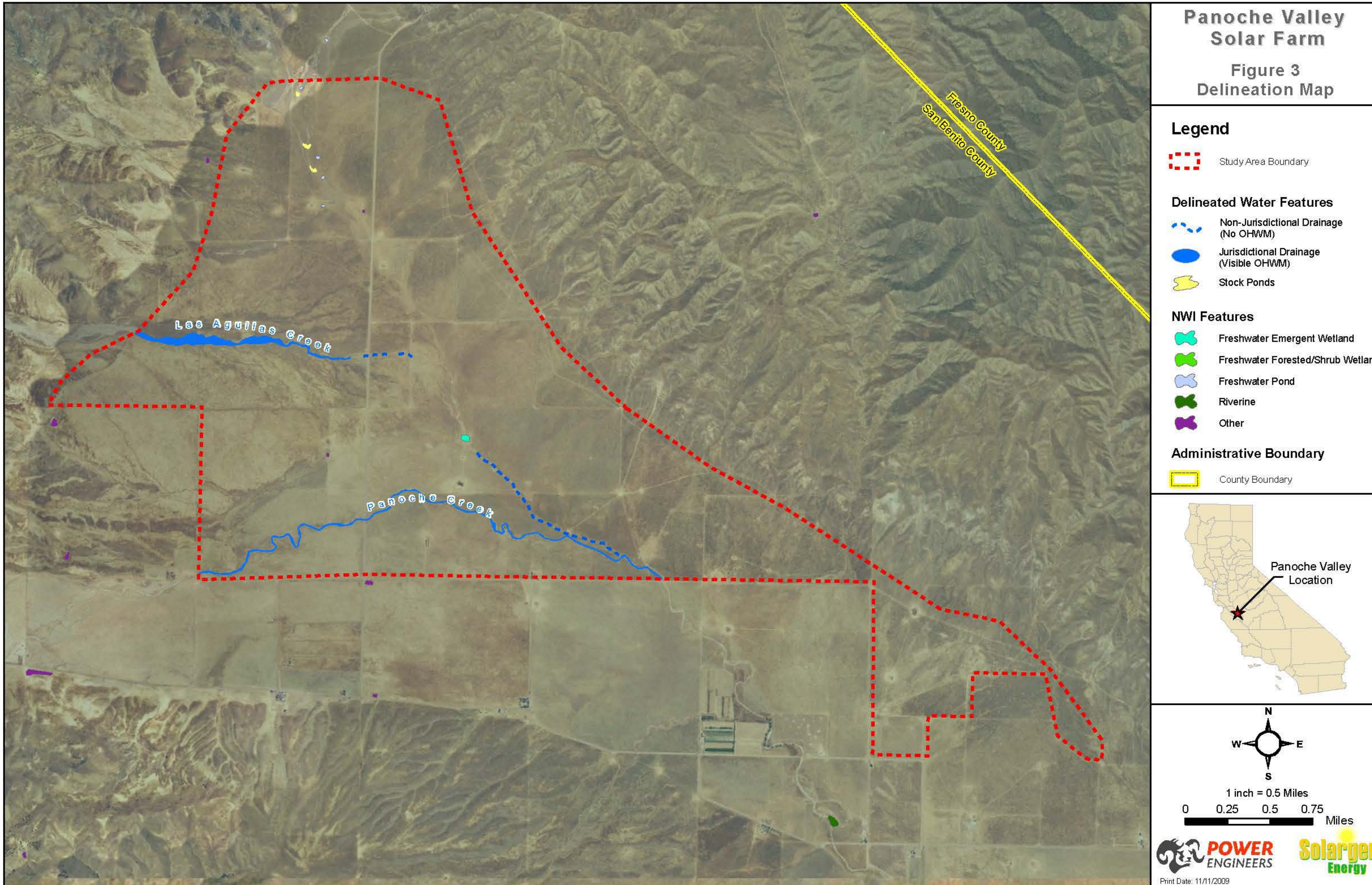
The Agricultural Rangeland designation is also assigned to the remote hillside areas and watershed, many of which have been classified as some form of open space within the Open Space and Conservation Elements. These areas are typified by a lack of transportation access, high to very high fire hazard and by the lack of utility services to allow for more dense types of development. Many of these areas are found within the critical fire hazard area or in the "out back" areas of the many isolated canyons throughout the County.

6.0 RESULTS

Wetlands

The NWI identified several Palustrine, Unconsolidated Shore, Seasonally Flooded/ Saturated, Diked/ Impounded (PUBFh) wetlands within the Study Area associated with a tributary to Las Aguilas Creek (Figure 4). These areas were investigated and tested for the presence of wetland indicators. All of the PUBFh wetlands are man-made livestock ponds that had recently been graded. Soil pits were dug both within the disturbed areas and the adjacent undisturbed low-lying areas. No hydric soils or other wetland indicators were identified. The area down gradient from the livestock ponds were investigated for the presence of an OHWM, and no evidence was found of a definable bed or bank, scour or sediment transport. The boundaries of the livestock ponds were delineated (Figure 3) and photographed (Photos 29, 30 and 31 in Appendix A.)

The NWI also identified one Palustrine Emergent, Temporarily Flooded, Excavated (PEMAx) wetland within the Study Area associated with Las Aguilas Creek (Figure 4). This area was investigated for the presence of wetland indicators. No wetland indicators were identified. The area was historically used as a water storage pond and based on the presence of a distribution line, piping and remnant pump equipment, water was pumped from this area to other areas on the property. Please see photo 13 in Appendix A.



Panoche Valley
Solar Farm
Figure 3
Delineation Map
Legend
Study Area Boundary
Delineated Water Features
Non-Jurisdictional Drainage (No OHWM)
Jurisdictional Drainage (Visible OHWM)
Stock Ponds
NWI Features
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Riverine
Other
Administrative Boundary
County Boundary
Panoche Valley Location
N
W
E
S
1 inch = 0.5 Miles
0
0.25
0.5
0.75
Miles
Las Aguilas Creek
Panoche Creek
Fresno County
San Benito County
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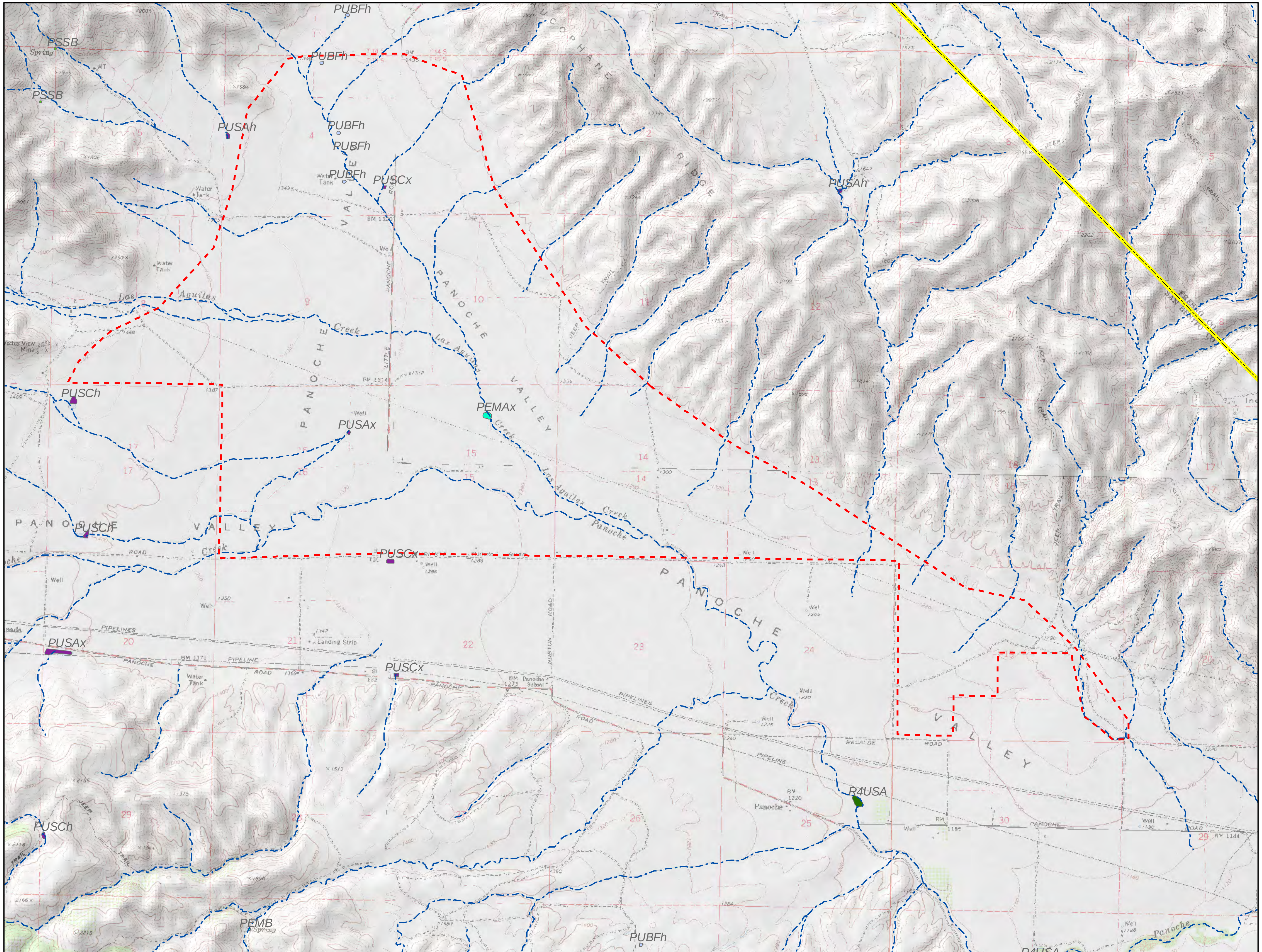

Panoche Valley Solar Farm

Figure 4
NWI Feature Map

Legend

Study Area Boundary

Administrative Boundary

County Boundary

Water Features

Blue Line Features

National Wetland Inventory Features

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine
- Other

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Non-Wetland Waters of the U.S.

The Study Area contains two blue-line drainages, Panoche Creek and Las Aguilas Creek as well as un-named tributaries to those drainages as depicted on the USGS topographic map (Figure 2). These areas were investigated for the presence of an OHWM using the methodology set forth in the OHWM Manual.

Drainages were surveyed beginning from the downstream end of the Study Area to the upstream end. The majority of Panoche Creek exhibited indicators of an OHWM and portions of Las Aguilas Creek exhibited indicators of an OHWM. Both of these drainages are ephemeral and flow only during, and for a short duration after precipitation events. Groundwater is not a source of water for these drainages. At the time of the survey, the entire area was heavily grazed by livestock, making identification of plant species difficult. However, changes in overall vegetation density were observable and proved valuable as a vegetative OHWM indicator. The portions of these drainages exhibiting an OHWM are depicted on Figure 3. OHWM Data Forms are included in Appendix B.

Panoche Creek

Panoche Creek traverses the southern portion of the Study Area for approximately 18, 700 feet. This segment of Panoche Creek is ephemeral and has an incised channel with a substrate of sand, gravel and cobble. The OHWM varies from 5 to 90 feet in width. The main stem of the drainage is crossed by a bridge on Little Panoche Road, which runs north/south through the Study Area.

The low flow channel of the drainage below the OHWM generally does not support vegetation. The transition from the low flow channel to the active floodplain was distinguishable by an increase in vegetative cover, change in particle size distribution, organic drift and a break in bank slope. The indicators above the OHWM included an increase in vegetative cover, surface rounding and surface relief. Figure 5 shows the location of the OHWM identified in this location that was typical of the Panoche Creek drainage.

Panoche Creek flows out of the Panoche Valley between the Panoche Hills and Tumey Hills, and northeast into the San Joaquin Valley. Panoche Creek disappears approximately 9.5 miles northeast of Interstate 5, in Township 14 South Range 13 East Section 2 NE of the USGS Chaney Ranch quadrangle (latitude 36° 44’ 54.24” N, longitude 120° 30’ 47.96” W). The Mendota Wildlife Area and the San Joaquin River are located approximately 9 miles east and 8 miles east of this point, respectively.

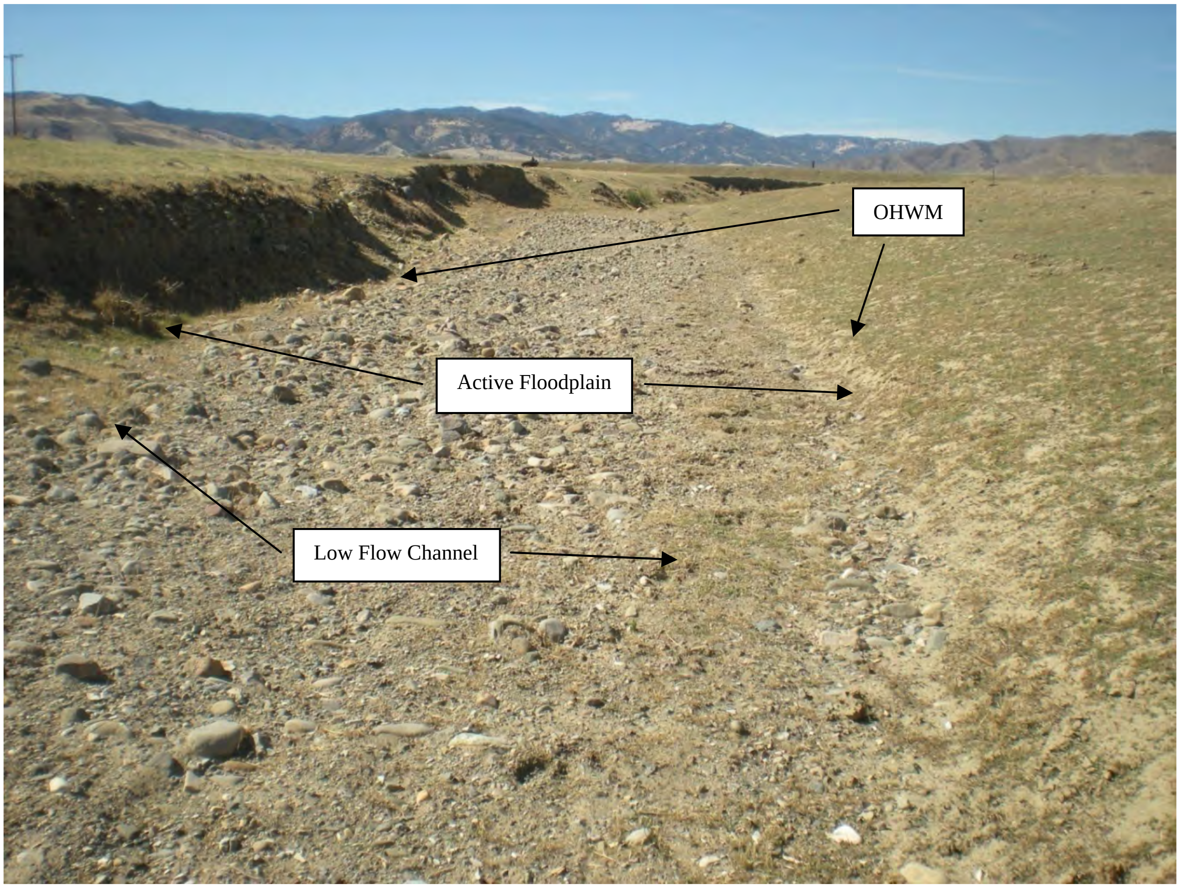

FIGURE 5: Typical OHWM of Panoche Creek

Las Aguilas Creek

Las Aquilas Creek traverses the central portion of the Study Area for approximately 18, 500 feet. It is an ephemeral drainage and has a channel that ranges from non-existent to incised with a substrate of sand, gravel and cobble, to braided with a broad floodplain. The OHWM varies from 10 to 360 feet in width. The main stem of the drainage is crossed by Little Panoche Road, which runs north/south through the project study area.

The lower reaches of Las Aguilas Creek from the confluence with Panoche Creek to a point approximately 5,930 feet northwest lacked indicators of an OHWM. This reach resembled a swale, with no evidence of a bed or bank and no evidence of sediment transport. The bottom of the drainage was uniformly vegetated and there was no apparent change in particle size distribution. From this point northwest to Little Panoche Road, there was virtually no drainage visible, let alone an OHWM. The drainage is interrupted by Little Panoche Road at this location, and two culverts allow ephemeral discharge to pass through. Immediately above the road, sediment deposits have built up, eliminating any definable channel, where it appears runoff sheet flows towards the road and eventually finds its way to the culverts. Approximately 417 feet northwest of Little Panoche Road, the drainage begins to exhibit a bed and bank again. The low flow channel of the drainage below the OHWM generally does not support vegetation. The transition from the low flow channel to the active floodplain was distinguishable by an increase in vegetative cover, change in particle size distribution and a break in bank slope. The indicators above the OHWM included an increase in vegetative cover, surface rounding and surface relief. Figure 6 shows the location of the OHWM identified in this location that was typical of the Las Aguilas Creek drainage beginning at Little Panoche Road and extending approximately 7000 feet west.

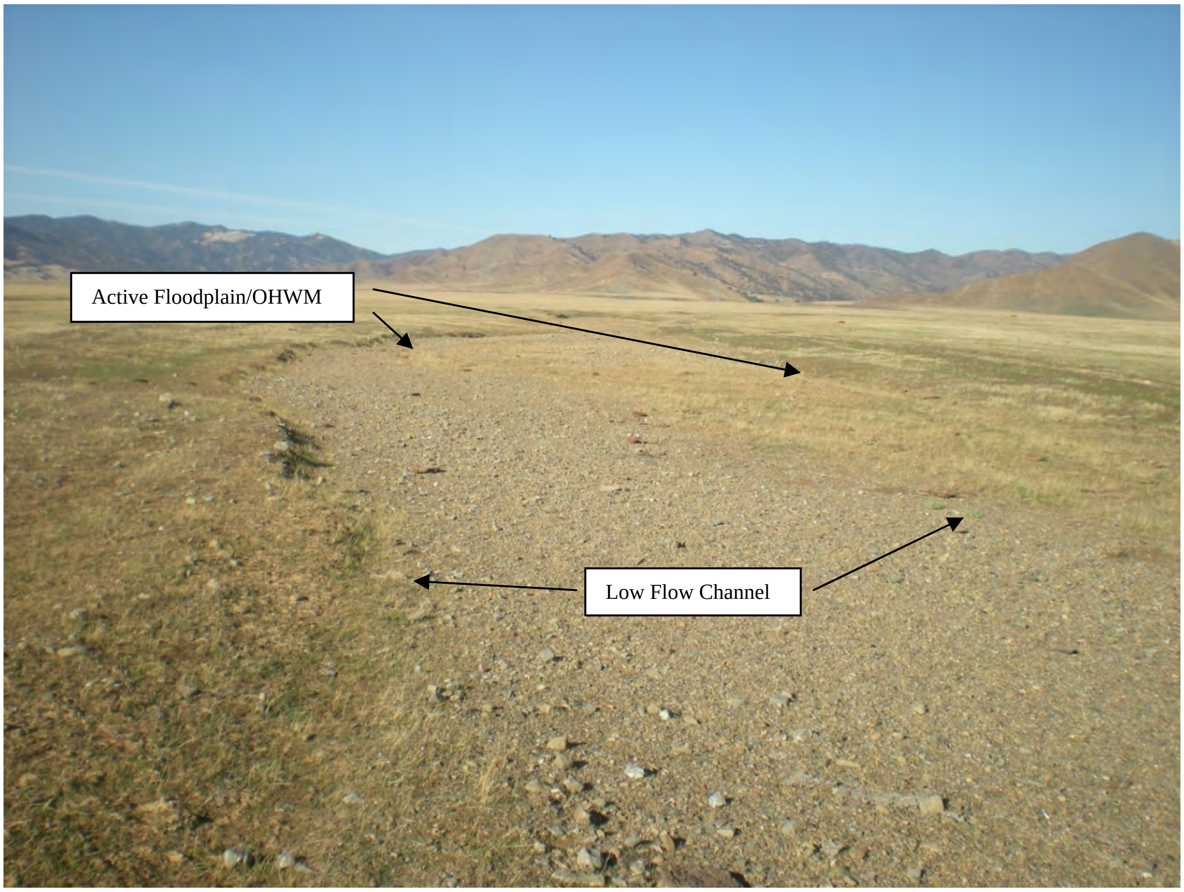

FIGURE 6 Typical OHWM of Las Aguilas Creek

The channel above this point begins to braid, with several low flow channels existing within the broader floodplain and continues this to the western boundary of the project area. Indicators used to define the OHWM included an increase in vegetative cover, change in particle size distribution and a break in bank slope. The indicators above the OHWM included an increase in vegetative cover, surface rounding and surface relief.

Additional Features

Several drainage features within the Study Area appeared to have the potential to contain an OHWM based on mapping and topography; however, the field investigation showed no evidence of flow or an OHWM. These features are identified as a dashed line on Figure 3.

7.0 CONCLUSIONS

Three PUB wetlands totaling approximately 1.46 acres were delineated within the Study Area as shown in Figure 3.

A total of approximately 18,700 feet of stream channel exhibiting an OHWM was delineated within the Panoche Creek drainage on site. A total of approximately 7,025 feet of stream channel exhibiting an OHWM was delineated within the Las Aguilas Creek drainage on site. The locations and extent of these stream channels are shown on Figure 3.

8.0 REFERENCES

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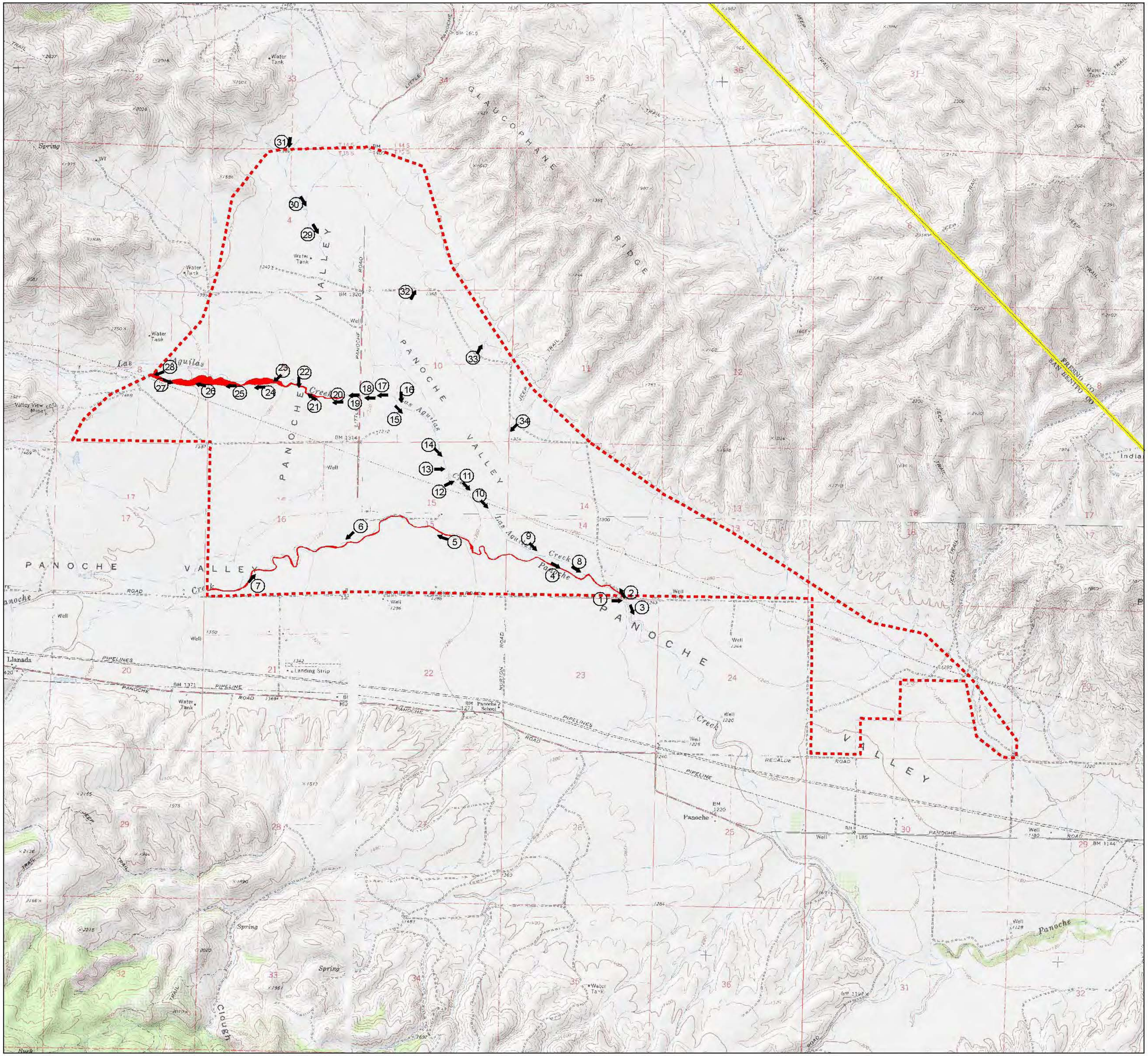
APPENDIX A: PHOTO LOG



Panoche Valley Solar Farm

Photo Log Map

Appendix A

Legend

Study Area Boundary

Administrative Boundary

County Boundary

Delineated Water Features

Photo Point

Photo Point Direction

Ordinary High Water Mark

N
W E
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0 0.5 1 Miles

POWER ENGINEERS

Solargen Energy

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Photo 1


Photo 2


Photo 3


Photo 4


Photo 5

Photo 6

Photo 7

Photo 8

Photo 9


Photo 10


Photo 11


Photo 12


Photo 13


Photo 14


Photo 15


Photo 16


Photo 17

Photo 18

Photo 19


Photo 20


Photo 21

Photo 22

Photo 23


Photo 24


Photo 25


Photo 26


Photo 27


Photo 28


Photo 29


Photo 30


Photo 31


Photo 32


Photo 33


Photo 34

APPENDIX B: DATA FORMS

Project: Panoche		**Date:** October, 2009	**Time:**
Project Number:		**Town:** Panoche	**State:** CA
Stream: Las Aguilas Creek		**Photo begin file#**	**Photo end file#**
Investigator(s): Kevin Lincoln, Allison Carver			

Y [x] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [x] Is the site significantly disturbed?

Location Details:

Projection: **Datum:**

Coordinates: 36 38' 8.986" N 120 52' 42.654" W

Notes:

Brief site description: Panoche Valley - Heavily grazed rangeland on relatively level valley floor.

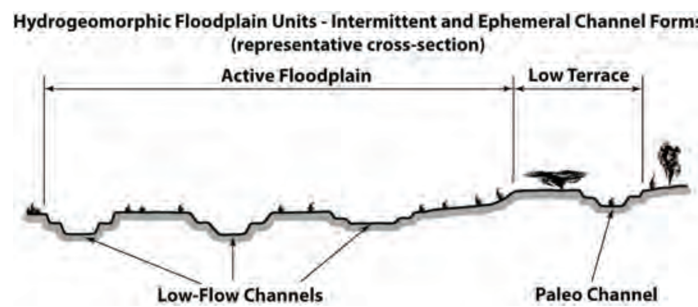
Checklist of resources (if available):

- [x] Aerial photography
  Dates:
- [x] Topographic maps
  Scale:
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [x] Global positioning system (GPS)
- [ ] Other studies

- [ ] Stream gage data
  Gage number: abc
  Period of record: abc
  - [ ] Clinometer / level
  - [ ] History of recent effective discharges
  - [ ] Results of flood frequency analysis
  - [ ] Most recent shift-adjusted rating
  - [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

The dominant Wentworth size class that imparts a characteristic texture to each zone of a channel cross-section is recorded in the average sediment texture field under the characteristics section for the zone of interest.

Inches (in)		Millimeters (mm)	Wentworth size class	
			Boulder	Gravel
	10.08	256		
			Cobble	
	2.56	64		
			Pebble	
	0.157	4		
			Granule	
	0.079	2.00		
			Very coarse sand	Sand
	0.039	1.00		
			Coarse sand	
	0.020	0.50		
1/2	0.0098	0.25	Medium sand	
1/4	0.005	0.125	Fine sand	
			Very fine sand	
1/8	0.0025	0.0625		
			Coarse silt	Silt
1/16	0.0012	0.031		
			Medium silt	
1/32	0.00061	0.0156		
			Fine silt	
1/64	0.00031	0.0078		
			Very fine silt	
1/128	0.00015	0.0039		
			Clay	Mud



[X]	**Walk the channel and floodplain within the study area to get an impression of the vegetation and geomorphology present at the site. Record any potential anthropogenic influences on the channel system in "Notes" above.**
[X]	**Locate the low-flow channel (lowest part of the channel). Record observations.** Characteristics of the low-flow channel: Average sediment texture: Sand/Gravel/Cobble ___ Total veg cover: _0_ % Tree: _____% Shrub: _____% Herb: _____% Community successional stage: [X] NA [ ] Early (herbaceous & seedlings) [ ] Mid (herbaceous, shrubs, saplings) [ ] Late (herbaceous, shrubs, mature trees) Dominant species present: ____________ Other: [ ] ____ [ ] ____ [ ] ____ [ ] ____
[X]	**Walk away from the low-flow channel along cross-section. Record characteristics of the low-flow/active floodplain boundary.** Characteristics used to delineate the low-flow/active floodplain boundary: [X] Change in total veg cover [ ] Tree [ ] Shrub [X] Herb [X] Change in overall vegetation maturity [ ] Change in dominant species present [ ] Other [X] Presence of bed and bank [X] Drift and/or debris [ ] Other: ____________ [ ] Other: ____________
[X]	**Continue walking the channel cross-section. Record observations below.** Characteristics of the active floodplain: Average sediment texture: Sand/Gravel/Cobble ___ Total veg cover: _____ % Tree: _____% Shrub: _____% Herb: _25-50_% Community successional stage: [ ] NA [X] Early (herbaceous & seedlings) [ ] Mid (herbaceous, shrubs, saplings) [ ] Late (herbaceous, shrubs, mature trees) Dominant species present: ____________ Other: [ ] ____ [ ] ____ [ ] ____ [ ] ____

[x]	**Continue walking the channel cross-section. Record indicators of the active floodplain/low terrace boundary.** Characteristics used to delineate the active floodplain/ low terrace boundary: [x] Change in average sediment texture [x] Change in total veg cover [ ] Tree [ ] Shrub [x] Herb [x] Change in overall vegetation maturity [ ] Change in dominant species present [x] Other [x] Presence of bed and bank [x] Drift and/or debris [ ] Other: ____________ [ ] Other: ____________
[x]	**Walk the active floodplain/low terrace boundary both upstream and downstream of the cross-section to verify that the indicators used to identify the transition are consistently associated the transition in both directions.** Consistency of indicators used to delineate the active floodplain/low terrace boundary: Y [x] N [ ] Change in average sediment texture Y [x] N [ ] Change in total veg cover [ ] Tree [ ] Shrub [x] Herb Y [x] N [ ] Change in overall vegetation maturity Y [ ] N [x] Change in dominant species present Y [x] N [ ] Other: Y [x] N [ ] Presence of bed and bank Y [x] N [ ] Drift and/or debris Y [ ] N [ ] Other: ____________ Y [ ] N [ ] Other: ____________
[ ]	**If the characteristics used to delineate the active floodplain/low terrace boundary were NOT consistently associated with the transition in both the upstream and downstream directions, repeat all steps above.**
[x]	**Continue walking the channel cross-section. Record characteristics of the low terrace.** Characteristics of the low terrace: Average sediment texture: Clay/Loam Total veg cover: _____ % Tree: _____% Shrub: _____% Herb: 50-90 % Community successional stage: [ ] NA [ ] Mid (herbaceous, shrubs, saplings) [ ] Early (herbaceous & seedlings) [ ] Late (herbaceous, shrubs, mature trees) Dominant species present: ____________ Other: [ ] ____________ [ ] ____________ [ ] ____________ [ ] ____________
[x]	**If characteristics used to delineate the active floodplain/low terrace boundary were deemed reliable, acquire boundary.** Active floodplain/low terrace boundary acquired via: [ ] Mapping on aerial photograph [x] GPS [ ] Digitized on computer [ ] Other: ____________

Project: Panoche	**Date:** October, 2009	**Time:**
Project Number:	**Town:** Panoche	**State:** CA
Stream: Las Aguilas Creek	**Photo begin file#**	**Photo end file#**
Investigator(s): Kevin Lincoln, Allison Carver		

Y [x] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [x] Is the site significantly disturbed?

Location Details: Near Windmill

Projection: **Datum:**

Coordinates:

Notes:

Brief site description: Panoche Valley - Heavily grazed rangeland on relatively level valley floor.

Checklist of resources (if available):

- [x] Aerial photography
  Dates:
- [x] Topographic maps
  Scale:
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [x] Global positioning system (GPS)
- [ ] Other studies

- [ ] Stream gage data
  Gage number: abc
  Period of record: abc
  - [ ] Clinometer / level
  - [ ] History of recent effective discharges
  - [ ] Results of flood frequency analysis
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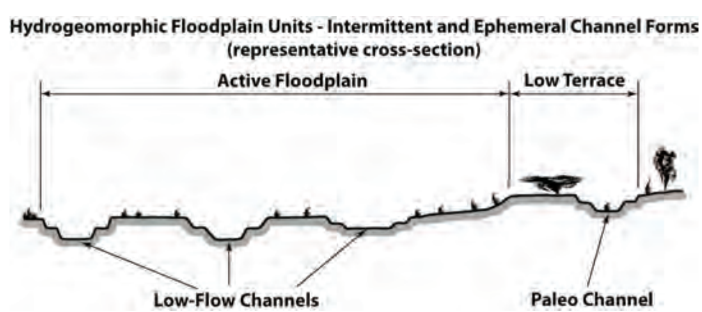
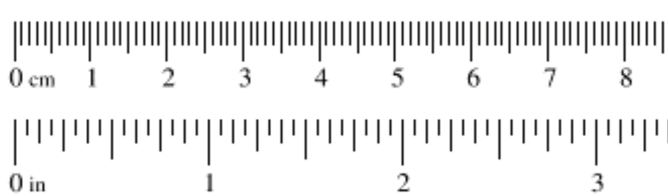
	2.56	64		
			Pebble	
	0.157	4		
			Granule	
	0.079	2.00		
			Very coarse sand	Sand
	0.039	1.00		
			Coarse sand	
	0.020	0.50		
			Medium sand	
1/2	0.0098	0.25		
			Fine sand	
1/4	0.005	0.125		
			Very fine sand	
1/8	0.0025	0.0625		
			Coarse silt	Silt
1/16	0.0012	0.031		
			Medium silt	
1/32	0.00061	0.0156		
			Fine silt	
1/64	0.00031	0.0078		
			Very fine silt	
1/128	0.00015	0.0039		
			Clay	Mud





[x]	**Walk the channel and floodplain within the study area to get an impression of the vegetation and geomorphology present at the site. Record any potential anthropogenic influences on the channel system in "Notes" above.**
[x]	**Locate the low-flow channel (lowest part of the channel). Record observations.** Characteristics of the low-flow channel: Average sediment texture: Sand/Gravel/Cobble Total veg cover: 0 % Tree: ____% Shrub: ____% Herb: ____% Community successional stage: [x] NA [ ] Mid (herbaceous, shrubs, saplings) [ ] Early (herbaceous & seedlings) [ ] Late (herbaceous, shrubs, mature trees) Dominant species present: ____ Other: [ ] ____ [ ] ____ [ ] ____ [ ] ____
[x]	**Walk away from the low-flow channel along cross-section. Record characteristics of the low-flow/active floodplain boundary.** Characteristics used to delineate the low-flow/active floodplain boundary: [x] Change in total veg cover [ ] Tree [ ] Shrub [x] Herb [x] Change in overall vegetation maturity [ ] Change in dominant species present [ ] Other [x] Presence of bed and bank [x] Drift and/or debris [ ] Other: ____ [ ] Other: ____
[x]	**Continue walking the channel cross-section. Record observations below.** Characteristics of the active floodplain: Average sediment texture: Sand/Gravel/Cobble Total veg cover: ____ % Tree: ____% Shrub: ____% Herb: 25-50% Community successional stage: [ ] NA [ ] Mid (herbaceous, shrubs, saplings) [x] Early (herbaceous & seedlings) [ ] Late (herbaceous, shrubs, mature trees) Dominant species present: ____ Other: [ ] ____ [ ] ____ [ ] ____ [ ] ____

[x]	**Continue walking the channel cross-section. Record indicators of the active floodplain/low terrace boundary.** Characteristics used to delineate the active floodplain/ low terrace boundary: [x] Change in average sediment texture [x] Change in total veg cover [ ] Tree [ ] Shrub [x] Herb [x] Change in overall vegetation maturity [ ] Change in dominant species present [x] Other [x] Presence of bed and bank [x] Drift and/or debris [ ] Other: ______ [ ] Other: ______
[x]	**Walk the active floodplain/low terrace boundary both upstream and downstream of the cross-section to verify that the indicators used to identify the transition are consistently associated the transition in both directions.** Consistency of indicators used to delineate the active floodplain/low terrace boundary: Y [x] N [ ] Change in average sediment texture Y [x] N [ ] Change in total veg cover [ ] Tree [ ] Shrub [x] Herb Y [x] N [ ] Change in overall vegetation maturity Y [ ] N [x] Change in dominant species present Y [x] N [ ] Other: Y [x] N [ ] Presence of bed and bank Y [x] N [ ] Drift and/or debris Y [ ] N [ ] Other: ______ Y [ ] N [ ] Other: ______
[ ]	**If the characteristics used to delineate the active floodplain/low terrace boundary were NOT consistently associated with the transition in both the upstream and downstream directions, repeat all steps above.**
[x]	**Continue walking the channel cross-section. Record characteristics of the low terrace.** Characteristics of the low terrace: Average sediment texture: Clay/Loam Total veg cover: ____ % Tree: ____% Shrub: ____% Herb: 50-90 % Community successional stage: [ ] NA [ ] Mid (herbaceous, shrubs, saplings) [ ] Early (herbaceous & seedlings) [ ] Late (herbaceous, shrubs, mature trees) Dominant species present: ______ Other: [ ] ______ [ ] ______ [ ] ______ [ ] ______
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Project: Panoche **Project Number:** **Stream:** Panoche Creek **Investigator(s):** Kevin Lincoln, Allison Carver	**Date:** October, 2009 **Time:** **Town:** Panoche **State:** CA **Photo begin file#** **Photo end file#**
Y [x] / N [ ] Do normal circumstances exist on the site? Y [ ] / N [x] Is the site significantly disturbed?	**Location Details:** **Projection:** **Datum:** **Coordinates:** 36 37' 2.119" N 120 50' 41.638" W

Notes:

Brief site description: Panoche Valley - Heavily grazed rangeland on relatively level valley floor.

Checklist of resources (if available):

- [x] Aerial photography
  Dates:
- [x] Topographic maps
  Scale:
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [x] Global positioning system (GPS)
- [ ] Other studies

- [ ] Stream gage data
  Gage number: abc
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  - [ ] Results of flood frequency analysis
  - [ ] Most recent shift-adjusted rating
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The dominant Wentworth size class that imparts a characteristic texture to each zone of a channel cross-section is recorded in the average sediment texture field under the characteristics section for the zone of interest.

Inches (in)		Millimeters (mm)	Wentworth size class	
			Boulder	Gravel
	10.08	256	Cobble	Gravel
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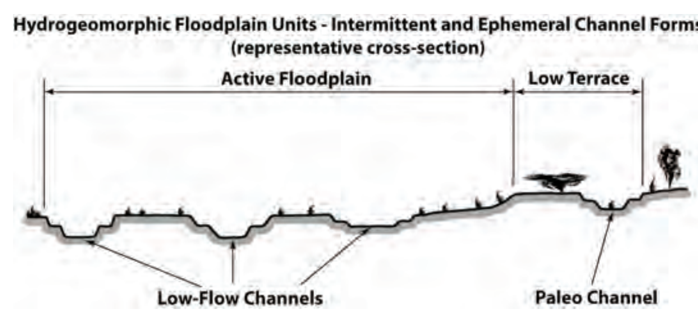
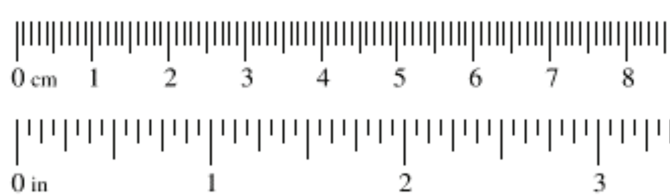
	0.157	4	Granule	Gravel
	0.079	2.00	Very coarse sand	Sand
	0.039	1.00	Coarse sand	Sand
	0.020	0.50	Medium sand	Sand
1/2	0.0098	0.25	Fine sand	Sand
1/4	0.005	0.125	Very fine sand	Sand
1/8	0.0025	0.0625	Coarse silt	Silt
1/16	0.0012	0.031	Medium silt	Silt
1/32	0.00061	0.0156	Fine silt	Silt
1/64	0.00031	0.0078	Very fine silt	Silt
1/128	0.00015	0.0039	Clay	Mud





[x]	**Walk the channel and floodplain within the study area to get an impression of the vegetation and geomorphology present at the site. Record any potential anthropogenic influences on the channel system in "Notes" above.**
[x]	**Locate the low-flow channel (lowest part of the channel). Record observations.** Characteristics of the low-flow channel: Average sediment texture: Sand/Gravel/Cobble Total veg cover: 0 % Tree: ____% Shrub: ____% Herb: ____% Community successional stage: [x] NA [ ] Mid (herbaceous, shrubs, saplings) [ ] Early (herbaceous & seedlings) [ ] Late (herbaceous, shrubs, mature trees) Dominant species present: ____ Other: [ ] ____ [ ] ____ [ ] ____ [ ] ____
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Project: Panoche
Project Number:
Stream: Panoche Creek
Investigator(s): Kevin Lincoln, Allison Carver

Date: October, 2009
Town: Panoche
Photo begin file#

Time:
State: CA
Photo end file#

Y [x] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [x] Is the site significantly disturbed?

Location Details:

Projection: **Datum:**
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Notes:

Brief site description: Panoche Valley - Heavily grazed rangeland on relatively level valley floor.

Checklist of resources (if available):

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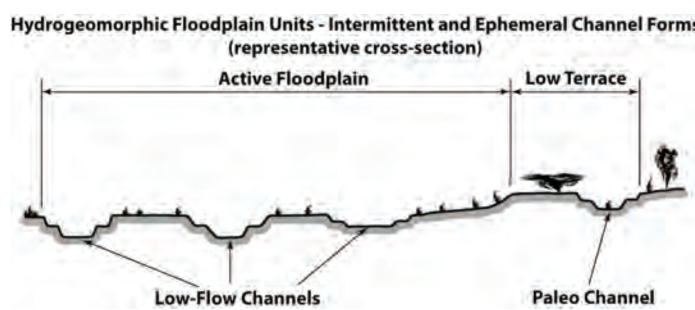

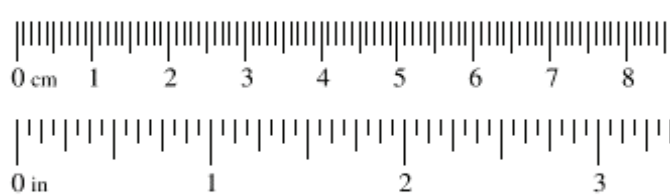

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Rare Plant Survey Results
Panoche Valley Solar Project
Project Footprint and Telecommunications Route

San Benito and Fresno Counties

October 2015

Prepared for:
Mr. Eric Cherniss
PVS 2 LLC

Prepared by:
McCormick Biological, Inc.
P.O. Box 80983
Bakersfield, California 93380

1.0 Introduction

The purpose of this report is to document rare plant surveys conducted by McCormick Biological, Inc. on the Panoche Valley Solar Project Footprint (approximately 2,506 acres) plus a buffer of at least 100 feet. The proposed Panoche Valley Solar Project (Project) is located in San Benito County, California (Attachment 1). In addition to surveys within the Project Footprint, eight wire pull sites, three guard structure sites, four temporary work areas, All Dielectric Self-Supporting (ADSS) pole sites and one helicopter landing zone were surveyed. These areas are located within natural lands that represent potential habitat for rare plant taxa along the proposed telecommunications routes for the Project within Pacific Gas & Electric (PG&E) right-of-way in San Benito and Fresno Counties. These surveys were conducted in compliance with the 2015 Final Supplemental Environmental Impact Report Mitigation Measure BR-3.1 (San Benito County 2015).

The surveys were conducted during 2015 following rare plant surveys conducted in 2009 and 2010 by Live Oak Associates (LOA 2009 and LOA 2010). The Project is located within the geographic range of several special-status plant taxa. The target lists prepared by Live Oak Associates were used as a baseline. Additional information sources were consulted to update the target list based on current available information. A literature review as described in Section 2.0 included 46 plant taxa evaluated in this report.

2.0 Data Collection and Evaluation Methods

Survey methods were consistent with the Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities (California Department of Fish and Wildlife [CDFW] 2009) (Protocols). Two site visits were conducted specifically for identification of flora during the spring of 2015. During the early spring surveys (March), each of the Project components was surveyed by qualified botanists using walking transects spaced no more than 20 meters apart. Special attention was given to areas of unusual soils and high species diversity. Reference sites that were located within approximately ten miles of the Project Footprint were surveyed for three early season rare plant species, San Joaquin wooly threads (*Monolopia congdonii*), forked fiddleneck (*Amisinckia furcata*), and Panoche peppergrass (*Lepidium jaredii* ssp. *album*), to verify survey timing. All three of these taxa were verified to be in a flowering and fruiting stage that enabled positive identification. Reference sites for all potentially occurring rare plant species were not visited; however, these three species were considered suitable proxies for verification of appropriate timing for potentially occurring early flowering plant species.

The surveys were conducted from March 3 to March 13 (early spring), 2015 and May 5 to May 7, 2015 (late spring). Early spring surveys were documented in a memorandum to Ms. Jennifer Kaminsky (McCormick Biological, Inc. 2015). Methods and results for both early spring and late spring surveys are combined in this report.

Early spring surveys consisted of between five and seven surveyors walking parallel transects spaced at 75 feet on the Project Footprint and surveying the required 100 foot buffer around the Project Footprint. Each of the PG&E telecommunications elements was inventoried by one to two surveyors. Each area visited during the late spring (May) was surveyed by three surveyors walking meandering transects and visually evaluating all of the survey areas. During the early season survey, plants identified to genera in the target list were mapped for follow-up surveys. Global Positioning System (GPS) points were taken to enable follow-up late spring surveys for the plants in these genera that could not be identified during the early season survey. All sites identified as containing potential target species were revisited to during the late spring surveys confirm identifications. Based on site conditions and phenology of taxa observed during the May surveys, no further surveys were conducted in the summer. All other portions of the Project Footprint and telecommunications route were visually inspected to determine whether any previously unidentified taxa were present. Although line transects were not walked during this second visit, all portions of the Project Footprint and telecommunications route were visually evaluated. Survey transects were conducted within all areas with identifiable plants present during the time of the survey.

All plant taxa encountered during surveys were identified to the extent possible. Identifications were made using keys contained in The Jepson Manual: Vascular Plants of California (2nd Edition 2012) and updates found in the Jepson eflora (http://ucjeps.berkeley.edu/IJM.html), containing revisions to taxonomic treatments. Plant identifications were made using a 10x or greater magnification field hand lens and/or were collected and identified using a dissecting microscope.

When encountered, observations of special-status plant species were documented as follows:

coordinates were recorded using a handheld global positioning unit, number of plants in the population was counted (<50 individuals) or estimated (>50 individuals), percent of population flowering, vegetative, and/or in fruit was estimated. If enough individuals were present, a voucher specimen was collected following standard botanical collecting guidelines.

"Special-status" or "sensitive" plant species considered in this evaluation include those that may occur in the Project vicinity that have statutory protections, such as federal- and state-listed (rare, threatened, endangered) species and candidates for listing under the respective endangered species acts. In addition, species that are of "concern" to either United State Fish and Wildlife Service (USFWS) or CDFW have been included if the Project Footprint or immediate vicinity includes habitat that may be occupied by such species.

Species may meet the criteria for consideration if a special interest group, such as the California Native Plant Society (CNPS), has concluded through published data that the species is declining and warrants concern and potential habitat is present on the Project Footprint or immediate vicinity were also considered during the survey events. Species evaluated in this biological resource assessment are collectively referred to as "special-status species."

The list of special-status species evaluated for the Project was compiled by consulting previous reports prepared for the Project, pertinent literature, accessing the California Natural Diversity Data Base (CNDDB) and the CNPS Rare Plant Inventory (CNPS 2015). McCormick Biological, Inc. (MBI) staff and qualified botanists reviewed these records and other pertinent information, including available literature, to complete the list of species considered. Each species was then evaluated based on site characteristics and observations were recorded.

3.0 Results

3.1 Target Species List

The list of target species includes 46 taxa that may occur in the vicinity of the Project Footprint and telecommunications route (Table 3.1). Of these, eight were considered unlikely to occur based on lack of suitable vegetation communities or specific habitat considerations such as soils. Therefore, 38 species were identified as potentially occurring based on range and habitat considerations.

3.2 Findings

Site conditions were fair, with relatively late rains resulting in response from perennial and annual species. However, rainfall in the region was below average for a third straight year. Although grazing was the predominant land use on most of the survey area, a wide variety of plant taxa were observed, with 139 taxa in 31 families identified during the surveys.

<u>Project Footprint</u>

No federal or state listed rare, threatened or endangered plant species were observed within the Project Footprint during any of the surveys conducted by MBI. Several plant species ranked by the California Native Plant Society were observed (See Table 1). Impacts to a small portion of a population (i.e., a few individuals) of plants that are not federally or State-listed, or impacts to a population for which loss of a local population would not substantially affect the range of the species, are not typically considered significant impacts under CEQA. Relatively small populations of forked fiddleneck, serpentine leptosiphon, and California groundsel were found within the Project Footprint (Figure 3.1). In the Panoche and Tumey Hills region, forked fiddleneck is found at several locations numbering in the thousands, while relatively large populations of serpentine leptosiphon (10,000+) and California groundsel (50+) were found outside of the Project Footprint on Conservation Lands during the survey.

Telecommunications Route

No federal or state listed rare, threatened or endangered plant species were observed within the Telecommunications Route during any of the surveys conducted by MBI. Lost Hills crownscale (*Atriplex coronata* var. *vallicola*), a plant ranked by the CNPS as 1B.2, was found near a proposed guard structure. Hundreds of individuals were observed on an open hillside under the existing PG&E transmission line within approximately 300 feet of the guard structure. Additionally, approximately 50 individuals were observed within the survey area approximately 300 feet east of the work area of a proposed wire pull site (Figure 3.2). A small number of individuals may be impacted in association with installation of the guard structure.

In addition, Idria buckwheat (*Erogonum vestitum*), a CNPS rank 4.3 plant, was observed in the vicinity of the guard structure but not within the work area. This plant is a watch list species, and as such, requires no further avoidance measures.

Impacts to these species would be reduced through implementation of Mitigation Measures BR-G.1 through BR-G.6 would ensure that (1) All construction personnel participate in the Worker Environmental Education Program; (2) Best Management Practices (BMPs) for biological resources are implemented; (3) A Habitat Restoration and Revegetation Plan is developed and implemented; (4) Biological construction monitoring is implemented; (5) Conservation easements are created for permanent habitat protection as appropriate; and (6) A Habitat Mitigation and Monitoring Plan is developed and implemented for mitigation lands. MM BR-1.1 would ensure the preparation and implementation of a Weed Control Plan and MM BR-1.2 would ensure the development of a Grazing Plan for vegetation management on the site. In addition, MM AQ-1.1 would reduce impacts from fugitive dust.

Table 3.1: Target List of Special-status Plant Species and Survey Findings Summary

Species	Status	Flowering Period	Comments
Amsinckia furcata Forked fiddleneck	CRPR 4.2	March-May	Approximately 80 individuals observed in the southeastern portion of the Project Footprint; populations numbering in thousands observed on BLM lands to the southeast. This relatively small population is not of regional significance.
Androsace elongata ssp. *acuta* California androsace	CRPR 4.2	February-April	Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated.
Antirrhinum ovatum Oval-leaved snapdragon	CRPR 4.2	May-July	Microhabitat typical for this species not observed; impacts not anticipated.
Astragalus macrodon Salinas milk vetch	CRPR 4.3	April-June	Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated.
Astragalus rattanii var. *jepsonianus* Jepson's milk vetch	CRPR 1B.2	April-June	Typical soils for this species are not present; very unlikely to occur. Impacts not anticipated.
Atriplex cordulata var. *cordulata* Heartscale	CRPR 1B.2	June-July	Small areas of suitable soils present in alkaline areas in northwestern portion of Project Footprint. Even though survey conducted prior to blooming period, certain characteristics are identifiable vegetatively that would trigger follow-up; no plants exhibiting these characters were observed; no further surveys recommended. Impacts not anticipated.
Atriplex coronata var. *coronata* Crownscale	CRPR 4.2	March-October	Small areas of suitable soils present in alkaline areas in northwestern portion of Project Footprint. Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated.
Atriplex coronata var. *vallicola* Lost Hills crownscale	CRPR 1B.2	April-September	Small areas of suitable soils present in alkaline areas in northwestern portion of Project Footprint. Survey conducted at appropriate time. Species was observed on Telecommunications Route but not Project Footprint; see text for avoidance and impact discussion.
Atriplex depressa Brittlescale	CRPR 1B.2	June-October	Based on known range, species very unlikely. No impacts anticipated.
Atriplex joaquiniana (=*Extriplex joaquiniana*) San Joaquin spearscale	CRPR 1B.2	April-September	Small areas of suitable soils present in alkaline areas in northwestern portion of Project Footprint. Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated.
Atriplex minuscula Lesser saltscale	CRPR 1B.1	April-October	Small areas of suitable soils present in alkaline areas in northwestern portion of Project Footprint. Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated

Species	Status	Flowering Period	Comments
Atriplex subtilis Deltoid bract saltbush	CRPR 1B.2	June-October	Artificial saline impoundments located in the northwestern portion of Project Footprint represent potentially suitable habitat. Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated
Blepharizonia plumosa Big tarplant	CRPR 1B.1	July-November	Suitable dry slopes present in northwestern portion of Project Footprint. Although flowering period for this species is published as July, another species, B. laxa, was observed on Telecommunications Route. Given this observation, it is assumed that this species would have also been identifiable at the time of the survey and it was not observed. In addition, certain characteristics are identifiable vegetatively that would trigger follow-up; no plants exhibiting these characters were observed; no further surveys recommended. No impacts are anticipated.
California macrophylla Round leaved filaree	CRPR 1B.1	March-July	Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated.
Camissonia benitensis San Benito evening primrose	FT, CRPR 1B.1	April-June	Serpentine soils typical of species locations are not present. Impacts not anticipated.
Campanula exigua Chaparral harebell	CRPR 1B.2	May-June	No talus slopes or serpentine soil described as habitat for this species were present. No further surveys recommended. Impacts not anticipated.
Caulanthus californicus California jewelflower	FE, SE, CRPR 1B.1	February-April	Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated.
Caulanthus lemmonii Lemmon's wild cabbage	CRPR 1B.2	March-May	Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated.
Chorizanthe ventricosa Priest Valley spineflower	CRPR 4.3	May-September	No serpentine soils described as habitat for this species were present. No further surveys recommended. Impacts not anticipated.
Chloropyron molle ssp. *hispidum* Hispid bird's beak	CRPR 1B.1	June-September	No saline marshes or flats representing potential habitat for this species were present. No further surveys recommended. Impacts not anticipated.
Deinandra halliana Hall's tarplant	CRPR 1B.1	April-May	Potential habitat is present over most of the Project Footprint. Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated
Delphinium californicum ssp. *interius* California larkspur	CRPR 1B.2	April-June	*Delphinium* sp. was observed just northwest of the northwestern portion of the Project Footprint. *Delphinium gypsophilum* ssp. *gypsophilum* was previously documented near these locations and also southeast of the current Project Footprint. Two *Delphinium recurvatum* occurrences were previously documented near the western extent of the Project Footprint and also outside of the eastern boundary of the current Project Footprint. The *Delphinium* sp. observed during the early spring survey was revisited in May. Although a species determination was not
Delphinium gypsophilum ssp. *gypsophilum* Pinoche Creek larkspur		March-June	
Delphinium recurvatum	CRPR 1B.2	March-June	

Species	Status	Flowering Period	Comments
Recurved larkspur			made, all of the populations of Delphinium sp. were found to be outside of the Project Footprint; therefore, no impacts are anticipated. Five individual *Delphinium gypsophilum* ssp. *gypsophilum* plants were identified within a work area on the Telecommunications Route. Given the limited number of individuals that will be affected on the Project Footprint, these impacts would not be considered significant with the implementation of mitigation measures.
Eriastrum hooveri Hoover's eriastrum	CRPR 4.2	March-July	Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated.
Eriogonum gossypinum Cottony buckwheat	CRPR 4.2	March-September	Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated.
Eriogonum nudum var. *indictum* Naked buckwheat	CRPR 4.2	April-December	This taxon is a perennial that would have been identifiable to genus during the period of the survey. No perennial *Eriogonum* sp. were observed. No further surveys recommended. Impacts not anticipated.
Eriogonum temblorense Temblor buckwheat	CRPR 1B.2	April-September	The project site is outside of the known range and typical soils were not observed. No further surveys are recommended. Impacts not anticipated.
Eriogonum vestitum Idria buckwheat	CRPR 4.3	April-August	Barren gypsum clay slopes typical for this species not present on Project Footprint. No further surveys recommended. Impacts not anticipated.
Fritillaria falcata Talus fritillary	CRPR 1B.2	March-May	Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated.
Fritillaria viridea San Benito fritillary	CRPR 1B.2	March-May	Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated.
Lagophylla diabolensis Diablo Range hare leaf	CRPR 1B.2	April-September	Generally suitable soils are present over much of the Project Footprint. Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated
Layia discoidea Rayless layia	CRPR 1B.1	May	No serpentine soils described as habitat for this species were present. No further surveys recommended. Impacts not anticipated.
Layia heterotricha Pale yellow layia	CRPR 1B.1	March-June	Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated.
Layia munzii Munz's tidy tips	CRPR 1B.2	March-April	Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated.
Lepidium jaredii ssp. *album* Panoche pepper grass	CRPR 1B.2	February-June	Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated.
Leptosiphon ambiguus Serpentine leptosiphon	CRPR 4.2	March-June	Three locations previously identified within the Project Footprint were confirmed totaling approximately 10,000 plants. One population located partially outside of the Project Footprint (northern boundary) consisting of greater than 10,000 plants was confirmed. This plant is well-represented in the region with over 35 additional

Species	Status	Flowering Period	Comments
			collections recorded from within 20 miles of the Project Footprint. Although individuals will be impacted by project activities, impacts not significant with implementation of mitigation measures.
Madia radiata Golden madia	CRPR 1B.1	March-May	Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated.
Malacothamnus aboriginum Gray bushmallow	CRPR 1B.2	April-October	This taxon is a perennial that would have been identifiable to genus during the period of the survey. No perennial *Malacothamnus* sp. were observed. No further surveys recommended. Impacts not anticipated.
Monolopia congdonii San Joaquin woollythreads	FE, CRPR 1B.2	February-May	Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated.
Navarretia nigelliformis ssp. *radians* Adobe navarretia	CRPR 1B.2	April-July	*Navarretia* sp. was identified at two locations within the Project Footprint and three locations outside the Project Footprint. These locations were revisited and determined be neither of these special-status species. See plant list for further information.
Navarretia prostrata Prostrate navarretia	CRPR 1B.2	April-July	
Phacelia phacelioides Mt. Diablo phacelia	CRPR 1B.2	April-May	Open rocky slopes typical of this species were not observed on Project Footprint. No further surveys recommended. Impacts not anticipated.
Senecio aphanactis California groundsel	CRPR 2B.2	January-April	Five individual plants of this taxon were observed at four locations within the Project Footprint. Two locations with two and 50 individuals respectively were observed southeast and west of the Project Footprint on Conservation Lands. Given the limited number of individuals that will be affected on the Project Footprint, these impacts would not be considered significant with the implementation of mitigation measures.
Streptanthus insignis ssp. *lyonii* Arburua Ranch jewelflower	CRPR 1B.2	March-May	Survey conducted at appropriate time and species not observed; no further surveys recommended. Impacts not anticipated.

FE = Federally Endangered SE = State Endangered

CRPR = California Plant Rank (California Native Plant Society)
1B = Plants that are rare, threatened, or endangered in California and elsewhere 4 = A watch list; plants of limited distribution
0.1: Seriously endangered in California 0.2: Fairly endangered in California 0.3: Not very endangered in California

Sources: Jepson Flora Project (B. G. Baldwin, D. J. Keil, S. Markos, B. D. Mishler, R. Patterson, T. J. Rosatti, and D. H. Wilken editors). 2015. *Jepson eflora*, http://ucjeps.berkeley.edu/IJM.html [accessed March 2015 and October 2015]; CNPS Inventory of Rare, Threatened and Endangered Plants of California. 2015. http://www.rareplants.cnps.org/ [accessed March 2015 and October 2015].

Table 3.2: Plants Observed During Surveys Conducted March 3 to 13 and May 5 to 8, 2015 on the Panoche Valley Solar Project

major_clade	Family	Scientific name	Common name	nativity
Eudicots				
	Apiaceae (Carrot family)			
		Lomatium caruifolium var. *caruifolium*	Alkali desertparsley	Native
		Lomatium utriculatum	Common lomatium	Native
		Sanicula bipinnata	Poison sanicle	Native
		Sanicula bipinnatifida	Purple sanicle	Native
	Asteraceae (Aster family)			
		Achyrachaena mollis	Blow wives	Native
		Agoseris sp.	Agoseris	Native
		Agoseris heterophylla	Annual agoseris	Native
		Ancistrocarphus filagineus	False neststraw	Native
		Blepharizonia laxa	Glandular big tarplant	Native
		Chaenactis xantiana	Fleshcolor pincushion	Native
		Deinandra kelloggii	Kellogg's tarweed	Native
		Holocarpha virgata	Yellowflower tarweed	Native
		Lasthenia gracilis	Needle goldfields	Native
		Layia platyglossa	Coastal tidytips	Native
		Logfia filaginoides		Native
		Logfia gallica	Narrowleaf cottonrose	Naturalized
		Malacothrix coulteri	Snake's head	Native
		Matricaria discoidea	Pinapple weed	Naturalized
		Micropus californicus		Native
		Microseris douglasii	Douglas' silverpuffs	Native

major_clade	Family	Scientific name	Common name	nativity
		Microseris elegans	Elegant silverpuffs	Native
		Microseris sylvatica	Sylvan scorzonella	Native
		Monolopia lanceolata	Common monolopia	Native
		Psilocarphus brevissimus	Short woollyheads	Native
		Senecio aphanactis	Chaparral ragwort	Native
		Senecio flaccidus var. *douglasii*	Douglas' ragwort	Native
		Senecio vulgaris	Old-man-in-the-Spring	Naturalized
		Stephanomeria sp.	Wirelettuce	Native
		Uropappus lindleyi	Lindley's silverpuffs	Native
	Boraginaceae (Borage family)			
		Amsinckia intermedia	Common fiddleneck	Native
		Amsinckia menziesii	Menzies' fiddleneck	Native
		Amsinckia tessellata	Bristly fiddleneck	Native
		Pectocarya anisocarpa	Combseed (newly described)	Native
		Pectocarya penicillata	Short-leaf combseed	Native
		Phacelia ciliata	Great Valley phacelia	Native
		Phacelia distans	Distant phacelia	Native
		Phacelia tanacetifolia	Lacy phacelia	Native
		Plagiobothrys acanthocarpus	Adobe popcornflower	Native
		Plagiobothrys bracteatus	Bracted popcornflower	Native
		Plagiobothrys canescens var. *canescens*	Valley popcornflower	Native
		Plagiobothrys leptocladus	Finebranched popcornflower	Native
		Plagiobothrys nothofulvus	Rusty popcornflower	Native
		Plagiobothrys shastensis	Shasta popcornflower	Native
	Brassicaceae (Mustard family)			
		Athysanus pusillus	Common sandweed	Native

major_clade	Family	Scientific name	Common name	nativity
		Brassica nigra	Black mustard	Naturalized
		Capsella bursa-pastoris	Shepherd's purse	Naturalized
		Caulanthus inflatus	Desert candle	Native
		Lepidium dictyotum	Alkali pepperweed	Native
		Lepidium nitidum	Shining pepperweed	Native
		Sinapis arvensis	Charlock mustard	Naturalized
		Sisymbrium irio	London rocket	Naturalized
		Sisymbrium orientale	Indian hedgemustard	Naturalized
		Thysanocarpus curvipes	Sand fringepod	Native
		Thysanocarpus laciniatus	Mountain fringepod	Native
		Tropidocarpum gracile	Dobie pod	Native
	Caryophyllaceae (Pink family)			
		Herniaria hirsuta	Hairy rupturewort	Naturalized
		Stellaria media	Common chickweed	Naturalized
		Stellaria nitens	Shiny chickweed	Native
	Chenopodiaceae (Goosefoot family)			
		Atriplex coronata var. *vallicola*	Lost Hills saltbush	Native
		Atriplex fruticulosa	Ball saltbush	Native
		Atriplex polycarpa	Common saltbush	Native
		Monolepis nuttalliana	Nuttall’s poverty weed	Native
		Salsola sp.	Russian thistle	Naturalized
	Convolvulaceae (Morning-glory family)			
		Convolvulus arvensis	Field bindweed	Naturalized
	Crassulaceae (Stonecrop family)			
		Crassula connata	Sand pygmyweed	Native
	Euphorbiaceae (Spurge family)			

major_clade	Family	Scientific name	Common name	nativity
		Croton setigerus	Dove weed	Native
		Euphorbia sp.	Spurge	unknown
	Fabaceae (Pea family)			
		Acmispon wrangelianus	Chilean bird's-foot trefoil	Native
		Astragalus gambelianus	Gambel's dwarf milkvetch	Native
		Lupinus bicolor	Miniature lupine	Native
		Lupinus succulentus	Hollowleaf annual lupine	Native
		Medicago polymorpha	Burclover	Naturalized
		Trifolium depauperatum var. *truncatum*	Truncate sack clover	Native
		Trifolium dichotomum	Branched Indian clover	Native
		Trifolium gracilentum	Pinpoint clover	Native
		Trifolium willdenovii	Tomcat clover	Native
	Geraniaceae (Geranium family)			
		Erodium brachycarpum	Shortfruit stork's bill	Naturalized
		Erodium cicutarium	Redstem stork's bill	Naturalized
		Erodium moschatum	Musky stork's bill	Naturalized
	Lamiaceae (Mint family)			
		Salvia columbariae	Chia	Native
		Trichostema lanceolatum	Vinegarweed	Native
	Loasaceae (Loasa family)			
		Mentzelia affinis	Yellowcomet	Native
	Malvaceae (Mallow family)			
		Eremalche parryi ssp. *parryi*	Parry's mallow	Native
		Malva parviflora	Cheeseweed mallow	Naturalized
	Molluginaceae (Carpet-weed family)			
		Mollugo verticillata	Whorled carpet-weed	Naturalized

major_clade	Family	Scientific name	Common name	nativity
	Montiaceae (Miner's lettuce family)			
		Calandrinia ciliata	Fringed redmaids	Native
		Claytonia parviflora	Streambank springbeauty	Native
	Myrtaceae (Myrtle family)			
		Eucalyptus globulus	Tasmanian bluegum	Naturalized
	Nyctaginaceae (Four o'clock family)			
		Mirabilis sp.	Four o'clock	need info
	Onagraceae (Evening Primrose family)			
		Clarkia sp.	Clarkia	Native
		Epilobium sp.	Willowherb	Native
		Eremothera boothii	Booth's evening primrose	Native
	Orobanchaceae (Broom-rape family)			
		Castilleja attenuata	Attenuate Indian paintbrush	Native
		Castilleja brevistyla	Shortstyle Indian paintbrush	Native
		Castilleja exserta	Exserted Indian paintbrush	Native
		Orobanche uniflora	Oneflowered broomrape	Native
	Papaveraceae (Poppy family)			
		Eschscholzia caespitosa	Tufted poppy	Native
		Eschscholzia californica	California poppy	Native
	Plantaginaceae (Plantain family)			
		Collinsia sp.	Blue eyed Mary	Native
		Plantago elongata	Prairie plantain	Native
		Plantago erecta	Dotseed plantain	Native
	Polemoniaceae (Phlox family)			
		Gilia clivorum	Purplespot gilia	Native
		Gilia tricolor	Bird's-eye gilia	Native

major_clade	Family	Scientific name	Common name	nativity
		Leptosiphon ambiguus	Serpentine leptosiphon	Native
		Leptosiphon bicolor	True babystars	Native
		Navarretia sp.[1]	Pincushionplant	Native
	Polygonaceae (Buckwheat family)			
		Chorizanthe membranacea	Pink spineflower	Native
		Eriogonum viridescens	Twotooth buckwheat	Native
		Eriogonum vestitum	Idria buckwheat	Native
		Rumex sp.	Dock	
	Primulaceae (Primrose family)			
		Dodecatheon clevelandii ssp. *patulum*		Native
	Ranunculaceae (Buttercup family)			
		Delphinium sp.	Larkspur	Native
		Delphinium gypsophilum	Pinoche Creek larkspur	Native
		Ranunculus aquatilis	White water crowfoot	Native
	Saxifragaceae (Saxifrage family)			
		Micranthes californica	California saxifrage	Native
	Valerianaceae (Valerian family)			
		Plectritis ciliosa	Longspur seablush	Native
Monocots				
	Alliaceae (Onion family)			
		Allium sp.	Onion	Native
		Allium howellii var. howellii	Howell's onion	Native
	Poaceae (Grass family)			
		Avena barbata	Lopsided oat	Naturalized
		Avena fatua	Wild oat	Naturalized

major_clade	Family	Scientific name	Common name	nativity
		Bromus carinatus var *carinatus*	California brome	Native
		Bromus diandrus	Ripgut brome	Naturalized
		Bromus hordeaceus	Soft brome	Naturalized
		Bromus madritensis	Compact brome	Naturalized
		Bromus racemosus	Bald brome	Naturalized
		Bromus sterilis	Poverty brome	Naturalized
		Festuca bromoides	Brome fescue	Naturalized
		Festuca microstachys	Pacific fescue	Native
		Festuca myuros		Naturalized
		Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	Naturalized
		Hordeum murinum	Mouse barley	Naturalized
		Lamarckia aurea	Goldentop grass	Naturalized
		Poa annua	Annual bluegrass	Naturalized
		Poa secunda	Sandberg bluegrass	Native
		Triticum aestivum	Common wheat	Naturalized
	Themidaceae (Brodiaea family)			
		Brodiaea terrestris ssp. *kernensis*		Native
		Dichelostemma capitatum	Bluedicks	Native
		Muilla maritima	Sea muilla	Native

1 The identification of the *Navarretia* sp. found in the survey area was determined to be *N. mitracarpa* based on flowers but *N. pubescens* based on bract characteristics. Upon further inquiry, Leigh Johnson, author of the Navarretia account in The Jepson Manual (Johnson 2013), confirmed that work is ongoing describing a new taxon (Johnson, pers. comm).

Participating Botanists:

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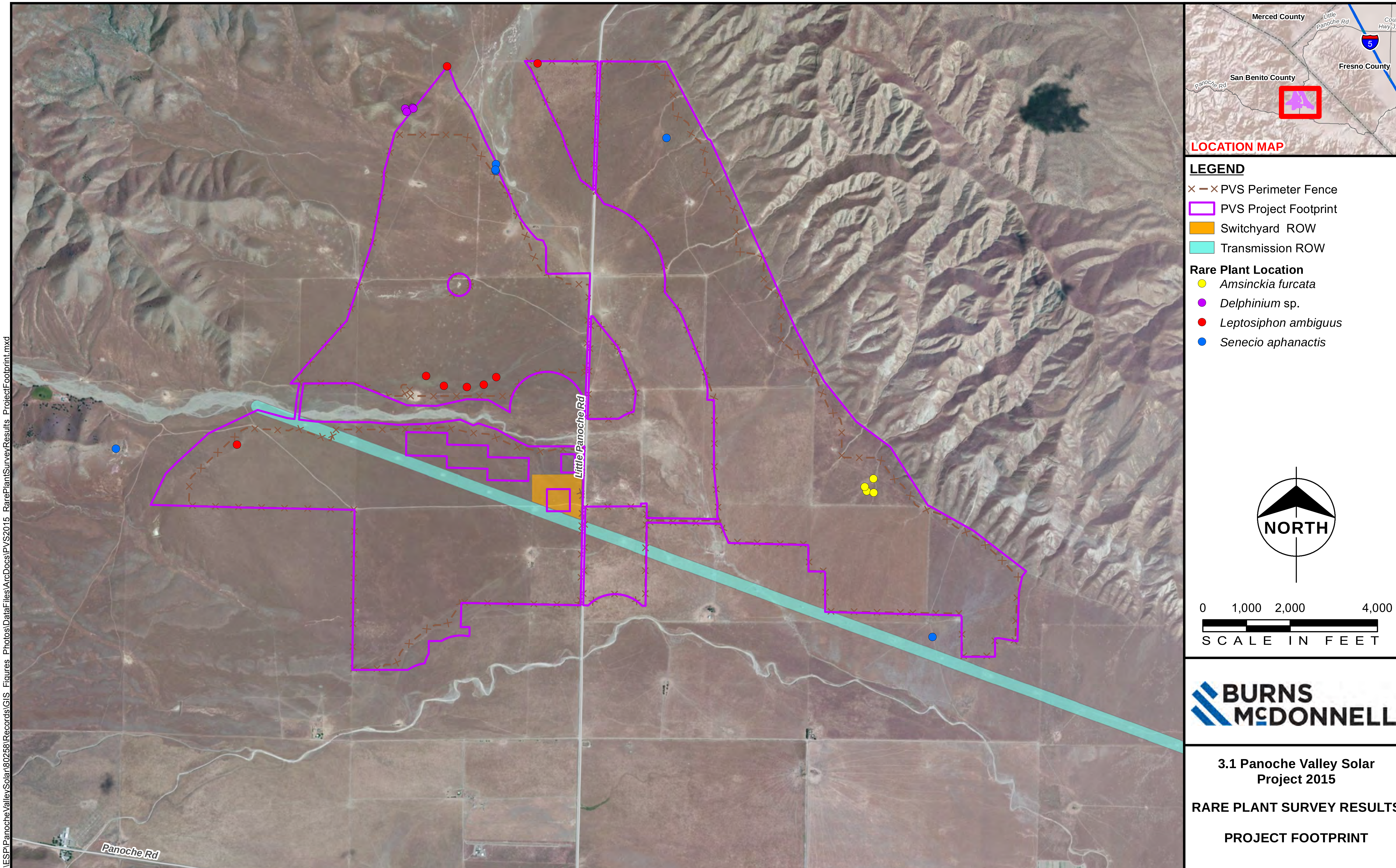
Figures



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3.2 Panoche Valley Solar Project 2015

RARE PLANT SURVEY RESULTS

TELECOMMUNICATIONS ROUTE

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McCORMICK BIOLOGICAL INC.

Energy Renewal PARTNERS, LLC

Panoche Valley Solar

Blunt-nosed Leopard Lizard Survey Report

Panoche Valley Solar Project
San Benito County, California
August 2015

Blunt-nosed Leopard Lizard Survey Report
Panoche Valley Solar Project

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Table of Contents

1.0 Project Overview **1**

2.0 Background **2**

3.0 Survey Methodology **6**

3.1 BNLL Abbreviated Surveys (2009 and 2010) 6

3.2 BNLL Focused Surveys (2012) 7

3.3 BNLL Protocol Surveys (2013) 7

3.4 BNLL Abbreviated Survey (2014) 8

3.5 BNLL Abbreviated Survey (2015) 9

4.0 Analysis and Results **11**

5.0 Summary **12**

6.0 References **13**

FIGURES

Figure 1: Project Area Overview
Figure 2: Blunt-nosed Leopard Lizard (BNLL) Abridged Protocol Survey
Figure 3: Rare Plant I Survey
Figure 4: Distance Sampling
Figure 5: Blunt-nosed Leopard Lizard Protocol Survey
Figure 6: Occupancy Sampling
Figure 7: Reconnaissance Surveys on the Silver Creek Ranch
Figure 8: Blunt-nosed Leopard Lizard Focused Survey
Figure 9: Blunt-nosed Leopard Lizard Protocol Survey
Figure 10: Giant Kangaroo Rat Focused Surveys
Figure 11: Modified Blunt-nosed Leopard Lizard Protocol Survey
Figure 12: Modified Blunt-nosed Leopard Lizard Protocol Survey
Figure 13: BNLL Observations 2009
Figure 14: BNLL Observations 2010
Figure 15: BNLL Observations 2013
Figure 16: BNLL Observations 2014

TABLES

Table 1: Surveys Conducted For the Project During Either Appropriate Survey Period For BNLL or Conditions During Which BNLL Could Be Incidentally Observed
Table 2: BNLL Observed During Protocol Conditions
Table 3: Incidental BNLL Observations
Table 4: Daily Reptile Observations Recorded During 2015 Protocol-Level, BNLL Surveys Conducted for the Panoche Valley Solar Project

APPENDICES

Appendix A: Photo log

1.0 Project Overview

This report documents the survey results for focused blunt-nosed leopard lizard (*Gambelia sila*; BNLL) studies conducted for the Panoche Valley Solar Project (the Project). Panoche Valley Solar LLC (PVS, the Applicant) is proposing to construct and operate a 247-megawatt (MW) solar photovoltaic energy generating facility in San Benito County, California (Figure 1).

The Project is located approximately three-quarters of a mile north of the intersection of Panoche Road and Little Panoche Road, in eastern San Benito County. The Project Footprint is located approximately two miles southwest of the Fresno County Line and the Panoche Hills, and approximately 15 miles west of Interstate 5 and the San Joaquin Valley (Figure 1). The Project Footprint is comprised of approximately 2,506 acres of heavily grazed land in the Panoche Valley along with 24,176 acres of Conservation Lands. The 2,514 acre Valley Floor Conservation Lands (VFCL) are contiguous with the Project Footprint, and are made up of primarily non-native annual grassland habitat, with some seasonal ponds and vernal and ephemeral pools, as well as segments of the seasonally dry Panoche and Las Aguilas Creeks. The 10,889 acre Silver Creek Ranch Conservation Lands (SCRCL) are located adjacent south and east of the VFCL and the 10,773 acre Valadeao Ranch Conservation Land (VRCL) is located adjacent northwest, north, and east of the Project Footprint.

The BNLL surveys described in this report were conducted on the Project Footprint and on portions of the Conservation Lands at various times and intervals between 2009 and 2015. Several surveys have been completed targeting BNLL detection on the Project Footprint. Additional surveys targeting other species that were conducted under conditions suitable for BNLL observation and/or during which BNLL were incidentally detected have also been completed. Efforts included both full protocol surveys and abbreviated surveys conducted under protocol conditions. This report provides a summary of each of the survey efforts, survey methods, and results. As currently designed, BNLL have not been observed on the Project Footprint during any of the survey events.

2.0 Background

The BNLL is currently listed as endangered by the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.) and the California Endangered Species Act (Fish and Game Code §§ 2050 et seq). It is also a Fully Protected species under California Fish and Wildlife Code Section 5050. No critical habitat has been designated for the BNLL. The BNLL is included in the Recovery Plan for Upland Species of the San Joaquin Valley, California (USFWS 1998). This lizard is found in Merced, Madera, Fresno, San Benito, Kings, Tulare, Kern, San Luis Obispo, Santa Barbara, and Ventura counties of the San Joaquin Valley and valleys of the coastal mountain ranges (CDPR 1997 and USFWS 2010).

This *Iguanidae* species is a relatively large lizard with a long tail, powerful hind limbs, and a short, blunt snout. The underside of this lizard is uniformly white with a variation in colors and patterns on the back. Males are typically larger in size and weight than females. Adult BNLL are between 3.4 to 4.7 inches in length (snout to vent) with a typical weight between 0.8 and 1.5 ounces. BNLL mainly utilize occupied or abandoned rodent burrows (often *Otospermophilus beecheyi* and *Dipodomys* spp.) for shelter from predators and inclement weather. However the BNLL will construct shallow tunnels in earth berms or under rocks in areas of low mammal burrow density. The BNLL typically prefers to inhabit open, sparsely vegetated areas such as non-native grasslands, valley saltbush scrub and valley sink-scrub communities with low relief. Valley needlegrass grasslands and alkali playas also provide suitable habitat for BNLL (CDPR 1997 and USFWS 2010). BNLL are mainly insectivorous, eating a variety of grasshoppers, cicadas, crickets, and moths. However, they seem to feed opportunistically on animals, eating whatever is available in the size range they can overcome and swallow such as the common side-blotched lizard (*Uta stansburiana*) (USFWS 2010).

The following surveys have been conducted on the Project Footprint targeting detection of BNLL or targeting other species that have included incidental observations of BNLL. The areas covered by each survey are illustrated in Figures 2 - 12.

TABLE 1: SURVEYS CONDUCTED FOR THE PROJECT DURING EITHER APPROPRIATE SURVEY PERIOD FOR BNLL OR CONDITIONS DURING WHICH BNLL COULD BE INCIDENTALLY OBSERVED

SURVEY TARGET	SURVEY DESCRIPTION	DATES	LANDS SURVEYED
BNLL	Abbreviated BNLL surveys conducted under CDFG (2004) protocol time and weather conditions on portions of 2,560+ acres: 3.5 transect iterations on Section 15 (640 acres); 8 transect iterations on Section 10 during Adult BNLL survey period; 5 transect iterations on Sections 10 and 15 during hatchling BNLL survey period; BNLL surveys on part of Section 9.	April 15, 2009 – July 31, 2009; and August 15, 2009 – September 15, 2009	Project Footprint and VFCL (see Figure 2)
Rare Plant I (Late Summer/Early Fall)	Protocol-level rare plant surveys on all or portions of Sections 3-5, 7-11, 13-17 of Township 15 South, Range10 East and Sections 18 and 19 of Township 15 South, Range 11 East; 6,200 acres of the original 10,000-acre Project Footprint	August17-19, 24-26, 2009; September 14-18, 21-25, 2009; and September 30-October 2, 2009	Project Footprint and VFCL (see Figure 3)
Multiple Species	Distance Sampling: Surveying for burrows and special status species along transects spaced at 350 meters on the Project Footprint, VFCL and VRCL	February 18, 2010 - March 18, 2010	Project Footprint, VFCL, and VRCL (See Figure 4)
BNLL	Surveys following CDFG (2004) protocol on Section 16 (640 acres).	April 15, 2010 – July 31, 2010; and August 15, 2010 – September 15, 2010	Project Footprint and VFCL (see Figure 5)

Survey Target	Survey Description	Dates	Lands Surveyed
Multiple Species	Occupancy Sampling: Surveying for special status species within 5-acre plots over 5 survey periods (50 meter radius plots for GKR)	May 10, 2010 - July 27, 2010	Project Footprint and VFCL (see Figure 6)
Multiple Species	Reconnaissance surveys on the Silver Creek Ranch: Meandering transects to detect special status species, suitable habitat for these species, and spotlight surveys for SJKF	August 30, 2010 - September 3, 2010	SCRCL (See Figure 7)
BNLL	Focused BNLL surveys within drainages on the 10,889-acre SCRCL; following time of day and weather parameters in CDFG (2004).	September 10, 2012– September 17, 2012	SCRCL (See Figure 8)
BNLL	Surveys following CDFG (2004) protocol for detection of BNLL; on entire Project Footprint and portions of the VFCL	May 9, 2013 - July 13, 2013; and August 2, 2013 - September 10, 2013	Project Footprint, portions of VFCL (See Figure 9)
Giant Kangaroo Rat	GKR focused surveys (100 50-meter radius plots) on the SCRCL in source population polygons identified in Figure 41 of the Recovery Plan (USFWS 1998).	September 10, 2010 – September 21, 2012	SCRCL (See Figure 10)
BNLL	Approximately 550 acres on Project Footprint and 220 acres on the VFCL* were surveyed; 5 iterations during BNLL adult period and 5 iterations during hatchling period. Surveys were conducted under weather and time of day conditions, and dates prescribed by CDFG (2004)	May 21, 2014 - May 29, 2014; and August 4, 2014- August 10, 2014	Project Footprint and VFCL (see Figure 11)

SURVEY TARGET	SURVEY DESCRIPTION	DATES	LANDS SURVEYED
Early Season Rare Plants	Entire Project Footprint plus 100-foot buffer was surveyed (2,608 acres)	March 3, 2015 – March 13, 2015	Project Footprint (plus approximately 50 acres in VRCL and VFCL)
BNLL	Approximately 640 acres on Project Footprint* and 82 acres on the VFCL were surveyed; 5 iterations during BNLL adult period and 4 iterations during hatchling period. Surveys were conducted under weather and time of day conditions, and dates prescribed by CDFG (2004)	May 25 and June 29, 2015; and hatchling surveys are in progress	Project Footprint and VFCL (See Figure 12)

*Proposed focused survey areas were discussed with and submitted to CDFW prior to beginning surveys

3.0 Survey Methodology

3.1 BNLL Abbreviated Surveys (2009 and 2010)

The BNLL abbreviated surveys in 2009 and 2010 included the Project Footprint and portions of the VFCL for both adult and hatchling BNLL. The surveys were conducted by Live Oak Associates (LOA) utilizing Level I and Level II surveyors.

The adult BNLL surveys conducted in 2009 were completed between June 10, 2009 and July 15, 2009. The 2009 hatchling/sub-adult BNLL surveys were completed between August 3, 2009 and September 1, 2009. Both adult and hatchling surveys were conducted consistently with weather and time conditions prescribed in CDFW *Approved Survey Methodology for the Blunt-nosed Leopard Lizard* (CDFW 2004) protocols. The surveys conducted in 2009 consisted of sampling portions of the Project Footprint and VFCL areas that were judged to have high potential for BNLL including:

- 3.5 transects of adult-BNLL surveys completed on Section 15 between June 10, 2009 and July 15, 2009
- 8 transects of adult-BNLL surveys completed on Section 10 between June 10, 2009 and July 15, 2009
- 5 transects of hatchling/sub-adult-BNLL surveys completed on Sections 10 and 15 between August 3, 2009 and September 1, 2009

No BNLL were observed in Section 10 at any time during the 2009 surveys. The areas surveyed in 2009 are illustrated on Figure 2

In late April of 2010, the Applicant initiated both abbreviated- adult season BNLL surveys following weather and time of day protocols per CDFG (2004) on Section 16 (covering portions of both the Project Footprint and the VFCL) (Figure 5) and dynamic occupancy sampling within 135 sample locations (each point was buffered by five acres or two hectares) spread over the entire Project Footprint and VFCL (Figure 4). Occupancy sampling followed weather and time of day protocols per CDFG (2004) to target detection of BNLL in addition to other species. Both types of surveys were repeated five times between April and July 15, 2010.

Two adults were detected in Section 10, within the 100-year floodplain of Las Aquilas Creek, during the occupancy sampling conducted in 2010. The adult BNLL found in Section 15 were in association with Panoche and Las Aquilas Creeks. Hatchling BNLL were found along washes and farther into the upland habitat. Adult BNLL were observed in and near Panoche Creek in Sections 10, 14, 15, and 16 (Figure 14 during 2010 surveys.

One hundred and five observations of BNLL were recorded during the 2009 and 2010 surveys (Figures 13 and 14). The data included adult and hatchling/sub-adult observations within protocol parameters, as well as miscellaneous and out of survey protocol observations.

3.2 BNLL Focused Surveys (2012)

Surveys intended to document BNLL presence on SCRCL were conducted from September 10, 2012 through September 17, 2012. Surveys were conducted by LOA utilizing teams of three Level I and Level II surveyors. Each team surveyed drainages, with one biologist walking in the drainage and two biologists on either side. Focused BNLL surveys were conducted according to specifications within the BNLL survey protocol except that drainages were targeted and surveys were conducted on September 17, 2012 (two days past the protocol dates). However, the lead biologist for the survey determined that the weather was still warm enough to continue with surveys, as evidenced by incidental BNLL sightings through September 21, 2012. During BNLL focused surveys, hatchling BNLL were observed within drainages, on hill slopes, and even on top of rocks on top of ridges. In addition, BNLL were incidentally observed during GKR focused surveys from September 11, 2012 through September 21, 2012. Thirty-one BNLL were observed during focused surveys for BNLL and there were 30 incidental BNLL detections during GKR focused surveys. A total of 61 BNLL detections occurred in a two-week period. All BNLL observed were hatchlings except for two subadults. No BNLL were observed within the Project Footprint at any time during the 2012 surveys.

3.3 BNLL Protocol Surveys (2013)

The adult season BNLL survey was conducted on the Project Footprint and portions of the VFCL (Figure 9). Survey methodology was based on the CDFW Approved Survey Methodology for the Blunt-nosed Leopard Lizard (CDFG 2004), the letter "Updated Blunt-nosed Leopard Lizard (BNLL) Survey Methodology" dated May 2, 2013 to CDFW, verbal conversations with Dave Hacker of CDFW and Patrick Golden of Energy Renewal on June 26, 2013, and email correspondence between CDFW and Duke Energy on June 27, 2013. Surveys were conducted by Energy Renewal Partners and McCormick Biological, Inc. utilizing Level I and Level II surveyors.

Adult BNLL season surveys on the Project Footprint and portions of the VFCL were conducted between May 9, 2013 and July 13, 2013, which is within the approved survey window of April 15 to July 15. The adult BNLL surveys were accomplished by completing 12 iterations of preset 30 meter transects within the Project Footprint and portions of the VFCL. The adult BNLL surveys consisted of 58 days of fieldwork. Iterations of the survey were tracked by transect completions.

Hatchling season surveys on the Project Footprint and portions of the VFCL were conducted August 2, 2013 through September 10, 2013, which is within the approved survey window of August 1 to September 15. The hatchling BNLL surveys were accomplished by completing five iterations of preset parallel transects spaced 30 meters apart within the Project Footprint and portions of the VFCL. The hatchling BNLL surveys consisted of 35 days of field work.

Surveys were conducted within the protocol's temperature window of 77.0 degrees Fahrenheit (°F) to 95°F or 25° to 35° Celsius, with the exception of four occasions during the entire survey (from July 4, 2013 to July 7, 2013). During these four days, the standard temperature protocol was exceeded, after verbal discussions with CDFW on June 26, 2013 (followed with email correspondence), to allow surveys to continue to 97°F as long as a reference BNLL was located by a Level II surveyor and observed between 95°F and 97°F. Survey activities that took place during exceeded temperatures were limited to short time periods (generally less than one hour) on each of the four days. Surveys were not conducted when weather conditions onsite were outside of other protocol limits (i.e. 90% cloud cover, sustained >10 miles-per-hour). Field data associated with potential prey items for BNLL were not recorded during 2013 surveys; however, invertebrates, such as grasshoppers, were observed to be present within all areas surveyed.

The BNLL survey crews consisted of no more than three Level I field surveyors for every Level II field surveyor. This requirement reduced the potential for incorrect or missed identifications. Level I field surveyors demonstrated the ability to distinguish BNLL from other common lizard species that may occur on the Project Footprint. Level II field surveyors demonstrated the ability to distinguish BNLL from other common lizard species that may occur on the Project Footprint and had participated previously in at least 50 survey days for BNLL with a minimum of one confirmed identification in the field.

Survey crews consisted of between five to 30 surveyors per day with an average of 15 throughout the adult survey season, and an average of approximately 14 surveyors per day throughout the hatchling survey season. As per the protocol, the surveyors walked preset parallel transects at a width of approximately 30 meters. The final (12th) iteration was completed on July 13, 2013 for the adult BNLL survey and the final (5th) iteration was completed on September 10, 2013 for the hatchling survey, resulting in 100% coverage of the Project Footprint and a significant portion of the VFCL for the 2013 survey season.

All BNLL observations were recorded using handheld global positioning system (GPS) devices and observations were categorized by sex (male or female, if characteristic features observed) and age class. Hatchlings consisted of the young of the year. An attempt was not made to differentiate between hatchlings and juveniles. All other BNLL were classified as adults. Additional information such as temperature, wind speed, and surrounding habitat descriptions were noted, if available. A total of 40 BNLL observations were made during the 2013 Protocol BNLL Survey (Figure 15). No BNLL were observed on the Project Footprint at any time during the 2013 surveys.

3.4 BNLL Abbreviated Survey (2014)

The BNLL abbreviated survey in 2014 was completed within the central portion of the Project Footprint and included portions of the VFCL (Figure 11). Surveys were completed by Energy Renewal Partners and McCormick Biological, Inc. The total acreage covered during the 2014 abbreviated BNLL survey was approximately 550 acres on the Project Footprint and 220 acres on the VFCL. Survey methodology generally followed the CDFW *Approved Survey Methodology for the Blunt-nosed Leopard Lizard* (CDFW 2004) with the exception of the number of iterations of transects completed.

Abbreviated adult BNLL surveys were conducted between May 21, 2014 and May 29, 2014, which is within the CDFW approved survey window of April 15 to July 15. The 2014 abbreviated adult BNLL surveys were accomplished by completing five iterations of set 30 meter transects within the survey area. The adult BNLL surveys consisted of seven days of fieldwork.

Abbreviated hatchling season BNLL surveys were conducted between August 4, 2014 and August 10, 2014, which is within the CDFW approved survey window of August 1 to September 15. The 2014 abbreviated hatchling BNLL surveys were accomplished by completing 5 iterations of the set 30-meter transects (shifted by 15 meters on the second and fourth iterations). The abbreviated hatchling BNLL surveys consisted of seven days of fieldwork using all Level II surveyors.

During the adult and hatchling surveys, the surveys were not conducted when weather conditions onsite were out of protocol limits (i.e. >90% cloud cover, sustained >10 miles-per-hour). Surveys were also conducted within the protocol's temperature window of between 77°F to 95°F or 25° to 35° Celsius. In addition, surveys began after sunrise, as soon as the minimum air temperature criterion was met, and ended by 1400 hours or when the maximum temperature was reached, whichever occurred first. Field data associated with potential prey items for BNLL were not recorded during 2014 surveys; however, invertebrates, such as grasshoppers, were observed to be present within the survey area.

Survey crews consisted of eight to nine surveyors per day throughout the survey period. As per the protocol, the surveyors walked preset parallel transects at a width of approximately 30 meters. The abbreviated surveys resulted in 100% coverage of each survey polygon.

All BNLL observations were recorded using handheld GPS devices and observations were categorized by sex (male or female) and age class (adult, juvenile, or hatchling) if possible. Start and end temperature, wind speed, and other wildlife observations were noted. For reptile species identified, the number of individuals observed was recorded.

No BNLL were found within the survey area during the 2014 abbreviated survey. However, there were a total of seven reference observations of BNLL, including two in the VFCL (Figure 16) and five in the SCRCL to the east of the Project Footprint during the abbreviated surveys. These reference observations were made subsequent to the daily surveys to verify the activity of BNLL in the Panoche region.

3.5 BNLL Abbreviated Survey (2015)

The BNLL Abbreviated survey in 2015 was completed within the specified portions of the Project Footprint (see Figure 12). Surveys were completed by McCormick Biological, Inc. The total acreage covered during the 2015 abbreviated BNLL survey was approximately 640 acres on the Project Footprint, 82 acres on the VFCL (Telecom sites), and 144 acres at four additional survey areas (Telecom sites). Survey methodology generally followed the CDFW *Approved Survey Methodology for the Blunt-nosed Leopard Lizard* (CDFW 2004) with the exception of the number of iterations of transects completed.

Abbreviated adult BNLL surveys were conducted between May 25, 2015 and June 29, 2015, which is within the CDFW approved survey window of April 15 to July 15. The 2015 abbreviated adult BNLL surveys were accomplished by completing five iterations of set 30 meter transects within the survey area. The adult BNLL surveys consisted of 23 days of fieldwork.

During the adult surveys, the surveys were not conducted when weather conditions onsite were out of protocol limits (i.e. >90% cloud cover, sustained >10 miles-per-hour). Surveys were also conducted within the protocol's temperature window of between 77°F to 95°F or 25° to 35° Celsius. In addition, surveys began after sunrise, as soon as the minimum air temperature criterion was met, and ended by 1400 hours or when the maximum temperature was reached, whichever occurred first.

Survey crews consisted of between two and six surveyors per day throughout the survey period. As per the protocol, the surveyors walked preset parallel transects at a width of approximately 30 meters. The abbreviated surveys resulted in 100% coverage of the each survey polygon.

All BNLL observations were recorded using handheld GPS devices and observations were categorized by sex (male or female) and age class (adult, juvenile, or hatchling) if possible. Start and end temperature, wind speed, and other wildlife observations were noted. For reptile species identified, the number of individuals observed was recorded. In addition, the relative number of invertebrate species observed that represented potential prey items for BNLL were recorded on surveys conducted between June 15 and June 29, 2015, based on a suggestion received from CDFW staff. In general, invertebrates, such as grasshoppers, were the prevalent prey item observed within the survey area. Relative abundance of prey items observed on each transect was classified as none, low (1-9), medium (10-99) or high (100+). Transects were variable in length; therefore, quantitative comparisons cannot be made. Transects generally fell within the low and medium categories, with very few transects classified as high relative abundance. See Table 4 for results recorded during the 2015 surveys.

Abbreviated hatchling season BNLL surveys are in the process of being conducted within the CDFW approved survey window of August 1 to September 15. The 2015 abbreviated hatchling BNLL surveys will be accomplished by completing four iterations of the set 30-meter transects (shifted by 15 meters on the second and fourth iterations). The abbreviated hatchling BNLL surveys will be completed by Level II surveyors.

No BNLL were found within the survey areas during the 2015 abbreviated surveys conducted to date. However, there were a total of seven reference observations of BNLL recorded on SCRCL to the east of the Project Footprint during the abbreviated surveys. These reference observations were made subsequent to the daily surveys to verify the activity of BNLL in the Panoche region.

4.0 Analysis and Results

Based on current design and engineering, no BNLL have been observed within the Project Footprint. There have been a total of 206 observations of BNLL in the Conservation Lands with a majority of the observations associated with the wash and floodplain habitats along Panoche Creek and Las Aguilas Creek and SCRCL.

The 2013 BNLL survey was conducted on the Project Footprint and portions of the VFCL and followed the CDFW *Approved Survey Methodology for the Blunt-nosed Leopard Lizard* (CDFG 2004). Additional surveys completed between 2009 and 2015 were focused on areas of most likely occurrence on the Project Footprint with some additional site visits on the adjacent Conservation Lands. These surveys were conducted in general accordance with temperature and seasonal parameters but did not follow the full CDFW approved survey methodology.

5.0 Summary

Various surveys conducted under suitable conditions for observation of BNLL have been undertaken on the Project Footprint and on portions of the Conservation Lands between 2009 and 2015. The observations recorded during these surveys provide strong evidence that the current distribution of BNLL does not include the Project Footprint. A total of 206 observations have been made over six years since 2009 when the PVS project was first proposed and the permitting process initiated. During the surveys for BNLL and other surveys on the Project Footprint, BNLL have not been observed within the Project Footprint. Based on the recorded observations of this species, the current Project Footprint does not propose disturbance within approximately 850 feet of any BNLL observation.

6.0 References

California Department of Fish and Game [CDFG]. 2004. Approved Survey Methodology for the Blunt-nosed Leopard Lizard. May 2004

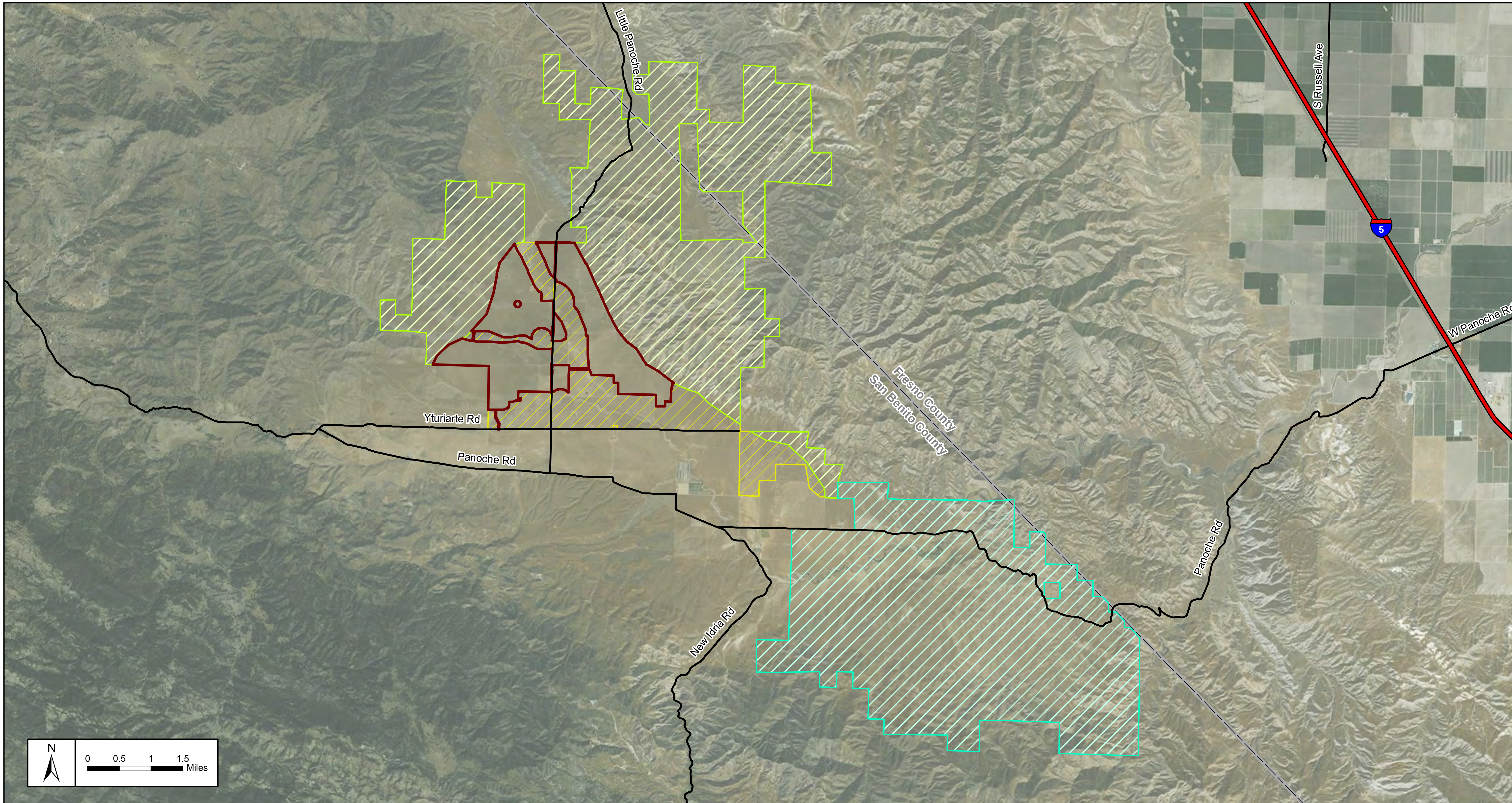
California Department of Pesticide Regulation [CDPR]. 1997. Blunt-Nosed Leopard Lizard Fact Sheet. Accessed online October 2013. www.cdpr.ca.gov/docs/endspec/espdfs/bnll1.pdf.

Live Oak Associates, Inc. [LOA]. 2010. Results of 2010 Adult and Juvenile BNLL Surveys Conducted on Section 16 of Township 15S, Range 10E for Solargen Energy's Panoche Valley Solar Farm. September 22, 2010.

U.S. Fish and Wildlife Service [USFWS]. 2010. Blunt-nosed leopard lizard (Gambelia sila) 5-year review, summary and evaluation. USFWS, Sacramento Fish and Wildlife Office, Sacramento, CA. Feb 2010. 79 pp.

U.S. Fish and Wildlife Service [USFWS]. 1998. Recovery Plan for Upland Species of the San Joaquin Valley, California.

FIGURES



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Legend

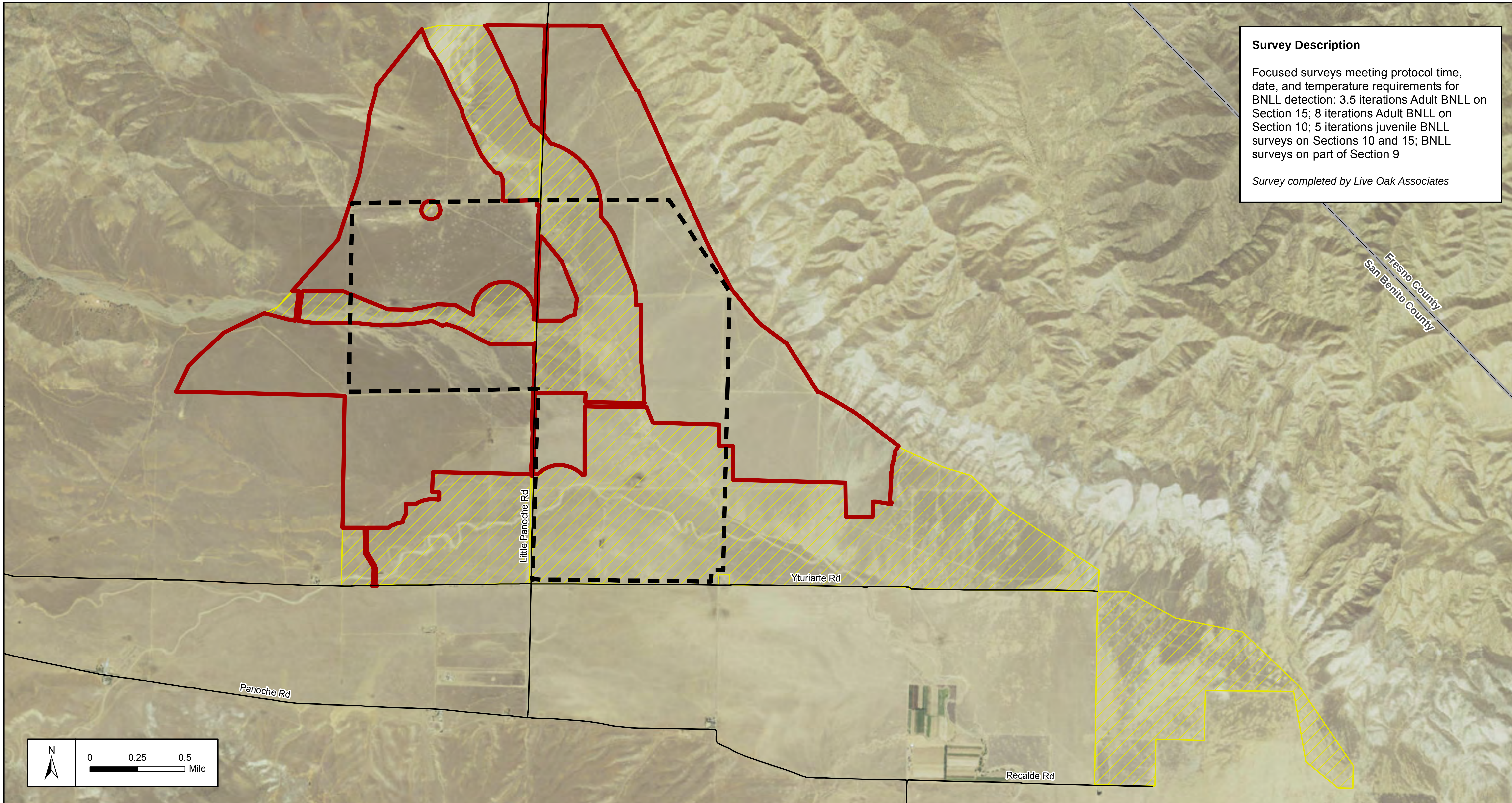
- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands

Panoche Valley Solar Project

Project Area Overview

FIGURE 1

JH 2015-08-11



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Legend

- Survey Area
- Project Footprint
- Valley Floor Conservation Lands

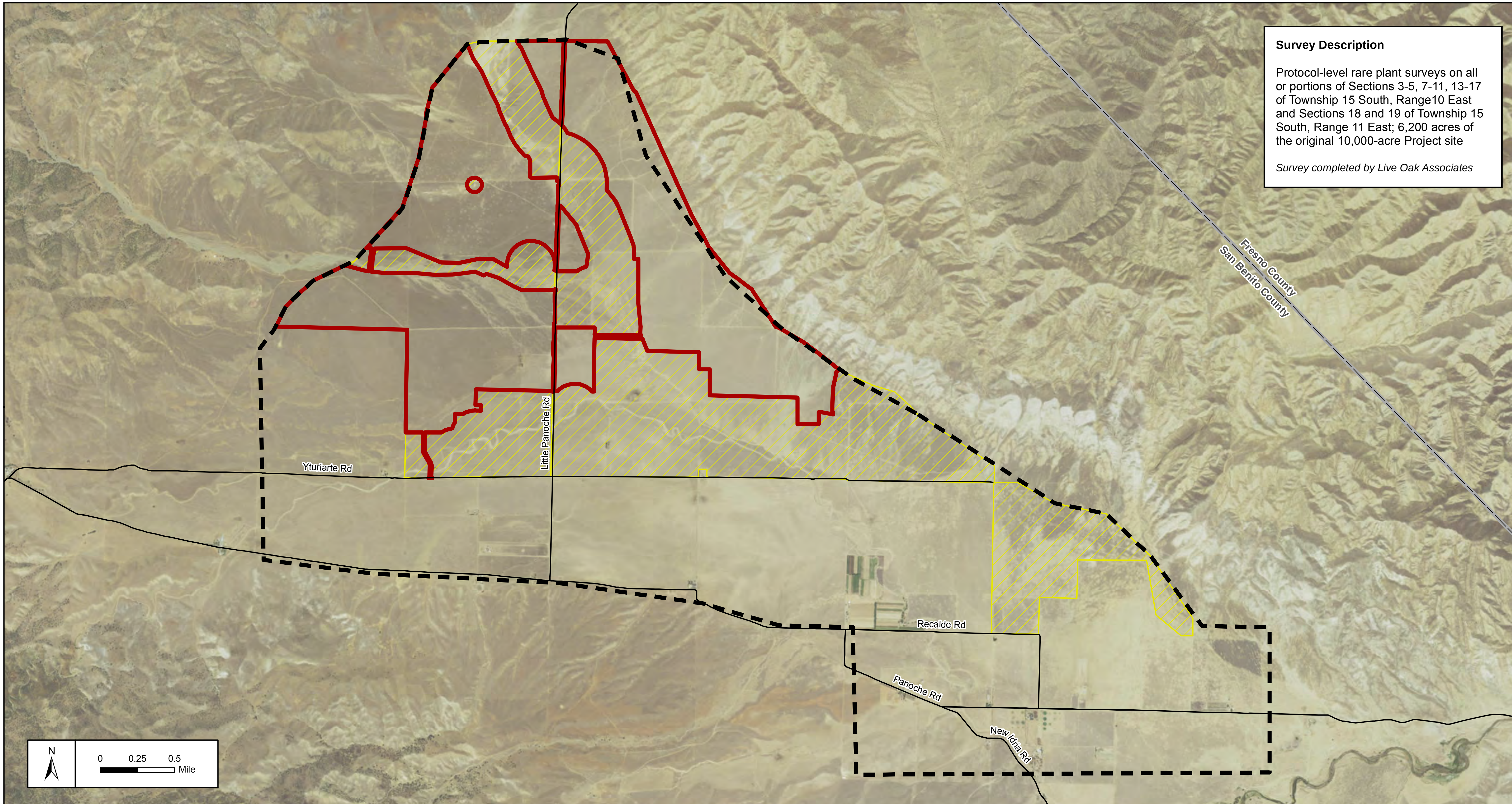
Panoche Valley Solar Project

Blunt-nosed Leopard Lizard (BNLL) Abridged Protocol Survey

April 15 - July 31 and August 15 - September 15, 2009

FIGURE 2

JH 2015-08-11



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Legend

- Survey Area *(historic project boundary)*
- Project Footprint
- Valley Floor Conservation Lands

Panoche Valley Solar Project

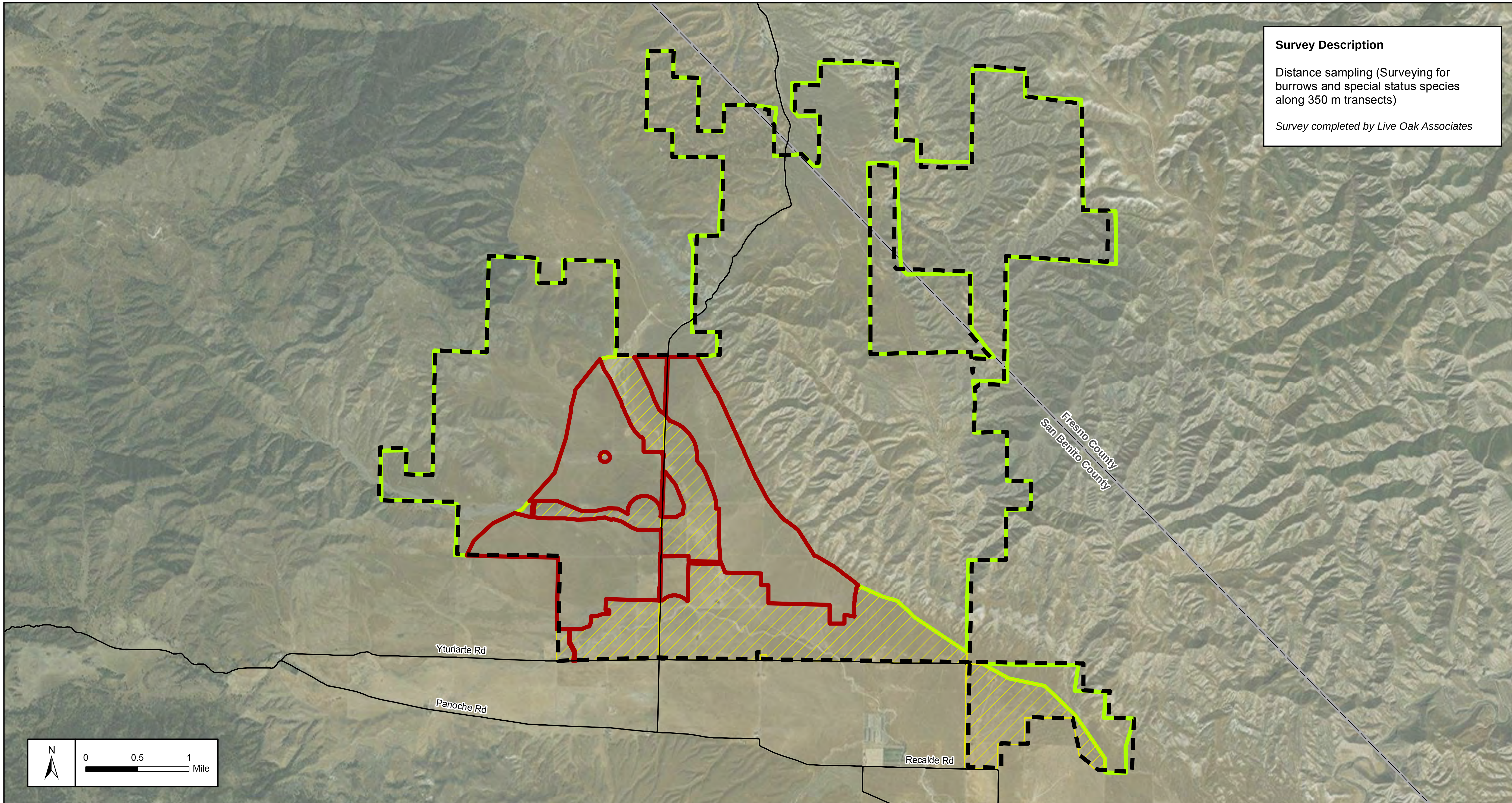
Rare Plant I Survey

August 17-19, 24-26; September 14-18, 21-25; and September 30 - October 2, 2009

FIGURE

3

JH 2015-08-11



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Legend

- Survey Area (*historic project and conservation lands boundaries)*
- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands

Panoche Valley Solar Project

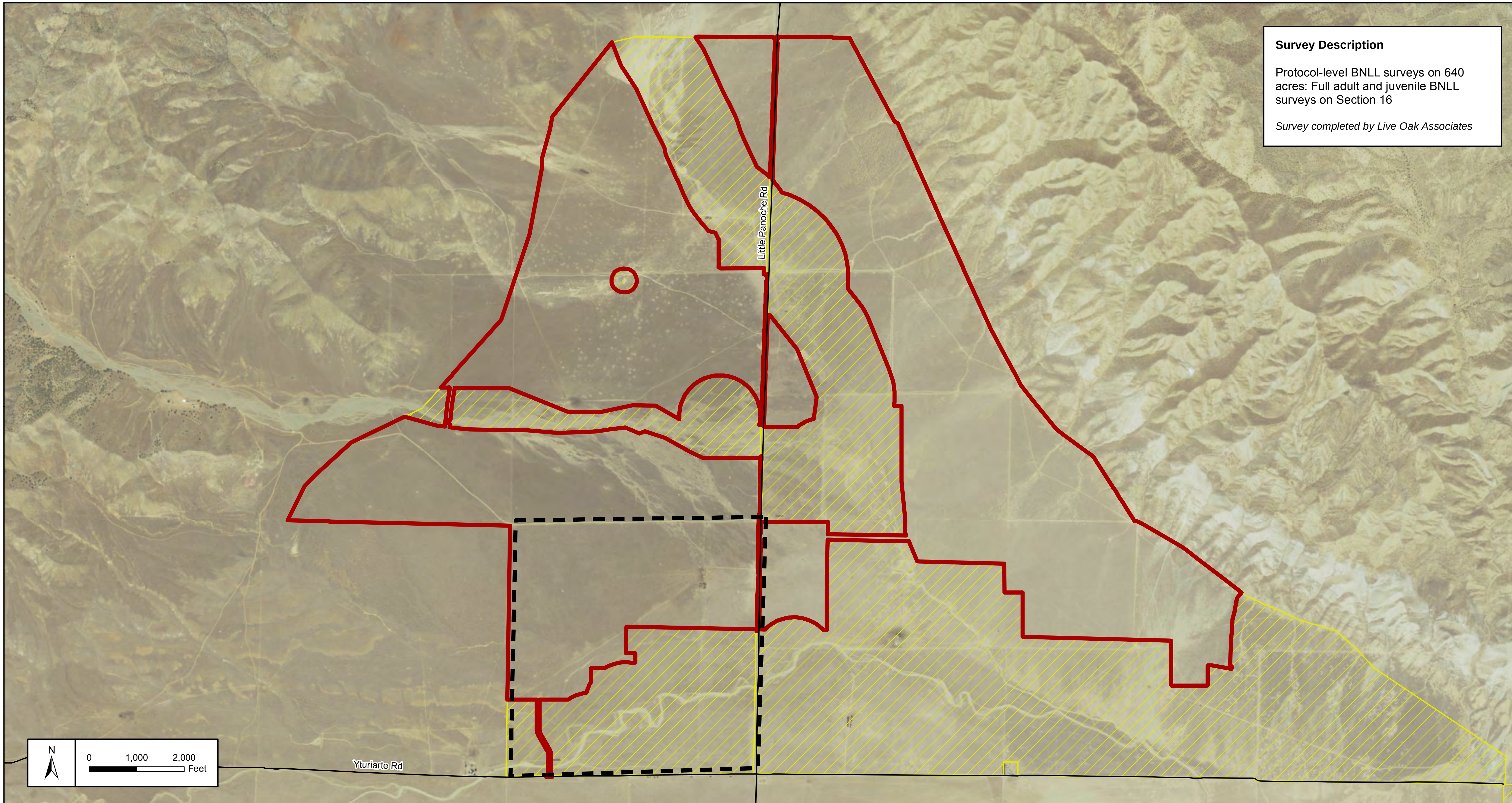
Distance Sampling

February 18 - March 18, 2010

FIGURE

4

JH 2015-08-11



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Legend

Survey Area
Project Footprint
Valley Floor Conservation Lands

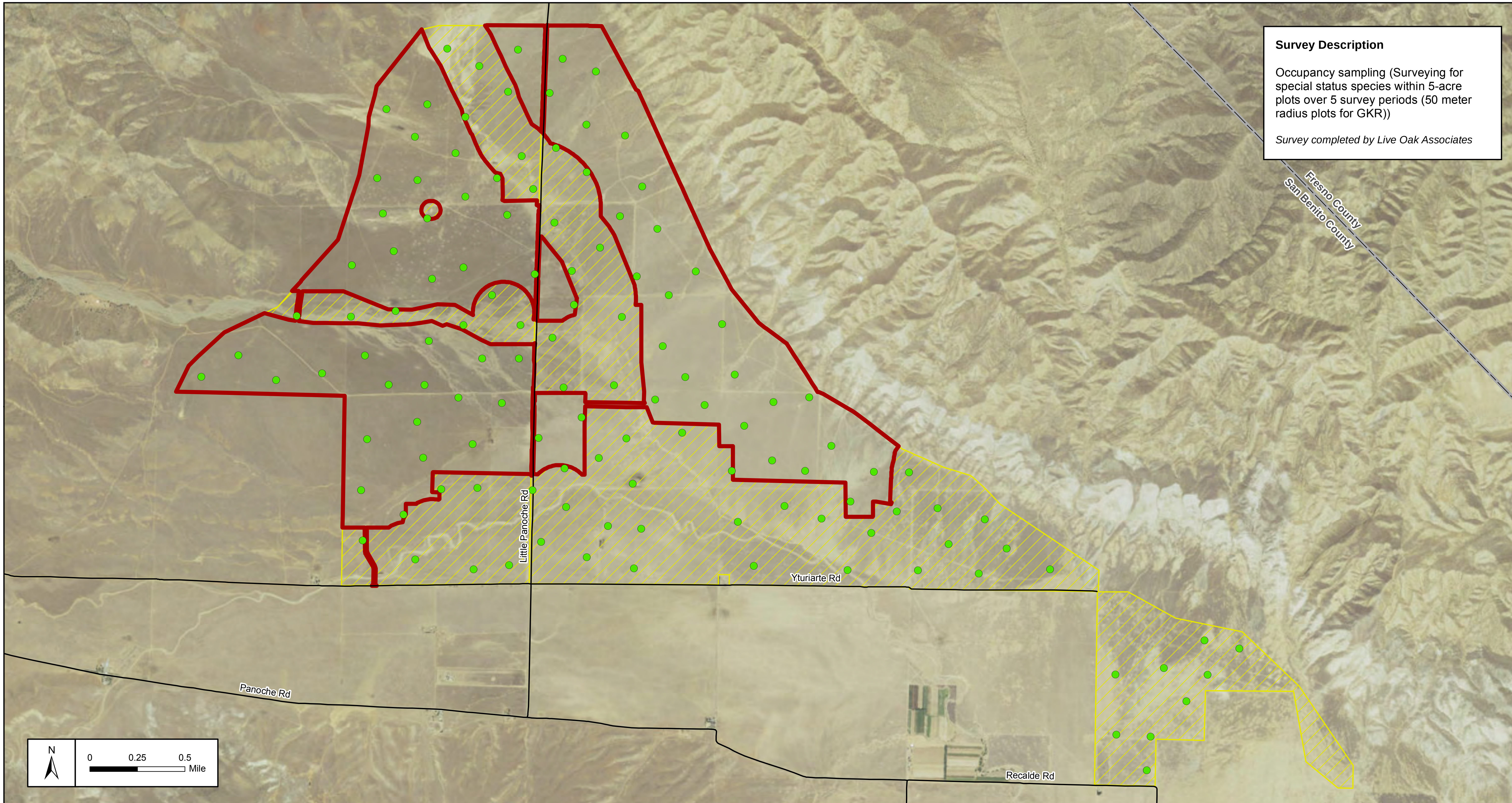
Panoche Valley Solar Project

Blunt-nosed Leopard Lizard
Protocol Survey

April 15 - July 31 and August 15 - September 15, 2010

FIGURE
5

JH 2015-08-11



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Legend

Plot Location | Project Footprint | Valley Floor Conservation Lands

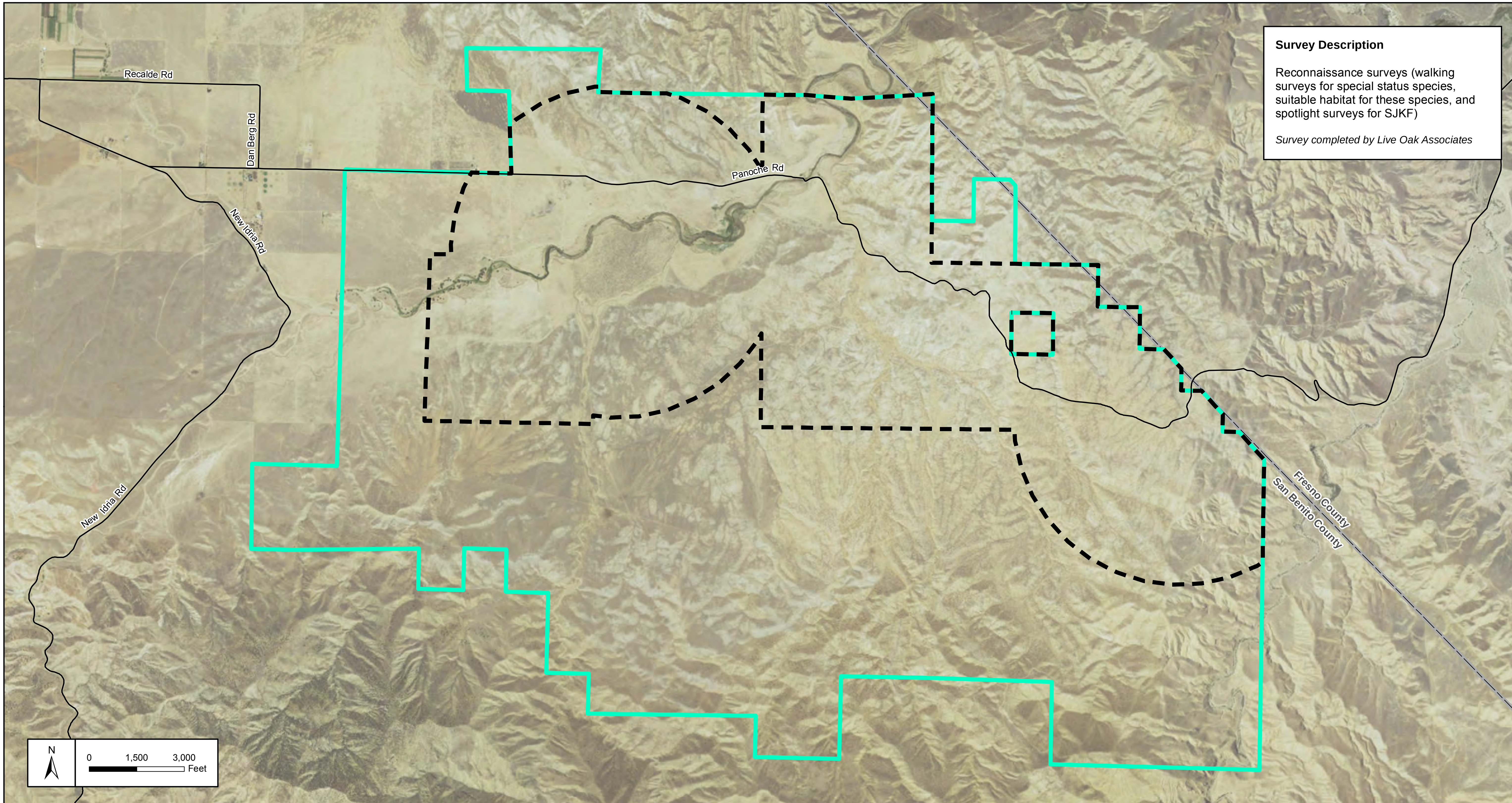
Panoche Valley Solar Project

Occupancy Sampling

May 10 - July 27, 2010

FIGURE 6

JH 2015-08-11



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Legend

Survey Area

Silver Creek Ranch Conservation Lands

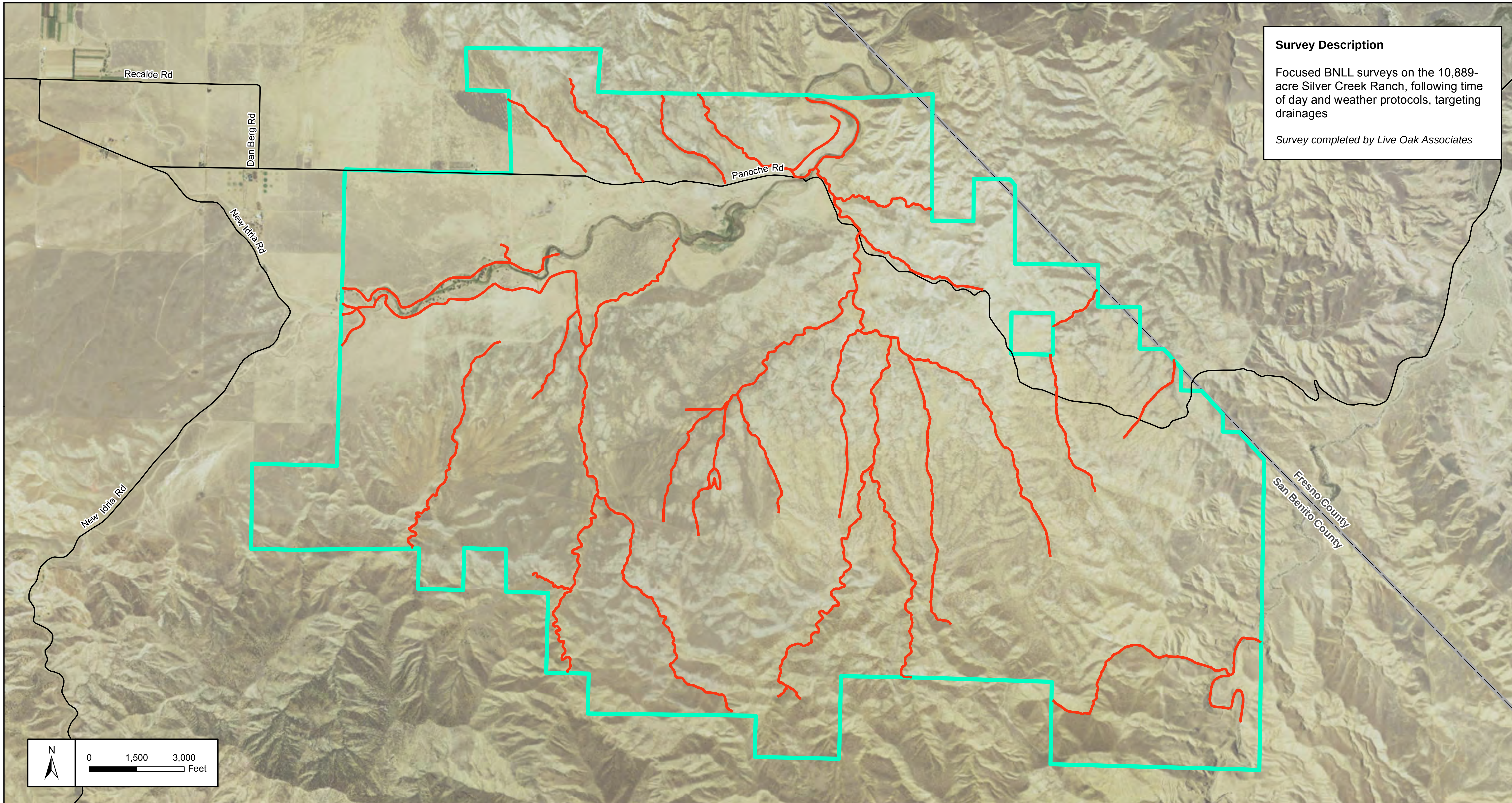
Panoche Valley Solar Project

Reconnaissance Surveys on the Silver Creek Ranch

August 30 - September 3, 2010

FIGURE 7

JH 2015-08-11



Survey Description

Focused BNLL surveys on the 10,889-acre Silver Creek Ranch, following time of day and weather protocols, targeting drainages

Survey completed by Live Oak Associates

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Legend

Focused Survey Route

Silver Creek Ranch Conservation Lands

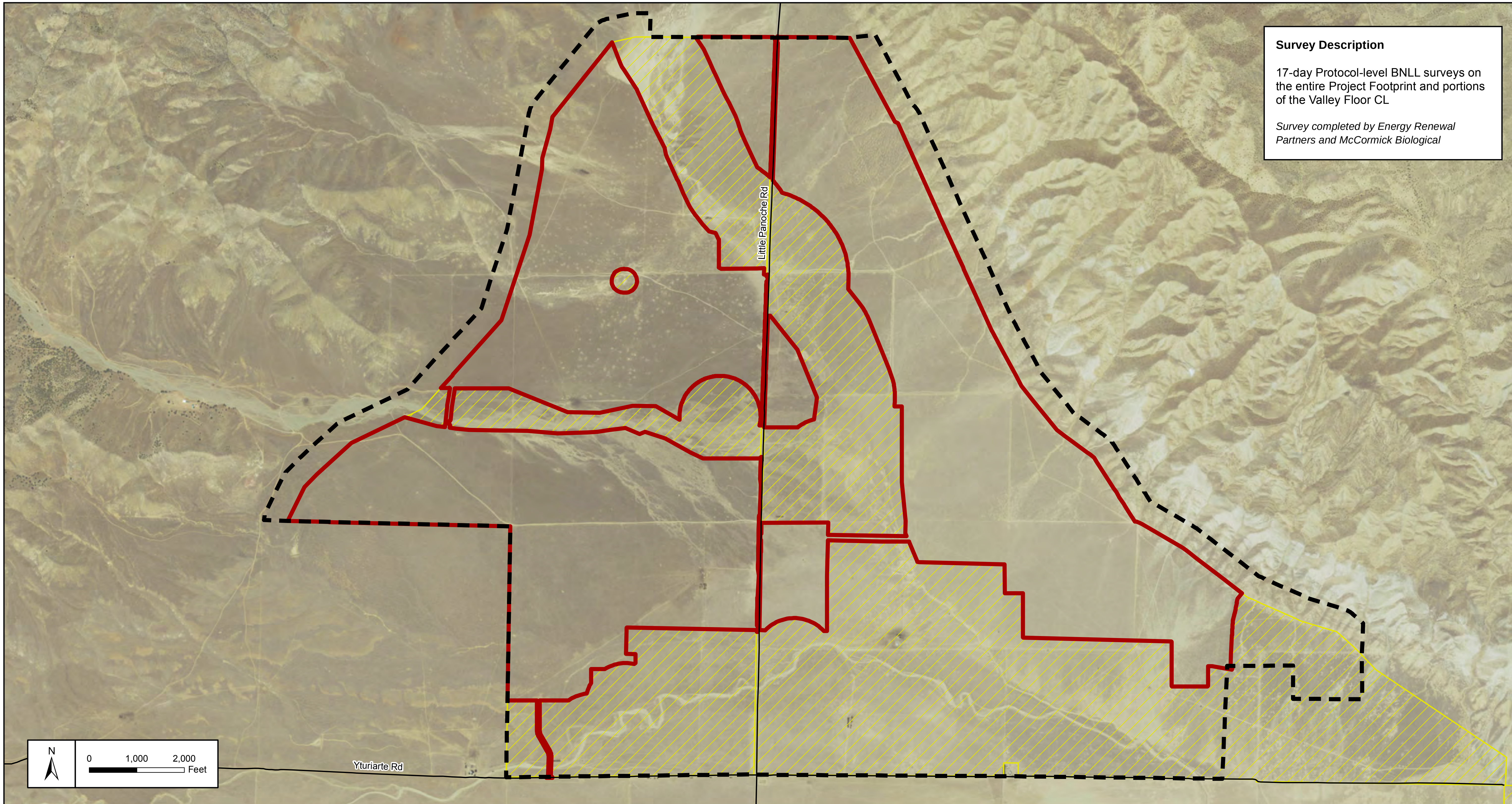
Panoche Valley Solar Project

Blunt-nosed Leopard Lizard Focused Survey

September 10-17, 2012

FIGURE 8

JH 2015-08-11



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Legend

Survey Area | Project Footprint | Valley Floor Conservation Lands

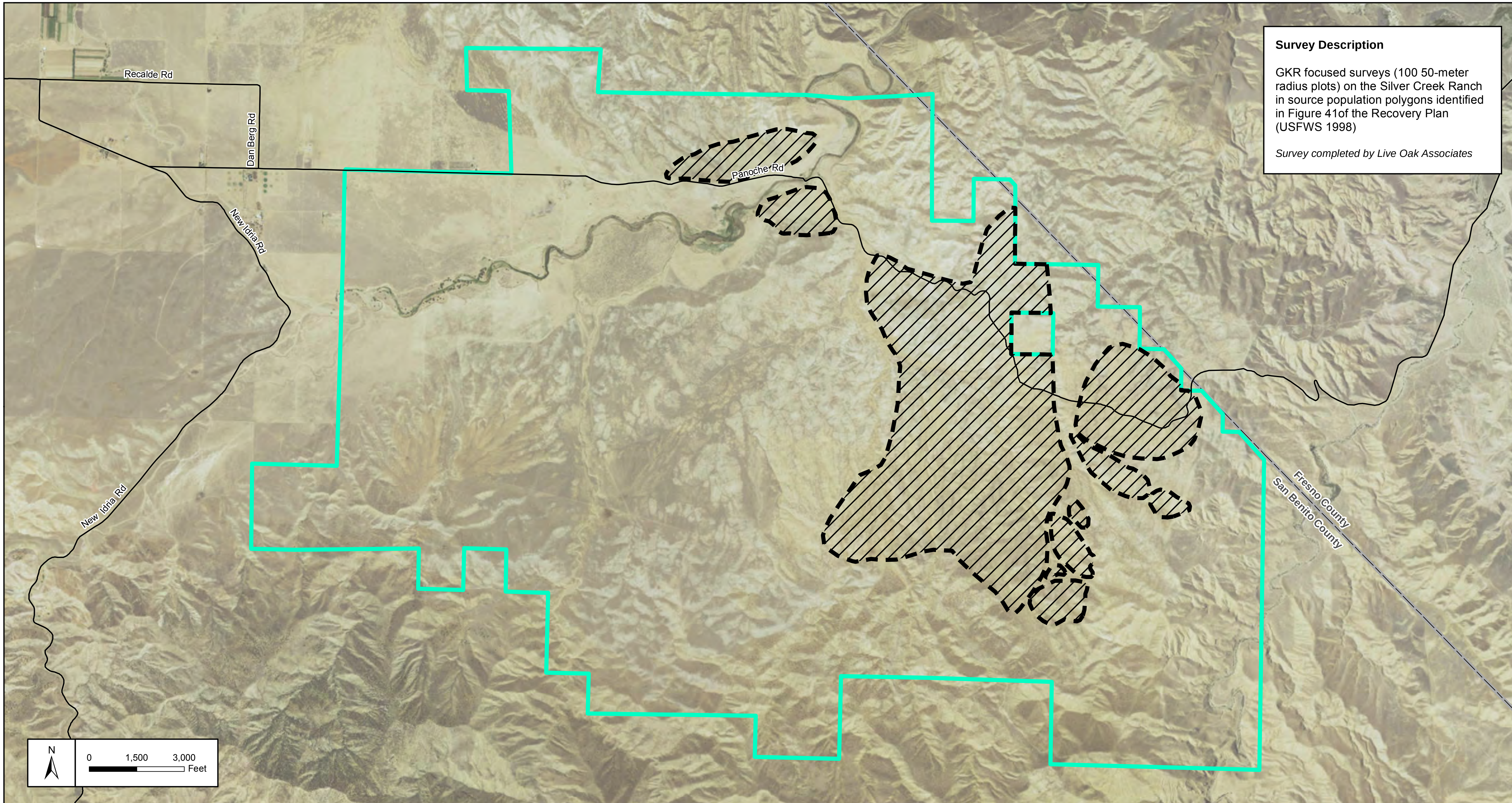
Panoche Valley Solar Project

Blunt-nosed Leopard Lizard
Protocol Survey

Spring and Summer 2013

FIGURE
9

JH 2015-08-11



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Legend

Survey Area

Silver Creek Ranch Conservation Lands

Panoche Valley Solar Project

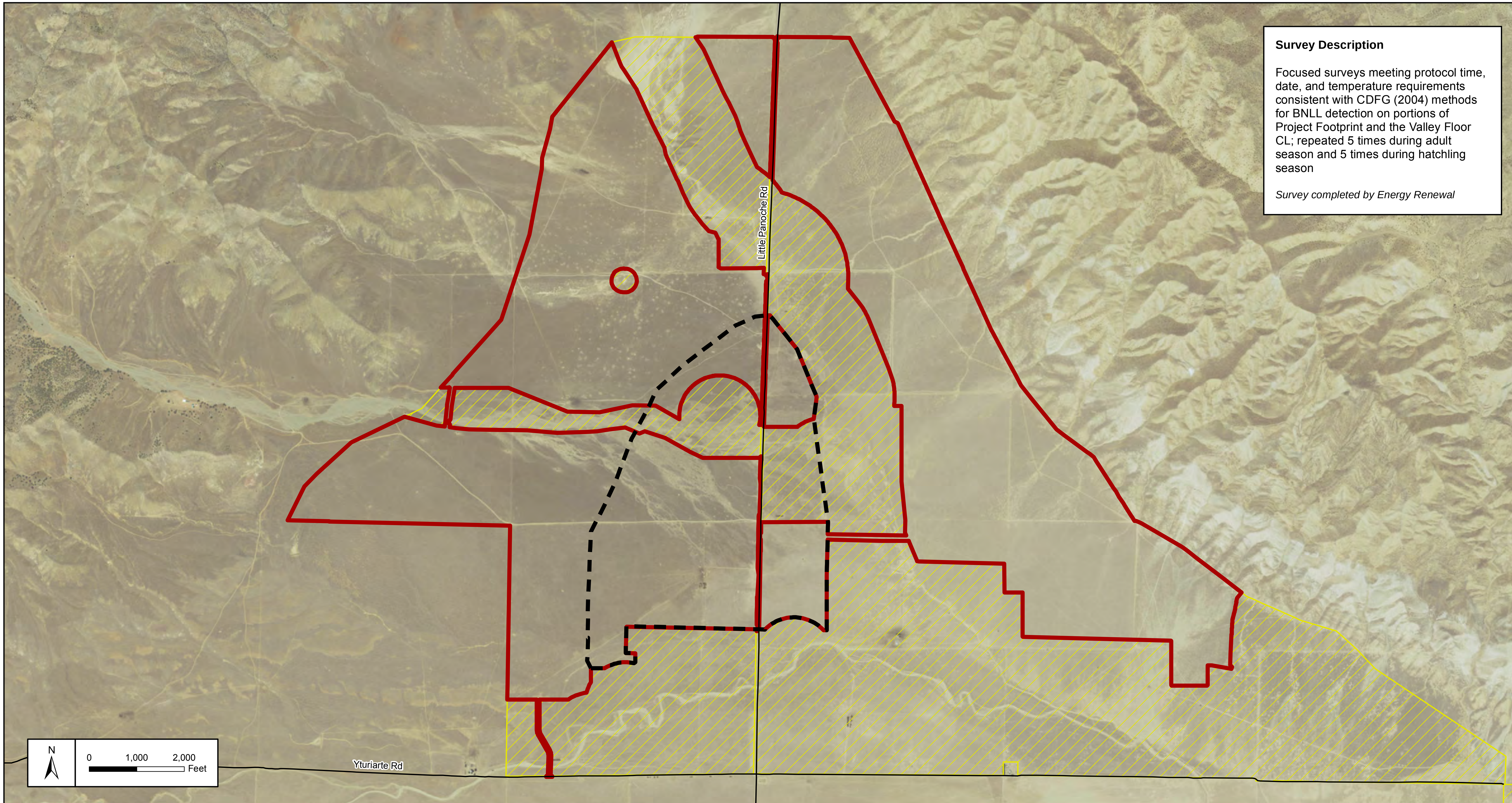
Giant Kangaroo Rat
Focused Surveys

September 10-21, 2012

FIGURE

10

JH 2015-08-11



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Legend

- Survey Area
- Project Footprint
- Valley Floor Conservation Lands

Panoche Valley Solar Project

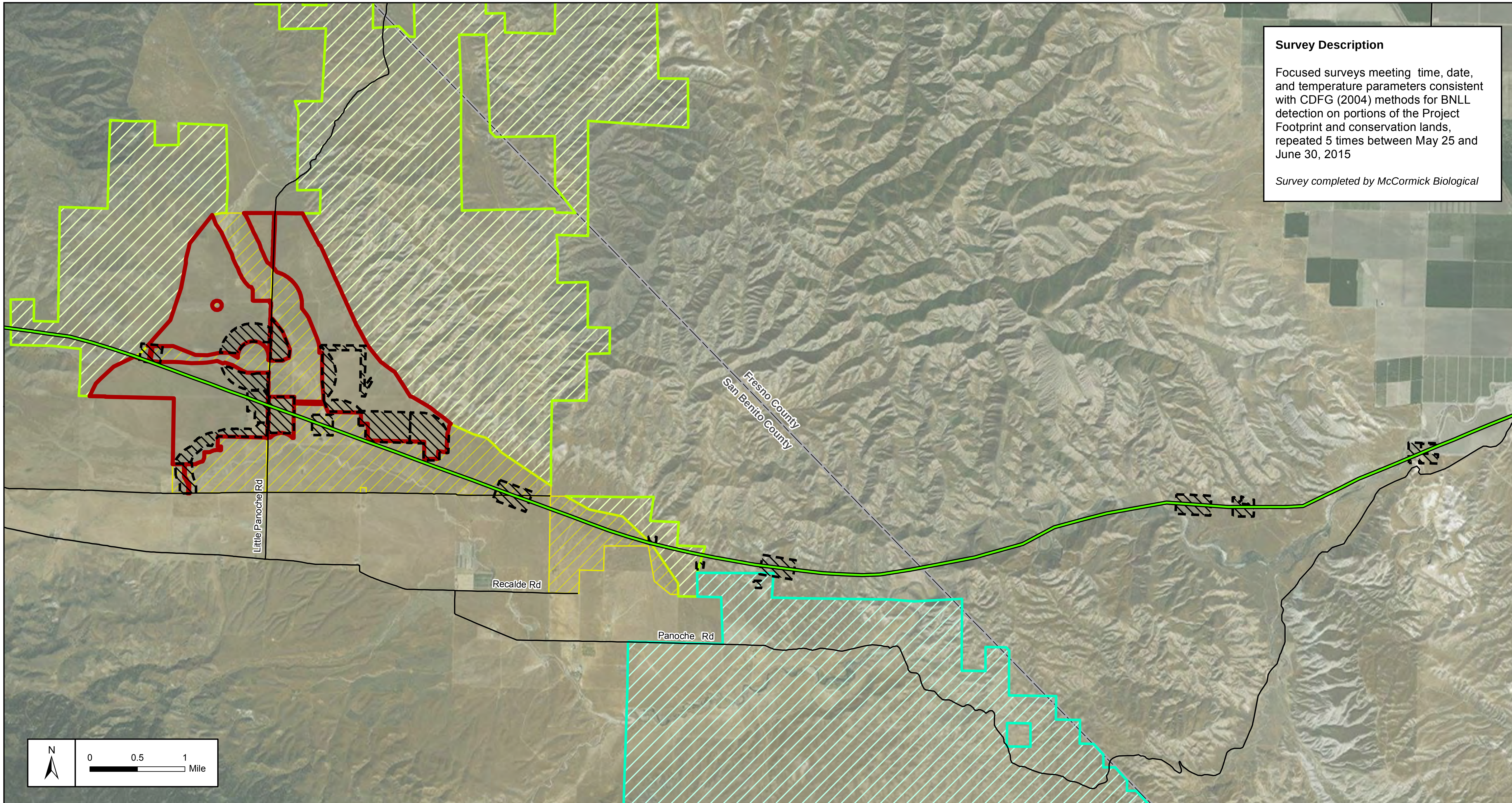
Modified Blunt-nosed Leopard Lizard Protocol Survey

Spring and Summer 2014

FIGURE

11

JH 2015-08-11



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Legend

- Survey Area
- Electric Transmission
- Project Footprint
- Valley Floor Conservation Lands
- Silver Creek Ranch Conservation Lands
- Valadeao Ranch Conservation Lands

Panoche Valley Solar Project

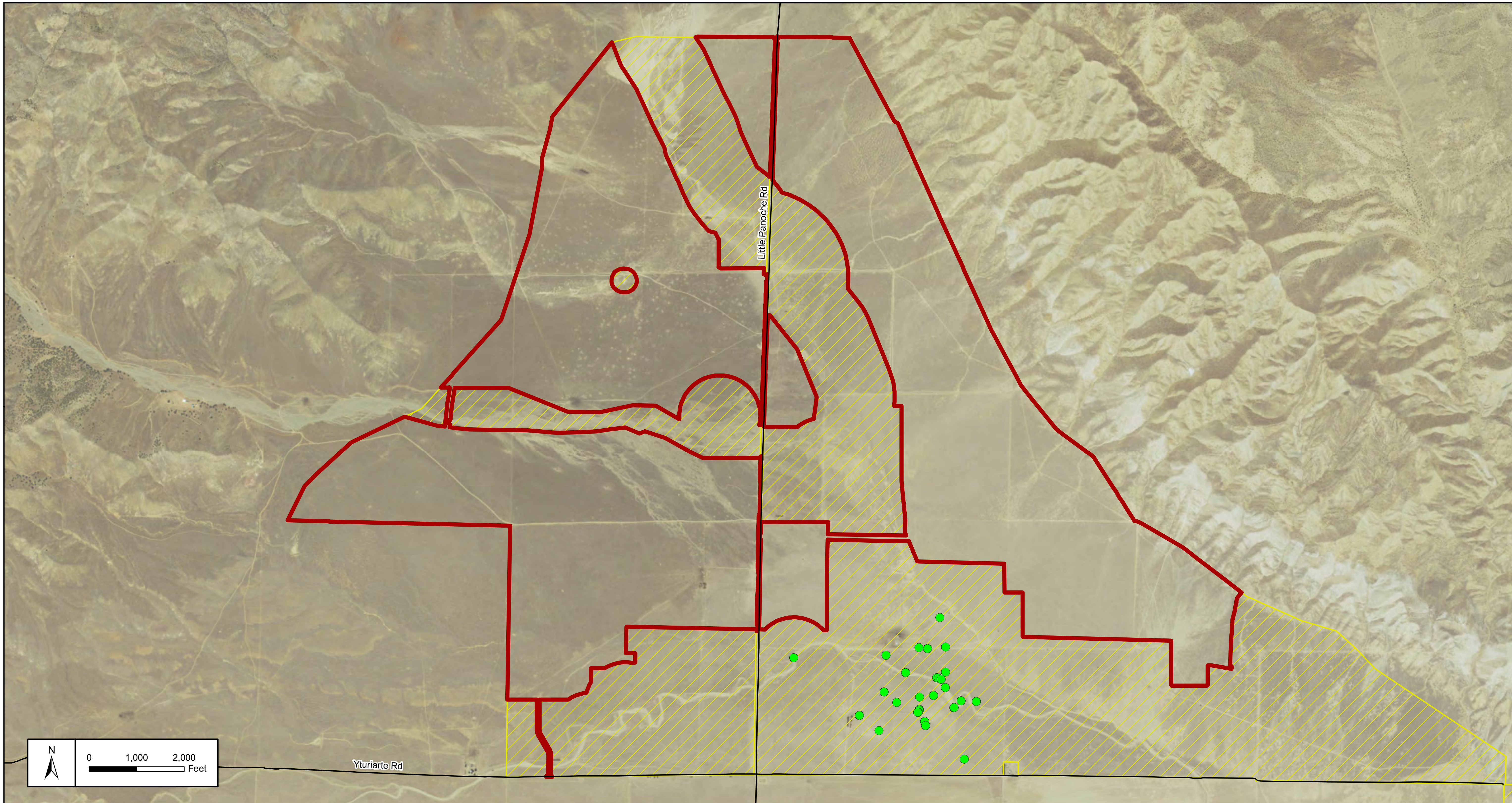
Modified Blunt-nosed Leopard Lizard Protocol Survey

Spring and Summer 2015

FIGURE

12

JH 2015-08-11



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Legend

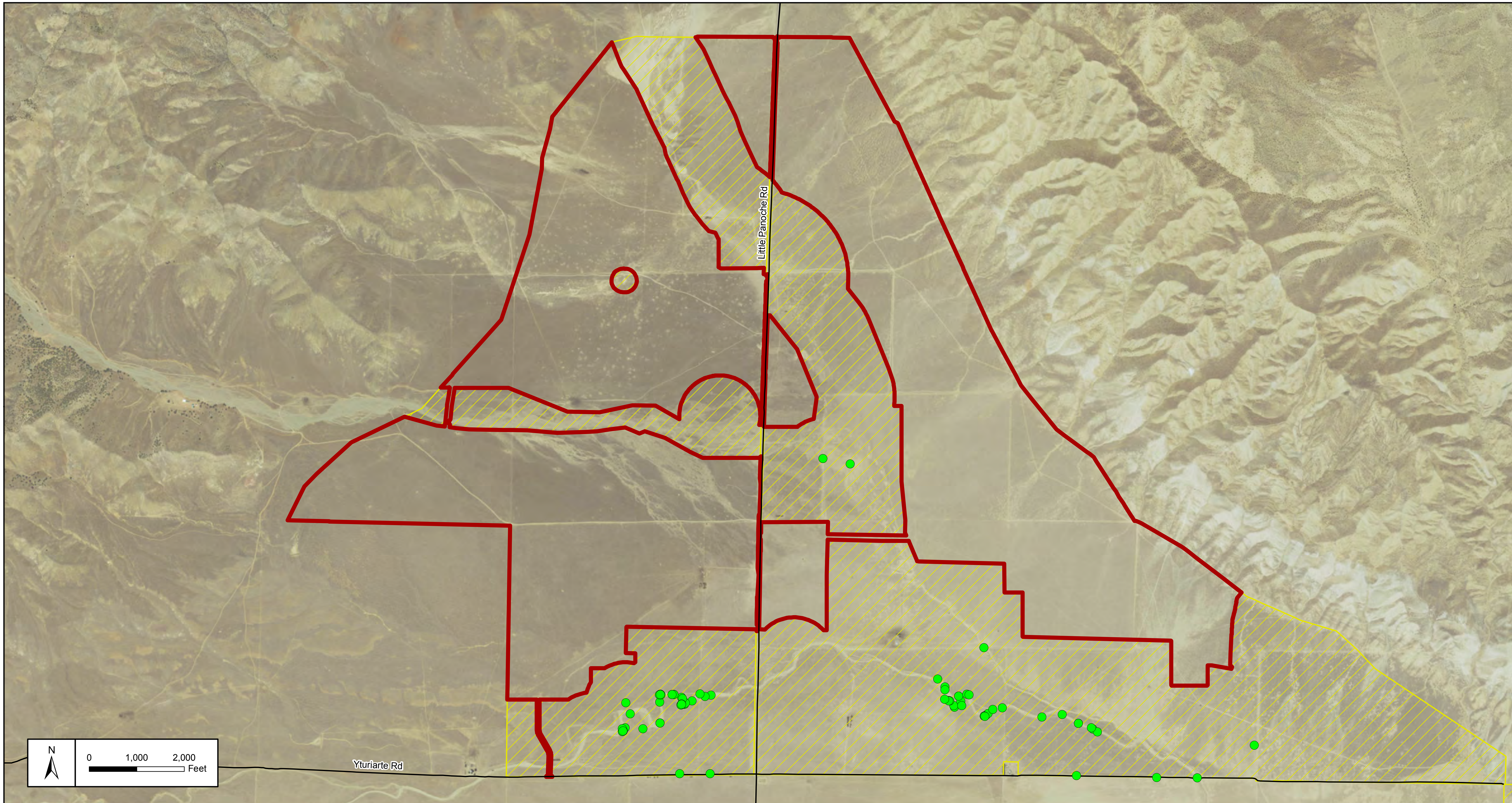
- Project Footprint
- Valley Floor Conservation Lands
- BNLL Observation

Panoche Valley Solar Project

BNLL Observations 2009

FIGURE 13

JH 2015-08-11



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Legend

Project Footprint

Valley Floor Conservation Lands

BNLL Observation

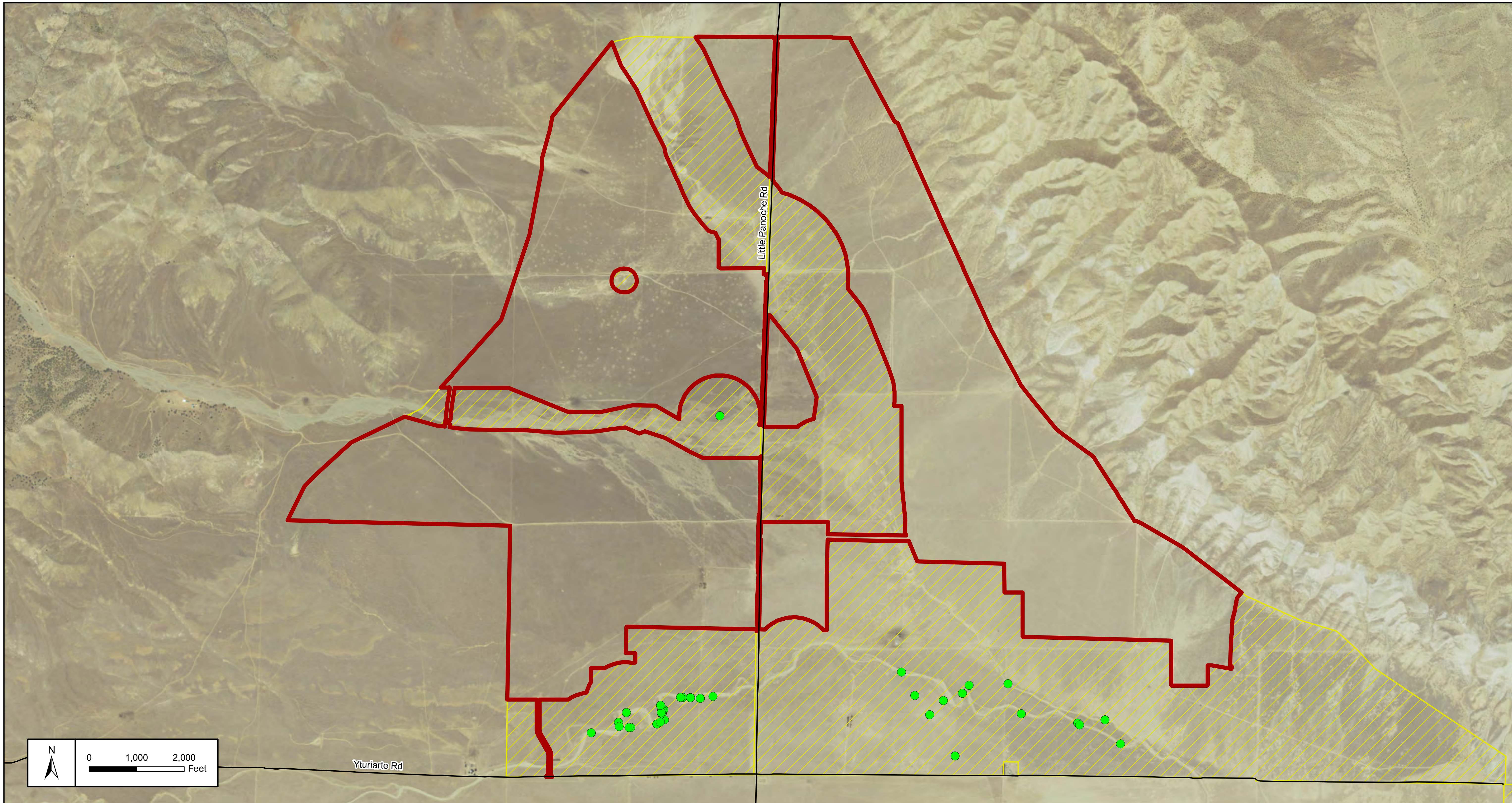
Panoche Valley Solar Project

BNLL Observations 2010

FIGURE

14

JH 2015-08-11



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Legend

- Project Footprint
- Valley Floor Conservation Lands
- BNLL Observation

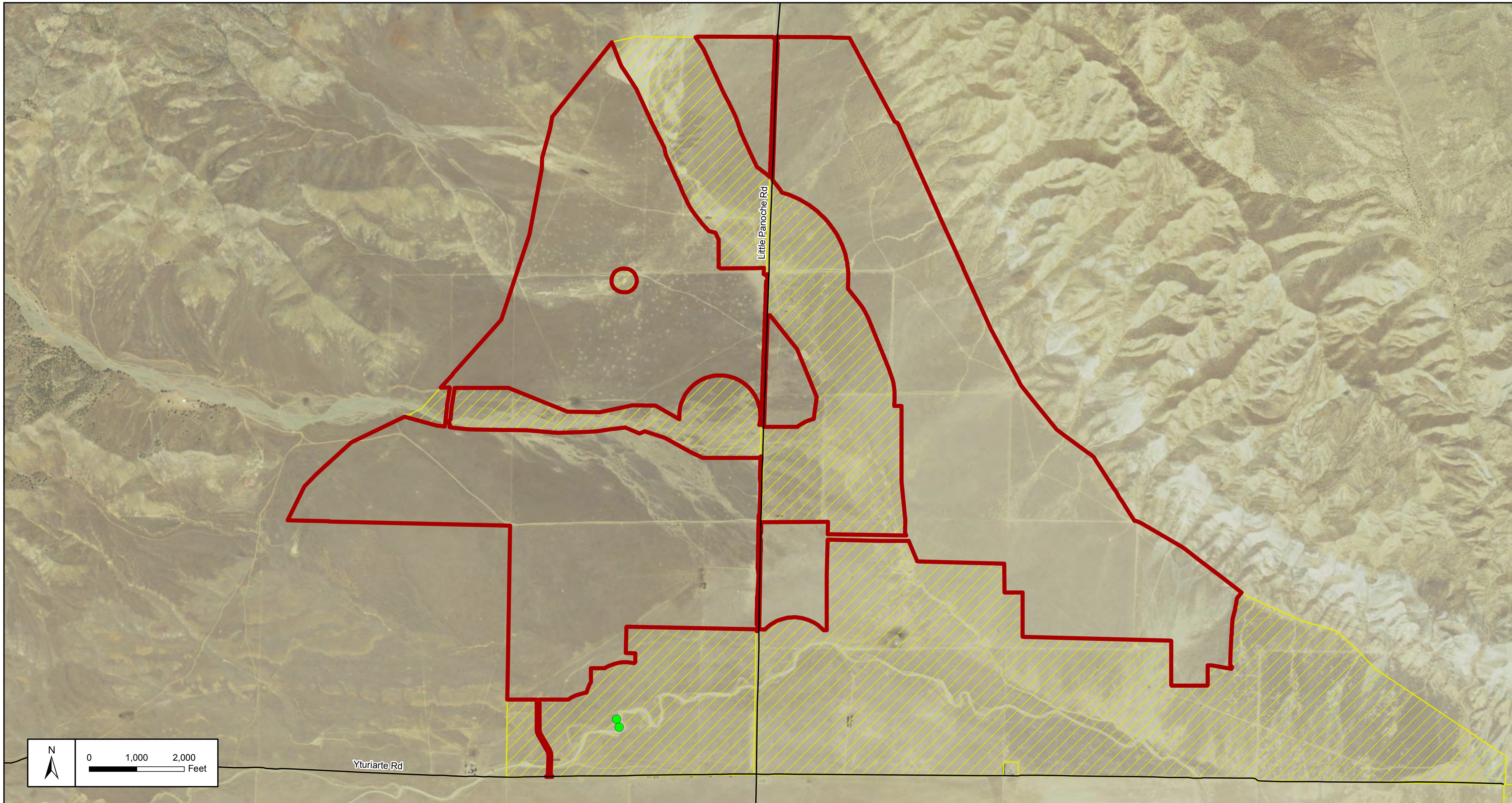
Panoche Valley Solar Project

BNLL Observations 2013

FIGURE

15

JH 2015-08-11



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Legend

Project Footprint

Valley Floor Conservation Lands

BNLL Observation

Panoche Valley Solar Project

BNLL Observations 2014

FIGURE

16

JH 2015-08-11

Table 2. BNLL Observed During Protocol Conditions

BNLL Point	UTM	Detection Date	Sex	Age Class	Temperature	Wind	Description
Adult Survey (May 9 through July 13, 2013)							
BNLL6	10 S 692115 4054924	5/14/2013	Female	Adult	Unknown	Unknown	Breeding colors apparent, Flushed from flat surface just outside of a burrow. On the south facing bank.
BNLL7	10 S 691942 4054896	5/10/2013	Unknown	Adult	Unknown	Unknown	Darted into burrow, on south-aspect wall of wash, head exposed in burrow entrance
BNLL8	10 S 691577 4054940	5/10/2013	Unknown	Adult	Unknown	Unknown	Ran quickly into a burrow
BNLL9	10 S 692220 4054773	5/14/2013	Male	Adult	Unknown	Unknown	Breeding colors. Sunning on side of burrow.
BNLL10	10 S 689276 4054847	6/3/2013	Unknown	Adult	90.5°F	0.9 mph	One meter from east wall of wash, small individual, probably young from last year, has salmon blotches on throat, but no spots on top of neck, detection distance was 5 meters
BNLL11	10 S 689292 4054806	6/3/2013	Unknown	Adult	91.0°F	4.2 mph	BNLL 15m from wash, all white on ventral side, no breeding colors, 9:55am, 10-foot detection distance
BNLL12	10 S 689277 4054847	6/6/2013	Female	Adult	93.0°F	1.0. mph	Breeding colors in wash bottom next to burrow
BNLL13	10 S 689274 4054846	6/6/2013	Unknown	Adult	93.0°F	1.0 mph	Salmon colored splotches on neck went down into burrow in wash bottom
BNLL14	10 S 689453 4054955	6/6/2013	Female	Adult	96.7°F	3.3 mph	Ran to burrow, had salmon colored splotches on neck, above wash was below 95°F
BNLL15	10 S 689046 4054843	6/11/2013	Unknown	Most Likely Adult	95.5°F	5.2 mph	BNLL in wash, not associated with a burrow, small individual, likely a first-year individual, no breeding colors, ran away out of the wash onto plateau area to the south, temperature up out of wash was 90°F
BNLL16	10 S 689245 4054778	6/11/2013	Unknown	Adult	95.0°F	3.3 mph	Ran across the wash and up the vertical into the grass on top. Distance to detection was around 5 meters
BNLL17	10 S 689454 4054955	6/11/2013	Female	Adult	90.5°F	6.0 mph	Possibly same female as BNLL14 and BNLL4, light body shade
BNLL18	10 S 691954 4054885	6/13/2013	Female	Adult	91.0°F	1.3 mph	BNLL female, adult, 44 feet off transect #60, sticking out of a burrow, 12:08 pm
BNLL20	10 S 689277 4054864	6/30/2013	Female	Adult	95.6°F	5.6 mph	Breeding colors, this female up while a team was finishing their lines between 95°F and 97°F in Block 5
BNLL22	10 S 688998 4054778	7/5/2013	Female	Adult	90.1°F	5.6 mph	BNLL in wash
BNLL23	10 S 689271 4054852	7/5/2013	Female	Adult	90.1°F	5.6 mph	Possibly same individual as BNLL21 (Table 2), no weather information taken
BNLL24	10 S 689516 4054954	7/6/2013	Female	Adult	96.0°F	2.3 mph	Some breeding colors, ran from wash bottom to burrow on S side of wash, used as a reference from 1107-1118 until the rest of the crew finished transects, left her at 96°F
BNLL25	10 S 690991 4054908	7/6/2013	Female	Adult	85.0°F	2.8 mph	Basking in sun in wash

BNLL26	10 S 689596 4054969	7/7/2013	Female	Adult	96.8°F	3.2 mph	Basking in sun on south side of wash, ran out to middle of wash bottom to back on a rock, used as reference BNLL until 97°F
Hatchlings and Sub-adult (August 2 through September 10, 2013)							
BNLL28	10 S 689003 4054750	8/2/2013	Female	Adult	90.6	9.3 mph	Very thin female, basking in the sun.
BNLL29	10 S 689267 4054791	8/2/2013	Unknown	Hatchling	88.0	6.3 mph	Detection was 20 minutes after detection of BNLL30 and was in the same general area at 10:50am.
BNLL30	10 S 689264 4054899	8/2/2013	Unknown	Hatchling	88.0	6.3 mph	10:30am hatchling detection.
BNLL31	10 S 690799 4055175	8/5/2013	Unknown	Hatchling	92.3	2.0 mph	Basking outside of a burrow, ducked quickly back into burrow in middle of wash
BNLL32	10 S 691195 4055055	8/11/2013	Unknown	Hatchling	92.0	8.6 mph	Middle of wash, ran to northern bank. Vent to snout length is estimated at 2 to 3 inches. Distance from BNLL was approximately 2 feet.
BNLL33	10 S 689079 4054748	8/16/2013	Unknown	Adult	87.0	1.2 mph	9:20am detection of adult just inside burrow about 30 meters south of wash wall. Observation lasted approximately 15 minutes
BNLL34	10 S 691234 4055109	8/22/2013	Unknown	Hatchling	92.0	9.6 mph	10:40am detection. Distance from BNLL was approximately 4 feet, vent to snout estimated at 2.5 inches, around 150 feet north of wash
BNLL35	10 S 689068 4054748	8/27/2013	Female	Adult	89.0	5.0 mph	10:40am detection. Basking in sun near log directly south of the wash in VFCL with breeding colors
BNLL36	10 S 689566 4056769	9/3/2013	Unknown	Hatchling	82.0	1.5 mph	9:35am detection. Sunning and ran as surveyor approached. There was an absence of burrows and lizard was using dried cow manure as cover.
BNLL37	10 S 688827 4054702	9/4/2013	Unknown	Hatchling	86.6	6.1 mph	Observed at 10:25am on south side of wash bed sunning.

Table 3. Incidental BNLL Observations

BNLL Point	UTM	Detection Date	Sex	Age Class	Temperature	Wind	Description
Adult Survey (May 9 through July 13, 2013)							
BNLL1	10 S 689272 4054862	5/9/2013	Unknown	Adult	Unknown	Unknown	In wash prior to survey-west of Little Panoche Rd., seen out of protocol during training.
BNLL2	10 S 689285 4054871	5/9/2013	Unknown	Adult	Unknown	Unknown	In wash prior to survey-west of Little Panoche Rd., seen out of protocol during training
BNLL3	10 S 689405 4054955	5/9/2013	Unknown	Adult	Unknown	Unknown	In wash prior to survey-west of Little Panoche Rd., seen out of protocol during training
BNLL4	10 S 689454 4054955	5/9/2013	Unknown	Adult	Unknown	Unknown	In wash prior to survey-west of Little Panoche Rd., seen out of protocol during training
BNLL5	10 S 689391 4054954	5/9/2013	Unknown	Adult	Unknown	Unknown	In wash prior to survey-west of Little Panoche Rd., seen out of protocol during training
BNLL19	10 S 689453 4054954	6/25/2013	Male	Adult	94.0°F	Unknown	Observed leaving burrow at 10:40am, stayed on the berm of the burrow for 15 min, seen out of protocol during training for new technicians
BNLL21	10 S 689273 4054845	7/4/2013	Female	Adult	96.8°F	1.2 mph	BNLL with breeding colors on face and side, 5 feet to detection, 8:45am, 96.8°F, 1.2 mph wind, reference lizard over 95°F
BNLL27	10 S 691484 4055128	7/14/2013	Unknown	Hatchling	100.6°F	9.4 mph	Likely a hatchling from this year, observed during GKR surveys
Hatchlings and Sub-adult (August 2 through September 10, 2013)							
BNLL38	10 S 690890 4055028	9/9/2013	Unknown	Hatchling	97.5	3.3 mph	Observed at 10:30am sunning near burrow.
BNLL39	10 S 691074 4055004	9/9/2013	Unknown	Hatchling	99.0	1.6 mph	No color, sunning on a burrow, cloud cover <50%, wind coming from the west northwest
BNLL40	10 S 691164 4054651	9/9/2013	Unknown	Hatchling	99.1	4.3 mph	Ran from under dried cow manure into burrow. Wind from east northeast.

Table 4. Daily Reptile Observations Recorded During 2015 Protocol-Level, BNLL Surveys Conducted for the Panoche Valley Solar Project

Survey Date	Time		Temperature (°F)		Wind Speed (Average mph)		Reptile Observations (Number)	Surveyors (**Bold = Level II**; Plain text = Level I)
	Start	End	Start	End	Start	End		
Phase 2								
5/25	11:52 AM	1:53 PM	86.8	86.3	5.5	1.4	*Uta stansburiana* (1)	**Megan McCormick, Tom Malley, Garrett Moss,** Steven Driedger, **Shady Shafik, Sami Neymark**
5/27	10:55 AM	12:32 PM	83.8	85.2	7.5	6.9	None	**Megan McCormick, Tom Malley, Garrett Moss,** Steven Driedger, **Shady Shafik, Sami Neymark**
5/29	10:40 AM	12:15 PM	85.9	89.2	3.2	8.6	*Uta stansburiana* (2)	**Megan McCormick, Tom Malley, Garrett Moss**, Steven Driedger, **Shady Shafik, Sami Neymark**
6/5	10:28 AM	12:35 PM	82.7	87.4	0.9	5.9	*Uta stansburiana* (4)	**Megan McCormick, Woody Moise, Garrett Moss,** Steven Driedger, **Shady Shafik, Sami Neymark**
6/17	8:08 AM	9:30 AM	79.3	89.3	1.0	0.4	*Uta stansburiana* (6)	**Megan McCormick, Woody Moise, Garrett Moss,** Steven Driedger, **Shady Shafik, Sami Neymark**
Area A								
5/26	10:02 AM	11:03 AM	80.1	83.8	8.9	8.6	*Uta stansburiana* (12)	**Tom Malley, Sami Neymark, Garrett Moss**
5/28	10:52 AM	11:33 AM	84.9	88.6	7.4	7.1	None	**Tom Malley, Sami Neymark, Garrett Moss**
5/30	9:02 AM	9:37 AM	86.1	88.0	3.7	2.4	*Uta stansburiana* (3)	**Tom Malley, Sami Neymark, Shady Shafik**
6/2	10:57 AM	11:37 AM	80.6	84.1	6.9	4.1	*Uta stansburiana* (9)	**Woody Moise, Garrett Moss, Sami Neymark**
6/15	9:23 AM	10:02 AM	89.8	94.9	2.4	4.1	*Uta stansburiana* (10)	**Woody Moise, Garrett Moss, Sami Neymark**

Survey Date	Time		Temperature (°F)		Wind Speed (Average mph)		Reptile Observations (Number)	Surveyors (**Bold = Level II**; Plain text = Level I)
	Start	End	Start	End	Start	End		
Area B								
5/26	10:36 AM	11:25 AM	80.4	83.8	7.8	8.3	*Uta stansburiana* (1)	**Megan McCormick, Shady Shafik,** Steven Driedger
5/28	10:42 AM	11:35 AM	83.1	87.9	5.2	6.4	*Uta stansburiana* (1)	**Megan McCormick, Shady Shafik,** Steven Driedger
5/30	8:55 AM	9:45 AM	82.2	88.0	5.8	3.7	*Uta stansburiana* (3)	**Megan McCormick, Garrett Moss,** Steven Driedger
6/2	10:54 AM	11:48 AM	81.1	83.1	6.2	8.6	*Uta stansburiana* (3)	**Megan McCormick, Shady Shafik,** Steven Driedger
6/16	7:58 AM	8:27 AM	77.2	81.1	1.0	3.3	*Uta stansburiana* (4)	**Megan McCormick, Garrett Moss,** Steven Driedger, **Sami Neymark, Woody Moise**
Area C								
5/26	12:20 PM	12:44 PM	85.3	87.4	5.6	0.4	*Uta stansburiana* (1)	**Tom Malley, Sami Neymark, Garrett Moss**
5/27	1:05 PM	1:29 PM	85.2	92.3	6.9	3.5	None	**Megan McCormick, Shady Shafik,** Steven Driedger
5/28	12:00 PM	12:24 PM	87.9	91.4	6.4	7.0	None	**Megan McCormick, Shady Shafik,** Steven Driedger
6/4	12:00 PM	12:24 PM	80.4	83.9	7.3	3.3	None	**Megan McCormick, Shady Shafik, Sami Neymark**
6/15	9:40 AM	10:02 AM	90.9	92.5	2.8	3.1	None	**Megan McCormick, Shady Shafik,** Steven Driedger
Area D								
5/26	11:45 AM	12:06 PM	83.8	85.3	8.6	5.6	None	**Tom Malley, Sami Neymark, Garrett Moss**
5/27	1:02 PM	1:28 PM	87.3	92.3	2.9	1.0	None	**Tom Malley, Sami Neymark, Garrett Moss**
5/28	11:54 AM	12:24 PM	88.6	89.4	7.1	7.0	None	**Tom Malley, Sami Neymark, Garrett Moss**
6/4	12:02 PM	12:29 PM	80.6	83.9	2.2	2.7	None	**Garrett Moss,** Steven Driedger, **Woody Moise**
6/16	9:25 AM	9:48 AM	85.7	88.0	0.8	4.8	*Uta stansburiana* (1)	**Megan McCormick, Woody Moise, Garrett Moss,** Steven Driedger, **Sami Neymark**

Survey Date	Time		Temperature (°F)		Wind Speed (Average mph)		Reptile Observations (Number)	Surveyors (**Bold = Level II**; Plain text = Level I)
	Start	End	Start	End	Start	End		
Area E								
5/26	9:04 AM	10:02 AM	77..5	80.1	0.4	8.4	*Uta stansburiana* (3)	**Tom Malley, Sami Neymark, Garrett Moss**
5/28	9:26 AM	10:23 AM	81.8	84.9	2.9	7.4	*Uta stansburiana* (3) *Crotalus oreganus* (1)	**Tom Malley, Sami Neymark, Garrett Moss**
5/30	7:48 AM	8:44 AM	77.3	86.1	0.2	3.7	*Uta stansburiana* (3)	**Tom Malley, Sami Neymark, Shady Shafik**
6/2	9:35 AM	10:36 AM	77.0	80.6	7.4	6.9	*Uta stansburiana* (4)	**Woody Moise, Garrett Moss, Sami Neymark**
6/15	8:01 AM	9:01 AM	78.0	89.8	0.0	2.4	*Uta stansburiana* (4)	**Woody Moise, Garrett Moss, Sami Neymark**
Area F								
5/26	9:30 AM	10:20 AM	79.7	80.4	7.0	7.8	*Uta stansburiana* (6)	**Megan McCormick,** Steven Driedger, **Shady Shafik**
5/28	9:29 AM	10:17 AM	81.8	83.1	5.8	5.2	*Uta stansburiana* (3)	**Megan McCormick,** Steven Driedger, **Shady Shafik**
5/30	7:51 AM	8:40 AM	77.2	82.2	1.2	5.8	*Uta stansburiana* (4)	**Megan McCormick,** Steven Driedger, **Garrett Moss**
6/2	9:40 AM	10:33 AM	77.2	81.1	6.4	6.2	*Uta stansburiana* (3)	**Megan McCormick,** Steven Driedger, **Shady Shafik**
6/15	8:09 AM	9:10 AM	81.6	90.9	1.6	2.8	*Uta stansburiana* (6) *Pituophis catenifer (1)*	**Megan McCormick,** Steven Driedger, **Shady Shafik**

Survey Date	Time		Temperature (°F)		Wind Speed (Average mph)		Reptile Observations (Number)	Surveyors (**Bold = Level II**; Plain text = Level I)
	Start	End	Start	End	Start	End		
Area G								
5/26	11:40 AM	1:32 PM	83.8	87.6	8.3	5.1	*Uta stansburiana* (1)	**Megan McCormick,** Steven Driedger, **Shady Shafik, Garrett Moss, Tom Malley, Sami Neymark**
5/27	9:24 AM	10:23 AM	77.9	82.2	7.5	4.3	*Uta stansburiana* (1)	**Megan McCormick,** Steven Driedger, **Shady Shafik, Garrett Moss, Tom Malley, Sami Neymark**
5/29	9:20 AM	10:13 AM	81.6	85.9	2.5	3.2	*Uta stansburiana* (1)	**Megan McCormick,** Steven Driedger, **Shady Shafik, Garrett Moss, Tom Malley, Sami Neymark**
6/5	9:46 AM	10:36 AM	80.9	85.8	3.4	2.9	*Uta stansburiana* (1)	**Garrett Moss, Shady Shafik,** Steven Driedger, **Sami Neymark**
6/19	8:23 AM	9:31 AM	78.2	88.3	7.7	4.1	*Uta stansburiana* (3)	**Alli Rhodehamel, Garrett Moss, Sami Neymark, Shady Shafik**
Bridge North								
6/6	8:24 AM	8:37 AM	77.0	83.0	3.1	1.3	None	**Megan McCormick, Woody Moise, Garrett Moss,** Steven Driedger, **Shady Shafik, Sami Neymark**
6/19	10:01 AM	10:18 AM	91.0	91.7	1.8	4.2	*Uta stansburiana* (2)	**Alli Rhodehamel,** Steven Driedger, **Sami Neymark, Woody Moise, Shady Shafik, Garrett Moss**
6/26	7:19 AM	7:42 AM	79.1	82.5	0.0	2.0	None	**Alli Rhodehamel,** Steven Driedger, **Shane O'Malley, Garrett Moss**
6/27	7:50 AM	8:02 AM	81.9	83.1	4.0	0.4	*Uta stansburiana* (7)	**Alli Rhodehamel, Shane O'Malley,** Jordan Reid, Steven Driedger
6/28	8:20 AM	8:30 AM	81.6	85.5	2.3	2.8	*Uta stansburiana* (2)	**Alli Rhodehamel,** Steven Driedger, **Shane O'Malley,** Jordan Reid
Bridge South								
6/6	9:13 AM	9:32 AM	82.9	82.2	4.8	5.8	*Uta stansburiana* (4)	**Megan McCormick, Woody Moise, Garrett Moss,** Steven Driedger, **Shady Shafik, Sami Neymark**
6/26	6:45 AM	7:06 AM	77.1	78.1	3.2	1.4	*Uta stansburiana* (6)	**Alli Rhodehamel,** Steven Driedger, **Shane O'Malley, Garrett Moss**
6/27	7:08 AM	7:28 AM	78.1	82.0	4.8	5.6	*Uta stansburiana* (4)	**Alli Rhodehamel, Shane O'Malley,** Jordan Reid, Steven Driedger
6/28	7:36 AM	7:53 AM	77.8	81.5	5.6	1.2	*Uta stansburiana* (9)	**Alli Rhodehamel, Shane O'Malley,** Jordan Reid, Steven Driedger
6/29	7:22 AM	7:40 AM	77.9	80.2	6.0	4.4	*Uta stansburiana* (15)	**Alli Rhodehamel, Shane O'Malley, Sami Neymark,** Steven Driedger

Survey Date	Time		Temperature (°F)		Wind Speed (Average mph)		Reptile Observations (Number)	Surveyors (**Bold = Level II**; Plain text = Level I)
	Start	End	Start	End	Start	End		
Fenceline								
6/23	10:28 AM	10:55 AM	89.4	93.7	4.4	7.0	*Uta stansburiana* (5)	Steven Driedger, **Woody Moise**
6/25	7:15 AM	7:47 AM	77.3	81.3	2.3	1.2	*Uta stansburiana* (2)	Steven Driedger, **Woody Moise**
6/26	8:16 AM	9:11 AM	86.5	91.7	0.2	0.0	*Uta stansburiana* (12)	**Alli Rhodehamel**, Steven Driedger
6/27	8:32 AM	9:26 AM	82.2	85.6	2.0	5.1	*Uta stansburiana* (4)	**Alli Rhodehamel**, Steven Driedger
6/28	8:56 AM	9:46 AM	83.5	88.7	0.0	1.2	*Uta stansburiana* (13)	**Alli Rhodehamel**, Steven Driedger
6/29	8:08 AM	8:40 AM	83.9	89.1	0.0	5.0	*Uta stansburiana* (19)	**Alli Rhodehamel**, Steven Driedger, **Shane O'Malley**, **Sami Neymark**
Telecom 1								
6/5	9:25 AM	9:50 AM	79.3	80.9	1.4	3.4	*Uta stansburiana* (3)	**Megan McCormick**, Steven Driedger, **Shady Shafik**, **Woody Moise**, **Garrett Moss**, **Sami Neymark**
6/16	8:42 AM	9:00 AM	81.3	85.0	1.8	2.8	None	**Megan McCormick**, Steven Driedger, **Woody Moise**, **Garrett Moss**, **Sami Neymark**
6/19	8:30 AM	9:15 AM	78.2	87.9	7.7	8.1	*Uta stansburiana* (4)	**Woody Moise**, Steven Driedger
6/26	8:04 AM	8:56 AM	87.9	91.4	0.5	1.4	*Uta stansburiana* (6)	**Shane O'Malley**, **Garrett Moss**
6/27	8:45 AM	9:35 AM	85.5	90.8	0.1	5.6	*Uta stansburiana* (5)	**Shane O'Malley**, Jordan Reid
6/28	8:18 AM	9:08 AM	84.7	89.4	3.3	1.4	*Uta stansburiana* (2)	**Shane O'Malley**, Jordan Reid
Telecom 2								
6/2	12:12 PM	12:25 PM	83.1	83.1	8.6	6.0	*Uta stansburiana* (1)	**Megan McCormick**, Steven Driedger, **Shady Shafik**, **Woody Moise**, **Garrett Moss**, **Sami Neymark**
6/16	10:03 AM	10:20 AM	88.0	91.1	4.8	5.7	*Uta stansburiana* (1)	**Megan McCormick**, Steven Driedger, **Woody Moise**, **Garrett Moss**, **Sami Neymark**
6/20	9:19 AM	9:38 AM	90.8	94.6	0.4	1.0	*Uta stansburiana* (3)	**Alli Rhodehamel**, Steven Driedger, **Garrett Moss**, **Sami Neymark**
6/23	7:44 AM	8:18 AM	77.0	83.1	0.4	2.4	*Uta stansburiana* (2)	**Woody Moise**, Steven Driedger
6/24	7:50 AM	8:23 AM	77.1	82.2	0.9	0.0	*Uta stansburiana* (6)	**Woody Moise**, Steven Driedger

Survey Date	Time		Temperature (°F)		Wind Speed (Average mph)		Reptile Observations (Number)	Surveyors (**Bold = Level II**; Plain text = Level I)
	Start	End	Start	End	Start	End		
Telecom 3								
6/4	1:21 PM	1:57 PM	84.3	88.3	2.9	1.2	*Uta stansburiana* (15)	**Megan McCormick**, Steven Driedger, **Shady Shafik**, **Woody Moise**, **Garrett Moss**, **Sami Neymark**
6/20	8:01 AM	8:53 AM	77.8	88.1	2.7	0.4	*Uta stansburiana* (38)	**Alli Rhodehamel**, **Sami Neymark**, **Garrett Moss**, Steven Driedger
6/23	8:45 AM	9:50 AM	86.1	90.2	4.0	7.1	*Uta stansburiana* (42)	**Woody Moise**, Steven Driedger
6/24	8:48 AM	9:54 AM	85.3	91.6	1.2	0.6	*Uta stansburiana* (38)	**Woody Moise**, Steven Driedger
6/25	8:10 AM	9:22 AM	84.5	93.4	0.2	3.2	*Uta stansburiana* (64)	**Woody Moise**, Steven Driedger
Telecom 4								
6/3	10:47 AM	12:25 PM	85.0	87.4	8.6	6.9	*Uta stansburiana* (5)	**Woody Moise**, **Shady Shafik**
6/20	7:54 AM	8:38 AM	80.3	86.1	3.1	1.3	*Uta stansburiana* (12)	**Woody Moise**, **Shady Shafik**
6/26	6:51 AM	7:57 AM	77.5	83.8	0.0	1.4	*Uta stansburiana* (17)	**Woody Moise**, **Sami Neymark**
6/27	7:00 AM	8:06 AM	77.0	86.4	2.2	3.0	*Uta stansburiana* (11)	**Steven Pruett**, **Shady Shafik**
6/28	7:36 AM	8:39 AM	78.6	87.2	3.4	0.0	*Uta stansburiana* (20)	**Steven Pruett**, **Shady Shafik**
Telecom 4 Drainage Crossings								
6/3	9:35 AM	10:47 AM	78.6	85.0	6.4	8.6	*Uta stansburiana* (3)	**Woody Moise**, **Shady Shafik**
6/20	7:40 AM	9:29 AM	79.0	92.2	3.1	1.2	*Uta stansburiana* (20)	**Woody Moise**, **Shady Shafik**
6/26	7:57 AM	8:52 AM	83.8	92.8	1.4	0.5	*Uta stansburiana* (26)	**Woody Moise**, **Sami Neymark**
6/27	7:00 AM	9:10 AM	77.0	87.6	2.2	3.4	*Uta stansburiana* (35)	**Steven Pruett**, **Shady Shafik**
6/28	7:36 AM	9:36 AM	78.6	89.5	3.4	0.0	*Uta stansburiana* (33)	**Steven Pruett**, **Shady Shafik**

Survey Date	Time		Temperature (°F)		Wind Speed (Average mph)		Reptile Observations (Number)	Surveyors (**Bold = Level II**; Plain text = Level I)
	Start	End	Start	End	Start	End		
Telecom 6								
6/6	11:37 AM	12:11 PM	88.9	92.5	6.2	1.8	*Uta stansburiana* (1)	**Megan McCormick**, Steven Driedger, **Shady Shafik**, **Garrett Moss**, **Woody Moise**, **Sami Neymark**
6/23	7:31 AM	8:57 AM	77.2	84.4	0.7	2.4	*Uta stansburiana* (5)	**Alli Rhodehamel**, **Sami Neymark**
6/24	7:34 AM	9:00 AM	79.5	84.5	0.2	5.4	*Uta stansburiana* (18)	**Alli Rhodehamel**, **Sami Neymark**
6/25	7:09 AM	8:44 AM	77.8	88.7	1.6	1.2	*Gambelia sila* (1) *Uta stansburiana* (22)	**Alli Rhodehamel**, **Sami Neymark**
6/28	7:36 AM	9:04 AM	77.1	87.6	0.0	3.1	*Uta stansburiana* (24)	**Garrett Moss**, **Sami Neymark**
Telecom 7								
6/3	11:17 AM	12:16 PM	83.0	86.0	7.0	2.3	*Uta stansburiana* (3)	**Garrett Moss**, **Sami Neymark**
6/23	9:06 AM	9:31 AM	80.4	83.7	9.0	6.4	*Uta stansburiana* (3)	**Alli Rhodehamel**, **Garrett Moss**, **Sami Neymark**, **Shane O'Malley**
6/24	8:39 AM	9:13 AM	81.1	86.1	8.1	6.4	*Uta stansburiana* (4)	**Shane O'Malley**, **Garrett Moss**
6/25	8:44 AM	9:05 AM	89.2	93.1	1.3	0.4	*Uta stansburiana* (6)	**Shane O'Malley**, **Garrett Moss**, **Sami Neymark**, **Alli Rhodehamel**
6/27	8:48 AM	9:24 AM	80.4	90.7	2.1	6.0	*Uta stansburiana* (7)	**Garrett Moss**, **Sami Neymark**
Telecom 8								
6/3	8:54 AM	10:25 AM	77.0	80.0	2.9	1.7	*Sceloporus uniformis* (1) *Uta stansburiana* (13)	**Garrett Moss**, **Sami Neymark**
6/23	7:25 AM	8:16 AM	77.5	78.5	0.0	3.0	*Uta stansburiana* (5) *Crotalus oreganus* (1)	**Garrett Moss**, **Shane O'Malley**
6/24	7:18 AM	8:00 AM	77.2	78.4	7.5	4.7	*Uta stansburiana* (7)	**Shane O'Malley**, **Garrett Moss**
6/25	7:07 AM	7:59 AM	77.2	81.1	6.7	2.5	*Uta stansburiana* (3)	**Shane O'Malley**, **Garrett Moss**
6/27	7:16 AM	8:09 AM	77.1	80.9	4.0	0.0	*Uta stansburiana* (4)	**Garrett Moss**, **Sami Neymark**

APPENDIX A

Photo Log

Photo 1. General view of Valley Floor Conservation Lands (VFCL) and Project Site looking north.

Photo 2. General view of wash within the VFCL and Project in the background looking north/northwest.

Photo 3. General view of wash within the VFCL looking southeast.

Photo 4. General view of wash within the VFCL looking west.

Photo 5. Female adult blunt-nosed leopard lizard observed in VFCL.

Photo 6. Hatchling/sub-adult blunt-nosed leopard lizard observed in VFCL.

MEMORANDUM

Date: **September 22, 2015**

To: Jennifer Kaminsky

Of: Burns and McDonnell Engineering Company, Inc.

From: Randi McCormick, Principal Biologist

Subject: BNLL hatchling season surveys – portions of Project Footprint, Valley Floor Conservation Lands and Telecom Sites

Purpose

The purpose of this memorandum is to briefly document blunt-nosed leopard lizard (BNLL) hatchling season surveys conducted by McCormick Biological, Inc. on portions of the Panoche Solar Project Footprint, Valley Floor Conservation Lands and Telecommunications sites located in Fresno and San Benito County, California. This memorandum is further intended as a follow-up to *Panoche Valley Solar Blunt-nosed Leopard Lizard Report* prepared by Energy Renewal Partners, LLC and McCormick Biological, Inc. (August 2015) (PVS BNLL Report). The surveys covered 640 acres on the Project Footprint, 82 acres on the VFCL, and 10 locations (144 acres) on the Telecommunications route as shown on Figure 12 of the PVS BNLL Report (Attachment 1).

Survey

Survey methodology generally followed the CDFW Approved Survey Methodology for the Blunt-nosed Leopard Lizard (CDFG 2004) with the exception of the number of iterations of transects completed.

Abbreviated hatchling season BNLL surveys were targeted for August 1 through August 30 based on discussions with CDFW. This window is more restrictive than the CDFW-approved survey window of August 1 to September 15. The 2015 abbreviated hatchling BNLL surveys were accomplished by completing four iterations of set 30 meter transects within the survey area. Transects were shifted 15 meters every other iteration with 100% coverage of the survey area as the objective. The hatchling BNLL surveys were conducted by between two and six Level II surveyors over 15 days of fieldwork. To reduce the potential for misidentification of reptiles, no Level I surveyors participated in hatchling surveys.

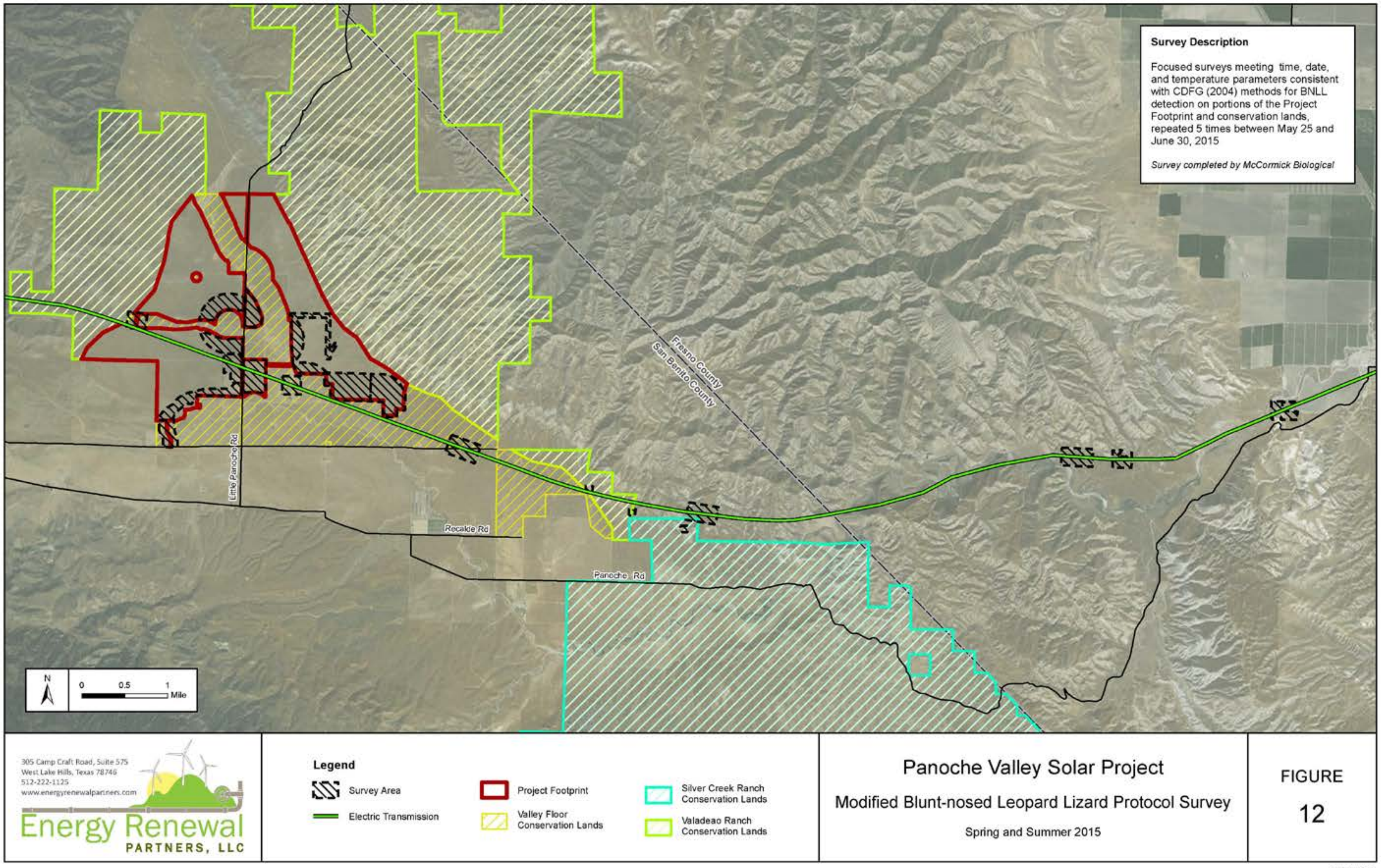
During the hatchling surveys, the surveys were not conducted when weather conditions onsite were out of protocol limits (i.e. >90% cloud cover, sustained >10 miles-per-hour). Surveys were also conducted within the protocol's temperature window of between 77°F to 95°F (25° to 35° Celsius). In addition, surveys began after sunrise, as soon as the minimum air temperature criterion was met, and ended by 1400 hours or when the maximum temperature was reached, whichever occurred first. If the maximum air temperature was reached during a survey, that transect was finished and no further surveys were conducted that day.

All BNLL observations were recorded using handheld GPS devices and observations were categorized by sex (male or female) and age class (adult, juvenile, or hatchling) if possible. Start and end temperature, wind speed, and other wildlife observations were noted. For reptile species identified, the number of individuals observed was recorded. In addition, the relative number of invertebrate species observed that represented potential prey items for BNLL were recorded, based on a suggestion received from CDFW staff. Relative abundance of prey items observed on each transect was classified as none, low (1-9), medium (10-99) or high (100+).

Findings

No BNLL were found within the survey areas during the 2015 abbreviated hatchling surveys. Invertebrate observations on transects generally fell within the low and medium categories, with very few transects classified as high relative abundance. Transects were variable in length; therefore, quantitative comparisons cannot be made. The only reptile observations consisted of common side-blotched lizard (*Uta stansburiana*). See Attachment 2 for results recorded during the 2015 hatchling season surveys.

Attachment 1: Figure 12 from PVS BNLL Report – Abbreviated Hatchling BNLL Survey Locations



Attachment 2: PVS Abbreviated Hatchling BNLL Survey Results Table

Survey Date	Time		Temperature (°F)		Wind Speed (Average mph)		15 meters offset	Reptile Observations (Number)	Surveyors (**Bold = Level II**; Plain text = Level I)
	Start	End	Start	End	Start	End			
Phase 2									
8/5	10:19 AM	11:46 AM	80.6	88.8	1.7	7.5		*Uta stansburiana* (3)	**Steve Pruett, Woody Moise, Samuel Louden, Garrett Moss, Blaine Grant, Sami Neymark**
8/13	8:34 AM	10:13 AM	77.4	89.5	0.8	3.3	X	*Uta stansburiana* (16)	**Allison Locatell, Shane O'Malley, Sami Neymark, Steve Pruett, Samuel Louden, Jake Hutton**
8/18	7:42 AM	9:14 AM	77.4	90.1	1.0	2.1		*Uta stansburiana* (18)	**Russell Kokx, Jake Hutton, Samuel Louden, Sami Neymark, Sabrina Alaniz, Kayla Doty**
8/21	8:33 AM	10:31 AM	77.0	91.3	2.8	4.3	X	*Uta stansburiana* (8)	**Russell Kokx, Kayla Doty, Sami Neymark, Sabrina Alaniz, Woody Moise**
Area A									
8/4	12:02 PM	12:49 PM	87.5	88.3	6.9	77.1		*Uta stansburiana* (5)	**Steve Pruett, Samuel Louden, Woody Moise**
8/14	11:10 AM	12:04 PM	87.6	91.0	5.5	6.4	X	None	**Jake Hutton, Shane O'Malley, Samuel Louden**
8/19	9:24 AM	10:12 AM	89.6	94.0	2.0	8.1		*Uta stansburiana* (23)	**Russell Kokx, Samuel Louden, Jake Hutton**
8/22	9:38 AM	10:21 AM	84.2	89.4	1.8	2.5	X	*Uta stansburiana* (13)	**Waring Laurendine, Kayla Doty, Sami Neymark**
Area B									
8/4	12:03 PM	12:51 PM	87.4	86.4	2.4	1.2		*Uta stansburiana* (7)	**Garrett Moss, Sami Neymark, Blaine Grant**
8/14	10:53 AM	11:56 AM	86.6	92.0	0.6	4.8	X	*Uta stansburiana* (11)	**Sami Neymark, Allison Locatell, Waring Laurendine**
8/19	9:14 AM	10:06 AM	86.2	94.0	5.4	0.4		*Uta stansburiana* (6)	**Sabrina Alaniz, Sami Neymark, Kayla Doty**
8/22	9:30 AM	10:34 AM	83.2	89.3	1.5	6.6	X	*Uta stansburiana* (8)	**Steve Pruett, Sabrina Alaniz, Jake Hutton**
Area C									
8/5	12:10 PM	12:36 PM	86.7	92.5	1.2	5.5		None	**Garrett Moss, Blaine Grant, Sami Neymark**
8/12	10:55 AM	11:19 AM	91.1	91.6	6.0	3.3	X	None	**Sami Neymark, Samuel Louden, Shane O'Malley**
8/14	12:20 PM	12:56 PM	93.5	95.0	2.8	4.7		*Uta stansburiana* (1)	**Sami Neymark, Allison Locatell, Waring Laurendine**
8/21	10:50 AM	11:32 AM	91.3	94.7	4.3	4.8	X	None	**Woody Moise, Russell Kokx**

Survey Date	Time		Temperature (°F)		Wind Speed (Average mph)		15 meters offset	Reptile Observations (Number)	Surveyors (**Bold = Level II**; Plain text = Level I)
	Start	End	Start	End	Start	End			
Area D									
8/5	12:10 PM	12:40 PM	88.8	92.3	7.5	2.6		None	**Steve Pruett, Woody Moise, Samuel Louden**
8/12	10:59 AM	11:25 AM	91.1	93.2	3.7	3.1	X	None	**Steve Pruett, Allison Locatell, Jake Hutton**
8/15	8:30 AM	8:58 AM	77.7	85.6	0.9	0.1		None	**Samuel Louden, Waring Laurendine**
8/21	10:59 AM	11:26 AM	91.3	94.7	4.3	4.8	X	*Uta stansburiana* (1)	**Kayla Doty, Sabrina Alaniz, Sami Neymark**
Area E									
8/4	10:08 AM	11:07 AM	78.6	86.2	4.0	2.3		*Uta stansburiana* (12)	**Steve Pruett, Samuel Louden, Woody Moise**
8/14	9:30 AM	10:50 AM	81.7	87.1	0.0	4.4	X	*Uta stansburiana* (12)	**Jake Hutton, Shane O'Malley, Samuel Louden**
8/19	8:14 AM	9:13 AM	81.4	87.8	3.1	4.1		*Uta stansburiana* (22)	**Russell Kokx, Samuel Louden, Jake Hutton**
8/22	8:31 AM	9:31 AM	78.0	84.2	0.0	1.8	X	*Uta stansburiana* (22)	**Waring Laurendine, Kayla Doty, Sami Neymark**
Area F									
8/4	10:11 AM	11:08 AM	78.6	85.2	4.0	1.3		*Uta stansburiana* (11)	**Garrett Moss, Sami Neymark, Blaine Grant**
8/14	9:33 AM	10:34 AM	82.4	86.4	0.6	9.0	X	*Uta stansburiana* (26)	**Sami Neymark, Allison Locatell, Waring Laurendine**
8/19	8:17 AM	9:07 AM	81.5	83.2	1.2	5.4		*Uta stansburiana* (19)	**Sabrina Alaniz, Sami Neymark, Kayla Doty**
8/22	8:27 AM	9:24 AM	78.0	83.2	1.3	1.5	X	*Uta stansburiana* (15)	**Steve Pruett, Sabrina Alaniz, Jake Hutton**
Area G									
8/4	1:00 PM	1:49 PM	86.4	87.5	7.1	5.6		*Uta stansburiana* (5)	**Garrett Moss, Sami Neymark, Blaine Grant, Steve Pruett**
8/12	8:51 AM	9:47 AM	77.6	87.1	0.7	3.7	X	*Uta stansburiana* (6)	**Steve Pruett, Allison Locatell, Sami Neymark, Jake Hutton**
8/15	9:49 AM	10:54 AM	89.9	94.6	6.0	5.9		*Uta stansburiana* (11)	**Jake Hutton, Shane O'Malley, Allison Locatell, Sami Neymark**
8/20	9:52 AM	10:49 AM	83.8	88.7	6.7	1.0	X	*Uta stansburiana* (5)	**Russell Kokx, Jake Hutton, Kayla Doty, Sami Neymark**
Bridge North									
8/7	10:06 AM	10:25 AM	88.6	87.3	2.9	3.3		*Uta stansburiana* (6)	**Sabrina Alaniz, Woody Moise, Shane O'Malley, Alli Rhodehamel**

Survey Date	Time		Temperature (°F)		Wind Speed (Average mph)		15 meters offset	Reptile Observations (Number)	Surveyors (**Bold = Level II**; Plain text = Level I)
	Start	End	Start	End	Start	End			
8/14	8:51 AM	9:07 AM	77.3	77.5	0.8	2.3	X	*Uta stansburiana* (14)	**Waring Laurendine, Jake Hutton, Allison Locatell, Sam Louden, Sami Neymark**
8/20	11:10 AM	11:29 AM	89.5	91.5	1.4	2.9		*Uta stansburiana* (14)	**Russell Kokx, Jake Hutton, Kayla Doty, Sami Neymark, Sabrina Alaniz, Samuel Louden**
8/22	10:55 AM	11:08 AM	91.2	93.9	4.1	3.2	X	*Uta stansburiana* (8)	**Steve Pruett, Waring Laurendine, Sami Neymark, Kayla Doty, Sabrina Alaniz**
Bridge South									
8/7	11:00 AM	11:21 AM	92.3	92.2	4.2	8.0		*Uta stansburiana* (10)	**Sabrina Alaniz, Steve Pruett, Woody Moise, Alli Rhodehamel, Samuel Louden, Shane O'Malley**
8/11	12:12 PM	12:30 PM	93.6	94.1	1.2	0.6	X	*Uta stansburiana* (9)	**Steve Pruett, Samuel Louden, Shane O'Malley, Jake Hutton, Allison Locatell, Sami Neymark**
8/18	9:49 AM	10:07 AM	94.0	95.6[1]	2.9	3.5		*Uta stansburiana* (19)	**Sami Neymark, Sabrina Alaniz, Kayla Doty, Russell Kokx, Jake Hutton, Samuel Louden**
8/22	11:31 AM	11:50 AM	93.9	93.6	7.4	9.2	X	*Uta stansburiana* (12)	**Steve Pruett, Waring Laurendine, Sami Neymark, Kayla Doty, Sabrina Alaniz, Jake Hutton**
[1] Maximum temperature reached during final transect. Start temperature of final transect was 94.6°F									
Fenceline									
8/7	9:24 AM	10:32 AM	79.1	92.2	9.6	5.4		*Uta stansburiana* (16)	**Steve Pruett, Samuel Louden**
8/11	10:56 AM	11:53 AM	92.6	95.0	1.5	1.6	X	*Uta stansburiana* (7)	**Steve Pruett, Samuel Louden**
8/15	9:13 AM	10:18 AM	83.7	91.2	0.1	2.0		*Uta stansburiana* (31)	**Samuel Louden, Waring Laurendine**
8/20	8:35 AM	9:44 AM	77.2	86.6	0.0	4.5	X	*Uta stansburiana* (17)	**Samuel Louden, Sabrina Alaniz**
Telecom 1									
8/4	12:55 PM	1:33 PM	88.3	88.7	7.1	7.3		*Uta stansburiana* (1)	**Samuel Louden, Woody Moise**
8/12	9:55 AM	10:19 AM	87.1	89.0	3.7	4.2	X	*Uta stansburiana* (5)	**Steve Pruett, Allison Locatell, Sami Neymark, Jake Hutton**
8/15	10:38 AM	11:14 AM	91.8	94.7	4.8	8.4		*Uta stansburiana* (12)	**Jake Hutton, Shane O'Malley, Allison Locatell, Sami Neymark, Samuel Louden, Waring Laurendine**
8/20	10:02 AM	10:39 AM	86.2	89.7	6.7	1.0	X	*Uta stansburiana* (3)	**Samuel Louden, Sabrina Alaniz**
Telecom 2									
8/5	1:00 PM	1:12 PM	86.5	88.8	4.1	6.6		*Uta stansburiana* (2)	**Garrett Moss, Blaine Grant, Steve Pruett, Sami Neymark, Woody Moise, Samuel Louden**

Survey Date	Time		Temperature (°F)		Wind Speed (Average mph)		15 meters offset	Reptile Observations (Number)	Surveyors (**Bold = Level II**; Plain text = Level I)
	Start	End	Start	End	Start	End			
8/7	11:46 AM	12:03 AM	91.5	93.0	5.2	6.9	X	*Uta stansburiana* (8)	**Steve Pruett, Woody Moise, Sabrina Alaniz, Alli Rhodehamel, Shane O'Malley, Samuel Louden**
8/12	10:31 AM	10:44 AM	89.0	88.9	4.2	3.7		*Uta stansburiana* (6)	**Steve Pruett, Allison Locatell, Sami Neymark, Jake Hutton, Shane O'Malley, Samuel Louden**
8/20	11:51 AM	12:06 PM	92.6	92.2	2.0	0.8	X	None	**Kayla Doty, Sami Neymark, Jake Hutton, Russell Kokx, Sabrina Alaniz, Samuel Louden**
Telecom 3									
8/5	9:30 AM	10:06 AM	77.9	80.6	2.6	1.7		*Uta stansburiana* (29)	**Woody Moise, Blaine Grant, Steve Pruett, Samuel Louden, Sami Neymark, Garrett Moss**
8/13	10:36 AM	11:09 AM	91.9	94.2	3.7	3.1	X	*Uta stansburiana* (21)	**Steve Pruett, Sami Neymark, Shane O'Malley, Samuel Louden, Jake Hutton, Allison Locatell**
8/15	8:21 AM	9:13 AM	77.2	85.3	4.6	1.7		*Uta stansburiana* (58)	**Jake Hutton, Shane O'Malley, Allison Locatell, Sami Neymark**
8/20	8:36 AM	9:30 AM	77.0	85.3	6.6	2.1	X	*Uta stansburiana* (58)	**Kayla Doty, Sami Neymark, Jake Hutton, Russell Kokx**
Telecom 4									
8/8	9:06 AM	10:08 AM	77.9	85.5	1.5	6.1		*Uta stansburiana* (5)	**Steve Pruett, Samuel Louden**
8/11	9:43 AM	10:20 AM	84.2	87.9	3.6	1.4	X	*Uta stansburiana* (29)	**Steve Pruett, Samuel Louden**
8/21	9:50 AM	10:42 AM	83.9	91.6	4.7	6.0		*Uta stansburiana* (11)	**Steve Pruett, Jake Hutton**
8/24	9:03 AM	10:15 AM	79.3	93.0	1.7	3.6	X	*Uta stansburiana* (30)	**Steve Pruett, Waring Laurendine**
Telecom 4 Drainage Crossings									
8/8	10:17 AM	10:59 AM	85.5	89.0	6.1	7.4		*Uta stansburiana* (15)	**Steve Pruett, Samuel Louden**
8/11	8:40 AM	9:35 AM	77.0	84.2	5.0	3.6	X	*Uta stansburiana* (9)	**Steve Pruett, Samuel Louden**
8/21	9:32 AM	11:56 AM	83.9	95.0	4.7	8.4		*Uta stansburiana* (28)	**Steve Pruett, Jake Hutton**
8/24	8:45 AM	11:29 AM	79.3	94.3	1.7	3.6	X	*Uta stansburiana* (31)	**Steve Pruett, Waring Laurendine**
Telecom 6									
8/8	9:10 AM	9:55 AM	78.8	81.2	2.5	4.0		*Uta stansburiana* (16)	**Woody Moise, Sabrina Alaniz, Alli Rhodehamel, Shane O'Malley**
8/11	8:35 AM	9:55 AM	82.1	88.0	0.2	6.6	X	*Uta stansburiana* (31)	**Allison Locatell, Sami Neymark**

Survey Date	Time		Temperature (°F)		Wind Speed (Average mph)		15 meters offset	Reptile Observations (Number)	Surveyors (**Bold = Level II**; Plain text = Level I)
	Start	End	Start	End	Start	End			
8/23	8:35 AM	9:44 AM	77.7	82.4	1.5	5.4		*Uta stansburiana* (27)	**Steve Pruett, Waring Laurendine, Sami Neymark**
8/24	8:01 AM	8:52 AM	77.1	80.3	0.0	0.0	X	*Uta stansburiana* (45)	**Woody Moise, Sami Neymark, Casi Cortez**
Telecom 7									
8/8	10:02 AM	10:26 AM	81.2	83.2	4.0	3.6		*Uta stansburiana* (9)	**Woody Moise, Sabrina Alaniz, Alli Rhodehamel, Shane O'Malley**
8/11	10:03 AM	10:29 AM	88.0	84.9	6.6	9.3	X	*Uta stansburiana* (9)	**Allison Locatell, Sami Neymark, Shane O'Malley, Jake Hutton**
8/23	9:56 AM	10:30 AM	82.5	84.6	5.7	5.0		*Uta stansburiana* (11)	**Steve Pruett, Waring Laurendine, Sami Neymark**
8/24	8:59 AM	9:24 AM	80.3	85.3	0.0	4.8	X	*Uta stansburiana* (20)	**Woody Moise, Sami Neymark, Casi Cortez**
Telecom 8									
8/11	8:31 AM	9:32 AM	77.4	78.7	5.6	2.8		*Uta stansburiana* (4)	**Shane O'Malley, Jake Hutton**
8/12	8:40 AM	9:26 AM	77.5	80.9	1.6	4.7	X	*Uta stansburiana* (16)	**Shane O'Malley, Samuel Louden**
8/23	11:10 AM	12:02 PM	85.7	92.6	1.7	4.2		*Uta stansburiana* (16)	**Steve Pruett, Waring Laurendine, Sami Neymark**
8/24	10:02 AM	10:41 AM	82.9	86.5	2.8	5.2	X	*Uta stansburiana* (23)	**Woody Moise, Sami Neymark, Casi Cortez**

Appendix G
Agency Consultation

SHPO Concurrence

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
1725 23rd Street, Suite 100
SACRAMENTO, CA 95816-7100
(916) 445-7000 Fax: (916) 445-7053
calshpo@parks.ca.gov
www.ohp.parks.ca.gov

October 12, 2015 In Reply Refer To: COE_2015_0916_001

Lisa M. Gibson
Regulatory Permit Specialist, Regulatory Division
Department of the Army Corps of Engineers
U.S. Army Engineer District, Sacramento
1325 J Street
Sacramento, CA 95814-2922

Re: Section 106 Consultation for the Panoche Valley Solar Farm Project, San Benito County (USACE SPK-2009-00443).

Dear Ms. Gibson:

Thank you for your letter received September 16, 2015 initiating consultation on the above referenced undertaking to comply with Section 106 of the National Historic Preservation Act of 1966 (as amended) and its implementing regulation at 36 CFR Part 800. The Army Corps of Engineers (COE) is considering issuing a Clean Water Act Section 404 permit to Panoche Valley Solar (Applicant) to place fill materials in waters of the U.S. The Applicant proposes developing a solar facility on 2,506 acres as well as upgrading the existing Panoche-Moss Landing 230kV transmission line to support connection to the electrical grid. Additional on-site and off-site acreage will be managed as conservation lands. The COE has defined the Area of Potential Effects (APE) as the permit area which includes approximately 4,717 -acres for the solar facility and conservation lands (2,506 of which will be developed into the solar facility), 523 acres for the telecommunication upgrade areas, and 57.76 acres for the off-site conservation lands.

Along with your letter, you submitted the following supporting documents:

- *Panoche Valley Solar Farm Project Cultural Resource Survey Final Report, San Benito County California.* (POWER Engineers with contributions by Far Western Anthropological Research Group, Inc. and JRP Historical Consulting. LLC 2010)
- Six supplemental Cultural Resources Inventory reports prepared by Natural Investigations Company (2014-2015)

Efforts to identify historic properties began in 2010 and continue to the present. These efforts included several field investigations, historical research, and consultation with Native American Tribes. The COE has consulted with the Amah Matsun Tribal Band, including the Applicant's consultant having a field review with a tribal representative. Your submittal details consultation with Mr. Ed Ketchum of the Amah Matsun Tribal Band regarding whether a plant traditionally used by his people was present in the project area. After consultation, COE determined the plant was likely either common reed (Phragmites australis) or Giant wild rye (Elymus condensatus) neither of which occurs on the proposed project site.

The COE has identified the following properties within the APE and has made the following determinations of eligibility to the National Register of Historic Places:

Designation	**NRHP Status**
Panoche 01, Ranch Complex	Not Eligible
Panoche 02, Water Diversion Structure	Not Eligible
Panoche 03, Ranch Features (trough, corral)	Not Eligible
Panoche 04, Ranch Complex(residence, tankhouse, outbuildings)	Not Eligible
Panoche 05, Moss Landing-Panoche 230 kV Electrical Transmission Lines	Not Eligible
P-10-005463, Isolated Handstone	Not Eligible
P-10-005835, Isolated Porcelain Fragment	Not Eligible
P-10-005887, Chaney Ranch Buildings (two groups of farm/ranch residences)	Not Eligible
P-10-006013, Panoche Substation	Not Eligible
Panoche Road Bridge (Bridge no. 42-0248	Not Eligible (Previous SHPO concurrence)
Historic-era Refuse Deposit (NIC 2015-02)	Not Eligible
CA-FRE-46 (P-10-0046), Prehistoric Lithic Scatter	Treat as Eligible

I concur with the above determinations of eligibility.

Your submittal explains site CA-FRE-46 is a lithic scatter located approximately 21 meters inside the northern boundary of the APE for Study Area 6 of the telecommunication upgrade area. No documented archaeological testing has occurred at this site. The site is located approximately 100 meters from the closest temporary (75-foot by 75-foot) wire pull site within the transmission right-of-way in Study Area 6; however, the COE has determined that the site will not be directly or indirectly impacted by the proposed telecommunication service improvements.

In a follow up conversation on October 9, 2015, you explained that, given the general sensitivity of the area, the COE will require archaeological monitoring of initial grading as a permit condition. Additionally, the Applicant has stated they will have Native American monitors for work within 200 meters of the creek and any other sensitive areas. I appreciate this responsiveness to tribal comments and attention to cultural resources.

The COE has concluded that issuing a permit would have no effect on historic properties and has requested my review and comment. I have the following comments:

- Pursuant to 36 CFR 800.4(b), I find that the COE has made a reasonable and good faith effort to identify historic properties within the area of potential effects.
- Pursuant to 36 CFR 800.4(d)(1)(i), **I do not object to a finding of no historic properties affected for this undertaking.**

Thank you for seeking my comments and for considering historic properties in planning your project. Be advised that under certain circumstances, such as unanticipated discovery or a change in project description, the COE may have additional future responsibilities for this undertaking under 36 CFR Part 800. If the COE requires additional information, please contact Anmarie Medin of my staff at (916) 445-7023 or Anmarie.Medin@parks.ca.gov.

Sincerely,

Julianne Polanco
State Historic Preservation Officer

401 Water Quality Certification

Central Valley Regional Water Quality Control Board

15 October 2015

Eric Cherniss
Panoche Valley Solar, LLC
845 Oak Grove Ave., Suite 202
Menlo Park, CA 94025

CLEAN WATER ACT §401 TECHNICALLY CONDITIONED WATER QUALITY CERTIFICATION FOR DISCHARGE OF DREDGED AND/OR FILL MATERIALS FOR THE PANOCHE VALLEY SOLAR FACILITY PROJECT, WDID#5C35CR00002, SAN BENITO COUNTY

This Order responds to the 4 November 2014 application and the 30 January 2015 revised application submitted by Panoche Valley Solar, LLC (Applicant) for the Water Quality Certification of construction and operation of a solar photovoltaic energy generating facility project permanently impacting 0.121 acres of waters of the United States. Additionally, 0.096 acres of waters of the United States will be impacted by compensatory mitigation activities on the Panoche Valley Solar Facility Project (Project) mitigation sites.

This Order serves as certification of the subject Project permitted by the United States Army Corps of Engineers' Individual Permit under § 401 of the Clean Water Act, and a Waste Discharge Requirement under the Porter-Cologne Water Quality Control Act and State Water Resources Control Board Order 2003-0017-DWQ.

WATER QUALITY CERTIFICATION STANDARD CONDITIONS:

1. This Certification is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to § 13330 of the California Water Code and § 3867 of Title 23 of the California Code of Regulations (23 CCR).

2. This Certification is not intended and shall not be construed to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to 23 CCR § 3855(b) and the application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

3. The validity of any non-denial certification action shall be conditioned upon total payment of the full fee required under 23 CCR § 3860.

4. In the event of any violation or threatened violation of the conditions of this Certification, the violation or threatened violation shall be subject to any remedies, penalties, process, or sanctions as provided for under State law and § 401 (d) of the federal Clean Water Act. The applicability of any State law authorizing remedies, penalties, process, or sanctions for the violation or threatened violation constitutes a limitation necessary to ensure compliance with this Certification.

WATER QUALITY CERTIFICATION GENERAL CONDITIONS:

1. Certification is valid for the duration of the Project described in the attached "Project Information Sheet." This Certification is no longer valid if the Project (as summarized in the "Project Information Sheet" and described in the water quality certification application) is modified, or coverage under the project permit issued by the U.S. Army Corps of Engineers pursuant to § 404 of the Clean Water Act has expired.

2. The Applicant shall provide a Notice of Completion (NOC) no later than 30 days after the Project completion. The NOC shall demonstrate that the Project has been carried out in accordance with the Project description in the Certification and in any approved amendments. The NOC shall include a map of the Project location(s), including final boundaries of any on-site restoration area(s), if appropriate, and representative pre and post construction photographs. Each photograph shall include a descriptive title, date taken, photographic site, and photographic orientation.

3. All reports, notices, or other documents required by this Certification or requested by the Central Valley Water Board shall be signed by a person described below or by a duly authorized representative of that person.

    a. For a corporation: by a responsible corporate officer such as (1) a president, secretary, treasurer, or vice president of the corporation in charge of a principal business function; (2) any other person who performs similar policy or decision-making functions for the corporation; or (3) the manager of one or more manufacturing, production, or operating facilities if *authority* to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

    b. For a partnership or sole proprietorship: by a general partner or the proprietor.

    c. For a municipality, State, federal, or other public agency: by either a principal executive officer or ranking elected official.

4. Any person signing a document under General Condition No. 3 shall make the following certification, whether written or implied:

    "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

ADDITIONAL TECHNICALLY CONDITIONED CERTIFICATION CONDITIONS:

In addition to the standard and general conditions above, the Applicant shall satisfy the following:

1. The Applicant shall notify the Central Valley Water Board in writing **seven days** prior to beginning any in-water activities.

2. Except for activities permitted by the U.S. Army Corps of Engineers under § 404 of the Clean Water Act, soil, silt, or other organic materials shall not be placed where such materials could pass into surface water or surface water drainage courses.

3. All areas disturbed by Project activities shall be protected from washout or erosion.

4. The Applicant shall maintain a copy of this Certification and supporting documentation (Project Information Sheet) at the Project site during construction for review by site personnel and agencies. All personnel (employees, contractors, and subcontractors) performing work on the proposed Project shall be adequately informed and trained regarding the conditions of this Certification.

5. An effective combination of erosion and sediment control Best Management Practices (BMPs) shall be implemented and adequately working during all phases of construction.

6. All temporarily affected areas shall be restored to pre-construction contours and conditions upon completion of construction activities.

7. The Applicant shall perform surface water sampling: 1) when performing any in-water work; 2) in the event that Project activities result in any materials reaching surface waters or; 3) when any activities result in the creation of a visible plume in surface waters. Pollutants shall be analyzed using the analytical methods described in 40 Code of Federal Regulations Part 136; where no methods are specified for a given pollutant, the method shall be approved by Central Valley Water Board staff. The following monitoring shall be conducted immediately upstream out of the influence of the Project and approximately 300 feet downstream of the active work area. Sampling results shall be submitted to this office by the first day of the second month following sampling. The sampling frequency and monitoring locations may be modified for certain projects with written permission from the Central Valley Water Board Executive Officer.

Parameter	Unit	Type of Sample	Frequency of Sample
Turbidity	NTU	Grab	Every 4 hours during in-water work
Settleable Material	ml/L	Grab	Same as above
pH	Standard units	Grab	Daily during concrete activity
Visible construction related pollutants	Observation	Visible Inspections	Continuous throughout the construction period

8. Activities shall not cause in surface waters:

   (a) where natural turbidity is between 0 and 5 Nephelometric Turbidity Units (NTUs), increases exceeding 1 NTU;

   (b) where natural turbidity is between 5 and 50 NTUs, increases exceeding 20 percent;

   (c) where natural turbidity is between 50 and 100 NTUs, increases exceeding 10 NTUs;

   (d) where natural turbidity is greater than 100 NTUs, increases exceeding 10 percent.

   In determining compliance with the above limits, appropriate averaging periods may be applied provided that beneficial uses will be fully protected. Averaging periods may only be used with prior permission of the Central Valley Water Board Executive Officer.

9. Activities shall not cause settleable material to exceed 0.1 ml/L in surface waters as measured in surface waters downstream from the Project.

10. Activities shall not cause the pH in surface waters to be depressed below 6.5 nor raised above 8.3.

11. The discharge of petroleum products or other excavated materials to surface water is prohibited. Activities shall not cause visible oil, grease, or foam in the work area or downstream. The Applicant shall notify the Central Valley Water Board immediately of any spill of petroleum products or other organic or earthen materials.

12. Prior to arrival at the project site and prior to leaving the project site, construction equipment that may contain invasive plants and/or seeds shall be cleaned to reduce the spreading of noxious weeds.

13. The Applicant shall implement the Wetlands Mitigation and Monitoring Plan (WMMP), as approved by the Central Valley Water Board on 31 July 2015. Modification to the WMMP must be submitted to the Central Valley Water Board for approval by the Executive Officer.

14. The Applicant shall notify the Central Valley Water Board immediately if any of the above conditions are violated, along with a description of measures it is taking to remedy the violation.

15. The Applicant shall comply with all California Department of Fish and Game Code § 1600 requirements for the Project.

16. The Applicant must obtain coverage under the NPDES General Permit for Storm Water Discharges Associated with Construction Activities issued by the State Water Resources Control Board for any project disturbing an area of one acre or greater.

17. In the event of any violation or threatened violation of the conditions of this Certification, the violation or threatened violation shall be subject to any remedies, penalties, process, or sanctions as provided for under State law and § 401 (d) of the federal Clean Water Act. The applicability of any State law authorizing remedies, penalties, process, or sanctions for the violation or threatened violation constitutes a limitation necessary to ensure compliance with this Certification.

18. If the Applicant or a duly authorized representative of the Applicant fails or refuses to furnish technical or monitoring reports, as required under this Certification, or falsifies any information provided in the monitoring reports, the Applicant will be subject to civil liability, for each day of violation, or criminal liability.

19. In response to a suspected violation of any condition of this Certification, the Central Valley Water Board may require the Applicant to furnish, under penalty of perjury, any technical or monitoring reports the Central Valley Water Board deems appropriate, provided that the burden, including cost of the reports, shall be in reasonable relationship to the need for the reports and the benefits to be obtained from them.

20. The Applicant shall allow staff of the Central Valley Water Board, or an authorized representative(s), upon the presentation of credentials and other documents, as may be required by law, to enter the Project premises for inspection, including taking photographs and securing copies of project-related records, for the purpose of assuring compliance with this Certification and determining the ecological success of the Project.

CENTRAL VALLEY WATER BOARD CONTACT PERSON:

Debra Mahnke, Water Resource Control Engineer
1685 E Street
Fresno, CA 93706
(559) 445-6281
debra.mahnke@waterboards.ca.gov

WATER QUALITY CERTIFICATION:

I hereby issue an order certifying that the proposed discharge from the Panoche Valley Solar, LLC Panoche Valley Solar Facility Project, WDID 5C35CR00002, will comply with the applicable provisions of § 301 ("Effluent Limitations"), § 302 ("Water Quality Related Effluent Limitations"), § 303 ("Water Quality Standards and Implementation Plans"), § 306 ("National Standards of Performance"), and § 307 ("Toxic and Pretreatment Effluent Standards") of the Clean Water Act. This discharge is also regulated under State Water Resources Control Board Water Quality Order No. 2003-0017 DWQ "Statewide General Waste Discharge Requirements For Dredged Or Fill Discharges That Have Received State Water Quality Certification."

Except insofar as may be modified by any preceding conditions, all certification actions are contingent on (a) the discharge being limited to and all proposed mitigation being completed in strict compliance with the Applicant's project description, the attached "Project Information Sheet," and the Applicant's water quality certification application; and (b) compliance with all applicable requirements of the Central Valley Water Board's *Water Quality Control Plan for the Tulare Lake Basin,* Second Edition, revised January 2004.

Any person aggrieved by this action may petition the State Water Resources Control Board to review the action in accordance with California Water Code § 13320 and California Code of Regulations, title 23, § 2050 and following. The State Water Resources Control Board must receive the petition by 5:00 p.m., 30 days after the date of this action, except that if the thirtieth day following the date of this action falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Resources Control Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filing petitions may be found on the Internet at: http://www.waterboards.ca.gov/public_notices/petitions/water_quality or will be provided upon request.

Clay L. Rodgers

for Pamela C. Creedon
Executive Officer

Enclosure: Water Quality Order No. 2003-0017 DWQ
Attachment: Project Information Sheet

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

Central Valley Regional Water Quality Control Board

15 October 2015

TO: See attached addressee list

CLEAN WATER ACT §401 TECHNICALLY CONDITIONED WATER QUALITY CERTIFICATION AND RESPONSES TO COMMENTS FOR DISCHARGE OF DREDGED AND/OR FILL MATERIALS FOR THE PANOCHE VALLEY SOLAR FACILITY PROJECT, WDID#5C35CR00002, SAN BENITO COUNTY

Enclosed is a copy of the Order issued by the Executive Officer of the Central Valley Regional Water Quality Control Board, serving as certification of the Panoche Valley Solar Project permitted by the United States Army Corps of Engineers' Individual Permit under § 401 of the Clean Water Act and a Waste Discharge Requirement under the Porter-Cologne Water Quality Control Act and State Water Resources Control Board Order 2003-0017-DWQ, responding to the 4 November 2014 application and the 30 January 2015 revised application submitted by Panoche Valley Solar, LLC (Applicant).

Also enclosed are responses to comments submitted by Fresno Audubon Society, Santa Clara Valley Audubon Society, Ohlone Audubon Society, Citizens to Complete the Refuge, Defenders of Wildlife, Sierra Club, and Center for Biological Diversity (Environmental Groups), and by Kim Williams on the Clean Water Act section 401 Water Quality Certification (Certification) application. The comments were submitted in response to the public notice posted on the Central Valley Water Board website on 20 February 2015 regarding the Certification application.

To conserve resources, paper copies of the Order and responses to comments are being sent to the Applicant, the Environmental Groups, and Ms. Williams. The Order, comments received, and responses to comments are available electronically on our California Integrated Water Quality System (CIWQS) database (https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?inCommand=drilldown&reportName=facilityAtAGlance&placeID=815414&reportID=1794935).

If you have any questions or would like to receive paper copies, please contact Debra Mahnke at (559) 445-6281 or debra.mahnke@waterboards.ca.gov.

MATTHEW S. SCROGGINS
Senior Engineer
RCE No. 67491

Enclosures: Clean Water Act section 401 Certification (Applicant, Environmental Groups, and Kim Williams only)
Responses to Comments (Applicant, Environmental Groups, and Kim Williams only)

APPLICANT

Eric Cherniss
Panoche Valley Solar, LLC
845 Oak Grove Ave., Suite 202
Menlo Park, CA 94025

INTERESTED PERSONS LIST

Jason Brush, Supervisor, Wetlands Regulatory Office, U.S. Environmental Protection Agency, Region 9, San Francisco (email)
Kate Dadey, Sacramento South Branch Chief, Regulatory Unit, Department of the Army, Corps of Engineers, Sacramento
Bill Orme, Water Quality Certification Unit Chief, Division of Water Quality, State Water Resources Control Board, Sacramento (email)
Regional Manager, San Joaquin Valley-Southern Sierra Region, California Department of Fish and Wildlife, Fresno
Margie Barrios, Supervisor, County of San Benito, 481 4th St., 1st Floor, Hollister, 95023
San Benito County Department of Public Works and Planning
Fresno County Department of Public Works and Planning
Kim Williams, 32615 Panoche Road, Panoche Valley, CA 95043 (Order and Response to Comments only)
Robert Snow, Fresno Audubon Society, P.O. Box 9324, Fresno, 93791 (Order and Response to Comments only)
Shani Kleinhaus, Santa Clara Audubon Society, 22221 McClellan Rd., Cupertino, 94303 (Order and Response to Comments only)
Carin High, Citizens Committee to Complete the Refuge, 453 Tennessee Lane, Palo Alto, 94306 (Order and Response to Comments only)
Kim Delfino, Defenders of Wildlife, 1303 J Street, Ste 270, Sacramento, 95814 (Order and Response to Comments only)
Michare Ferreira, Sierra Club, Loma Prieta Chapter, 3921 E. Bayshore Rd., Ste. 204, Palo Alto, 94303 (Order and Response to Comments only)
Sarah K. Friedman, Sierra Club, Los Angeles Chapter, 3435 Wilshire Blvd, Ste.660, Los Angeles, 90010-1904 (Order and Response to Comments only)
Ileene Anderson, Center for Biological Diversity, 8033 Sunset Blvd., #447, Los Angeles, CA 90046 (Order and Response to Comments only)
Evelyn Cormier, Ohlone Audubon Society, 1922 Hillsdale Street, Hayward, CA 94541 (Order and Response to Comments only)
Cody Elliot, San Benito Residents for Responsible Development, Adams Broadwell Joseph & Cardozo, 601 Gateway Boulevard, Ste. 1000, South San Francisco, 94080-7037
Elizabeth D. Kipp, Big Sandy Rancheria, P.O. Box 337, Auberry, 93602
Jeffrey Lee, Cold Springs Rancheria of Mono Indians, P.O. Box 209, Tollhouse, 93667
Rueben Barrios Sr., Santa Rosa Rancheria Tachi Yokut Tribe, P.O. Box 8, Lemoore, 93245
Leanne Walker-Grant, Table Mountain Rancheria, P.O. Box 410, Friant, 93626
Benjamin Charley, Sr., Dunlap Band of Mono Indians, Box 45, Dunlap, 93621
Robert Ledger, Dumna Wo-Wah Tribal Government, 2216 E. Hammond St., Fresno, 93703
Kenneth Woodrow, Wuksache Indian Tribe/Eshorn Valley Band, 1179 Rock Haven Ct., Salinas 93906
David Alvarez, Traditional Choinumni Tribe, 2415 E. Houston Ave., Fresno, 93720
Ann Marie Sayers, Indian Canyon Mutsun Band of Costanoan, P.O. Box 28, Hollister, 95024
Louise Miranda-Ramirez, Ohlone/Costanoan-Esselen Nation, P.O. Box 1301, Monterey, 93942
John W. Burch, Salinan Tribe of Monterey, San Luis Obispo and San Benito Counties, 7070 Morro Road, Ste. A, Atascadero, 93422
Ramona Garibay Representative, Trina Marine Ruano Family, 30940 Watkins St., Union City, 94587
Donna Harro, Xolon Salinan Tribe, 150 Fig Tree Lane, Apt. 28, Martinez, 94553

PROJECT INFORMATION SHEET

Application Date: 4 November 2014, revised on 30 January 2015

Applicant: Panoche Valley Solar, LLC

Applicant Representatives: Eric Cherniss, Lead Developer
Jennifer Kaminsky, Burns and McDonnell

Project Name: Panoche Valley Solar Facility Project

Application Number: WDID 5C35CR00002

Type of Project: Solar photovoltaic energy generating facility

Project Location: 2 miles north of the intersection of Little Panoche Road and Panoche Road, Sections 3-4, 8-11, 13-16, Township 15 South, Range 10 East, MDB&M.

Project Duration: The Project is tentatively scheduled to begin in 2015 and be completed in eighteen months. The schedule may be adjusted to avoid or minimize environmental impacts.

County: San Benito

Receiving Water: Las Aguilas Creek, Panoche Creek, and three unnamed ephemeral drainages, Tulare Lake Hydrologic Basin, Coast Range Hydrologic Unit #559.11, Ciervo Hills HA, Panoche HSA

Water Body Type: Un-vegetated streambed

Designated Beneficial Uses: The *Water Quality Control Plan for the Tulare Lake Basin,* Second Edition, revised January 2004 (Basin Plan), has designated beneficial uses for surface and ground waters within the region. Beneficial uses that could be impacted by the project include, but are not limited to: Municipal and Domestic Water Supply (MUN); Agricultural Supply (AGR); Industrial Supply (IND); Hydropower Generation (POW); Groundwater Recharge (GWR); Water Contact Recreation (REC-1); Non-Contact Water Recreation (REC-2); Warm Freshwater Habitat (WARM); Cold Freshwater Habitat (COLD); Preservation of Biological Habitats of Special Significance (BIOL); Rare, Threatened, or Endangered Species (RARE); Migration of Aquatic Organisms (MIGR); Spawning, Reproduction, and/or Early Development (SPWN); and Wildlife Habitat (WILD). A comprehensive and specific list of the beneficial uses applicable for the project area can be found at http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/index.shtml.

Project Description: The Project consists of the construction and operation of a 247 megawatt (AC) solar photovoltaic energy generating facility. The Proposed Project Footprint consists of approximately 2,506 acres located in the Panoche Valley of eastern San Benito County, California. The Project Footprint will be comprised of the following components: solar arrays, an operations and maintenance building, project perimeter roads including emergency access and egress, collection lines, electrical transformers, DC-AC inverters, and an electrical substation and switchyard. In connection with the Proposed Project, Pacific Gas & Electric will also be performing telecommunication upgrades. The impacts to the jurisdictional waters (federal waters) would result from the mandatory emergency road crossings over Las Aguilas Creek channel as well as three additional crossings of un-vegetated streambeds.

Preliminary Water Quality Concerns: Construction activities may impact surface waters with increased turbidity and settleable matter.

Proposed Mitigation to Address Concerns: The Applicant has placed heavy emphasis on Low Impact Development (LID) criteria when designing the Project as per the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activities.. The Project is not expected to significantly alter the pre-development hydrologic conditions within the Project Footprint. The Project has been designed to implement the following LID features and criteria:

- Hardscape and impermeable surfaces will be minimal;
- PV modules will be elevated above grade, which preserves permeability of the soil within the Project Site;
- Existing natural drainage flows will be maintained as much as possible;
- A Wetland Mitigation and Monitoring Plan and a Habitat Management Plan will be developed for the Project to mitigate potential impacts;
- Road crossings will be avoided where possible, and where necessary, roads will be built as near to right angles to the streams and drainages as possible;
- All construction and maintenance activities shall be conducted in a manner that would minimize disturbance to vegetation, drainage channels, and intermittent or perennial stream banks for both federal and non-federal waters;
- A Fugitive Dust Mitigation Plan will be developed for the Project, which will include dust-control measures in sensitive areas; and
- Low water crossings (LWC) will be used within the Project Footprint where feasible.

Fill/Excavation Area:

Table 1. Proposed Impacts to Federal Waters from Project Construction

Drainage Impact #	Latitude/Longitude	Type of Crossings	Approx. Cut/Fill (Yd3)	Approx. Total Linear Ft.	Approx. Total acre(s)
1	N036° 38' 13.08"/ W120° 53' 56.96"	Singe span bridge	343/396	*20	0.001
14	N036° 38' 55.47"/ W120° 51' 54.94"	Perimeter Rd	103/4,865	1,529	0.05
19	N036° 38' 31.05"/ W120° 51' 41.12"	Perimeter Rd	204/1,008	1,156	0.04
22	N036° 38' 05.31"/ W120° 51' 13.69"	Perimeter Rd	13/611	799	0.03
TOTAL				**3,504**	**0.121**
*Impacts will be due to rip rap support for the bridge abutments.					

Table 2. Proposed Impacts to Federal Waters from Compensatory Mitigation (Debris Removal)

Drainage Impact #	Latitude/Longitude			Total Linear Ft.	Total acre(s)
Debris Removal Area 1b	N36°38'54.98"/W120°49'43.47"			30	0.003
Debris Removal 4	N36°35'7.57"/ W120°47'12.04"			323	0.093
TOTAL				**353**	**0.096**

Dredge Volume: None

U.S. Army Corps of Engineers Permit Number: Individual Permit

Department of Fish and Wildlife Streambed Alteration Agreement: The Applicant originally applied for a Streambed Alteration Agreement on 13 October 2014, and submitted revised applications on 21 March 2014 and 18 August 2015.

Status of CEQA Compliance: The County of San Benito, acting as the California Environmental Quality Act (CEQA, Public Resources Code § 21000, et seq.) Lead Agency, certified the Final Environmental Impact Report (FEIR) on 10 November 2010. A Notice of Determination was filed with the State Clearinghouse on 22 November 2010. Subsequently, on 19 May 2015, the County of San Benito certified a Supplemental EIR (SEIR) to reflect changes to the previously certified project. A Notice of Determination was filed with the County of San Benito on 20 May 2015, with Fresno County on 22 May 2015, and the State Clearinghouse on 11 June 2015.

Following certification of the SEIR, the County of San Benito adopted a Statement of Overriding Considerations for significant impacts considered unavoidable and not reduced to a level of Less Than Significant by mitigation. The unavoidable significant impacts not expected to be reduced by mitigation listed in the SEIR were related to aesthetics and construction noise.

The SEIR concludes that the Project is not expected to cause or contribute to any violation of applicable water quality standards or substantially degrade existing water quality, and that the implementation of specific mitigation measures will further reduce potential impacts to water quality to a less than significant level.

The Central Valley Water Board, acting as a CEQA Responsible Agency in compliance with California Code of Regulations (CCR), title 14 § 15096, reviewed both the Notice of Preparation of the FEIR and SEIR, and the FEIR and SEIR for the Project, and submitted comments to the County of San Benito accordingly. The Central Valley Water Board also evaluated the potentially significant impacts resulting from the fill of drainages and related mitigation measures identified in the FEIR and SEIR. Mitigation measures were imposed on the Project in the FEIR and SEIR to ensure that impacts resulting from the fill of drainages are less than significant.

Compensatory Mitigation: On 15 June 2015, the Discharger submitted a document entitled draft Wetlands Mitigation and Monitoring Plan (Mitigation Plan). The Mitigation Plan proposes to mitigate for impacts to both the waters of the United States and waters of the State through the creation, enhancement, and restoration of water features on designated Conservation Lands described below. As described in the Mitigation Plan and below, the Discharger will provide for the direct creation, enhancement, or restoration of 11.960 acres of drainages, vernal pools, and wetlands by implementing the Mitigation Plan.

Additionally, to mitigate for the loss of waters of the State and the United States, the Discharger will preserve a total of 24,176 acres, which will be managed through implementation of a Conservation Management Plan. Preserved lands include the Valley Floor Conservation Lands (2,514 acres), Valadeao Ranch Conservation Lands (10,772 acres), and Silver Creek Ranch Conservation Lands (10,890 acres). The three large parcels of Conservation Lands are contiguous with the Project site and with 86,000 acres of Bureau of Land Management lands. The Discharger will preserve in perpetuity under conservation easement 716,853 linear feet of streams, drainages, and creeks within the Conservation Lands, as shown in Table 3 below.

Table 3. Summary of Preserved Waters of the State

Total Linear Feet of Streams, Drainages, & Creeks	
Valley Floor Conservation Lands	81,957
Valadeao Ranch Conservation Lands	326,519
Silver Creek Ranch Conservation Lands	308,377
Total Linear Feet	**716,853**

The Conservation Lands associated with the Project are located within Township 15S, Range 10E, Sections 3-4, 8-10, 13-16, and 25; Township 15S, Range 11E, Section 19; Township 14S, Range 10E, Sections 21-27 and 32-36; Township 14S, Range 11E, Sections 19 and 29-32; Township 15S, Range 10E, Sections 1-8 and 10-14; Section 15S, Township 11E, Sections 6-7, 19-20, and 26-36; and Township 16S, Range 11E, Sections 1-6 and 8-12. The solar facility and all associated land will be located on property under control of the Discharger.

The Discharger will create three ponds to support California tiger salamander (CTS) viability on the Valadeao Ranch Conservation Lands northwest of the Project footprint. The total size of the ponds will be approximately 0.31 acres. Additional CTS ponds may be created determined by incidental take of CTS during construction.

The Discharger will install exclusionary fencing around a portion of Panoche Creek channel that has been degraded by overgrazing. The Project will restore 11.16 acres of waters of the State within the Panoche Creek channel, including 5.81 acres considered to be jurisdictional waters of the United States.

The Discharger will enhance approximately 0.050 acres of existing ephemeral pools on the Valley Floor Conservation Lands that have been degraded by overgrazing by seeding the pools with approved native seed mixes or inoculum from vernal pools within the Project footprint that will be impacted.

The Discharger will restore approximately 0.44 acres of stream channels in seven locations by removing debris and reseeding the channels.

The Mitigation Plan describes detailed activities and plans, performance criteria to measure success, initial monitoring and management actions, and long-term management activities to mitigate for unavoidable impacts to State and Federal waters resulting from construction of the Project. This Certification requires the Discharger to proceed with the proposed Mitigation Plan and requires monitoring and adaptive management measures to ensure successful implementation.

Application Fee Provided: Total fees of $90,600 have been submitted as required by 23 CCR §3833(b)(3)(A) and by 23 CCR §2200(e) for impacts to waters of the United States and waters of the State.

STATE WATER RESOURCES CONTROL BOARD

WATER QUALITY ORDER NO. 2003 - 0017 - DWQ

STATEWIDE GENERAL WASTE DISCHARGE REQUIREMENTS FOR DREDGED OR FILL DISCHARGES THAT HAVE RECEIVED STATE WATER QUALITY CERTIFICATION (GENERAL WDRs)

The State Water Resources Control Board (SWRCB) finds that:

1. Discharges eligible for coverage under these General WDRs are discharges of dredged or fill material that have received State Water Quality Certification (Certification) pursuant to federal Clean Water Act (CWA) section 401.

2. Discharges of dredged or fill material are commonly associated with port development, stream channelization, utility crossing land development, transportation water resource, and flood control projects. Other activities, such as land clearing, may also involve discharges of dredged or fill materials (e.g., soil) into waters of the United States.

3. CWA section 404 establishes a permit program under which the U.S. Army Corps of Engineers (ACOE) regulates the discharge of dredged or fill material into waters of the United States.

4. CWA section 401 requires every applicant for a federal permit or license for an activity that may result in a discharge of pollutants to a water of the United States (including permits under section 404) to obtain Certification that the proposed activity will comply with State water quality standards. In California, Certifications are issued by the Regional Water Quality Control Boards (RWQCB) or for multi-Region discharges, the SWRCB, in accordance with the requirements of California Code of Regulations (CCR) section 3830 et seq. The SWRCB's water quality regulations do not authorize the SWRCB or RWQCBs to waive certification, and therefore, these General WDRs do not apply to any discharge authorized by federal license or permit that was issued based on a determination by the issuing agency that certification has been waived. Certifications are issued by the RWQCB or SWRCB before the ACOE may issue CWA section 404 permits. Any conditions set forth in a Certification become conditions of the federal permit or license if and when it is ultimately issued.

5. Article 4, of Chapter 4 of Division 7 of the California Water Code (CWC), commencing with section 13260(a), requires that any person discharging or proposing to discharge waste, other than to a community sewer system, that could affect the quality of the waters of the State,[1] file a report of waste discharge (ROWD). Pursuant to Article 4, the RWQCBs are required to prescribe waste discharge requirements (WDRs) for any proposed or existing discharge unless WDRs are waived pursuant to CWC section 13269. These General WDRs fulfill the requirements of Article 4 for proposed dredge or fill discharges to waters of the United States that are regulated under the State's CWA section 401 authority.

[1] "Waters of the State" as defined in CWC Section 13050(e)

6. These General WDRs require compliance with all conditions of Certification orders to ensure that water quality standards are met.

7. The U.S. Supreme Court decision of *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers*, 531 U.S. 159 (2001) (the *SWANCC* decision) called into question the extent to which certain "isolated" waters are subject to federal jurisdiction. The SWRCB believes that a Certification is a valid and enforceable order of the SWRCB or RWQCBs irrespective of whether the water body in question is subsequently determined not to be federally jurisdictional. Nonetheless, it is the intent of the SWRCB that all Certification conditions be incorporated into these General WDRs and enforceable hereunder even if the federal permit is subsequently deemed invalid because the water is not deemed subject to federal jurisdiction.

8. The beneficial uses for the waters of the State include, but are not limited to, domestic and municipal supply, agricultural and industrial supply, power generation, recreation, aesthetic enjoyment, navigation, and preservation and enhancement of fish, wildlife, and other aquatic resources.

9. Projects covered by these General WDRs shall be assessed a fee pursuant to Title 23, CCR section 3833.

10. These General WDRs are exempt from the California Environmental Quality Act (CEQA) because (a) they are not a "project" within the meaning of CEQA, since a "project" results in a direct or indirect physical change in the environment (Title 14, CCR section 15378); and (b) the term "project" does not mean each separate governmental approval (Title 14, CCR section 15378(c)). These WDRs do not authorize any specific project. They recognize that dredge and fill discharges that need a federal license or permit must be regulated under CWA section 401 Certification, pursuant to CWA section 401 and Title 23, CCR section 3855, et seq. Certification and issuance of waste discharge requirements are overlapping regulatory processes, which are both administered by the SWRCB and RWQCBs. Each project subject to Certification requires independent compliance with CEQA and is regulated through the Certification process in the context of its specific characteristics. Any effects on the environment will therefore be as a result of the certification process, not from these General WDRs. (Title 14, CCR section 15061(b)(3)).

11. Potential dischargers and other known interested parties have been notified of the intent to adopt these General WDRs by public hearing notice.

12. All comments pertaining to the proposed discharges have been heard and considered at the November 4, 2003 SWRCB Workshop Session.

13. The RWQCBs retain discretion to impose individual or General WDRs or waivers of WDRs in lieu of these General WDRs whenever they deem it appropriate. Furthermore, these General WDRs are not intended to supersede any existing WDRs or waivers of WDRs issued by a RWQCB.

IT IS HEREBY ORDERED that WDRs are issued to all persons proposing to discharge dredged or fill material to waters of the United States where such discharge is also subject to the water quality certification requirements of CWA section 401 of the federal Clean Water Act (Title 33 United States Code section 1341), and such certification has been issued by the applicable RWQCB or the SWRCB, unless the applicable RWQCB notifies the applicant that its discharge will be regulated through WDRs or waivers of WDRs issued by the RWQCB. In order to meet the provisions contained in Division 7 of CWC and regulations adopted thereunder, dischargers shall comply with the following:

1. Dischargers shall implement all the terms and conditions of the applicable CWA section 401 Certification issued for the discharge. This provision shall apply irrespective of whether the federal license or permit for which the Certification was obtained is subsequently deemed invalid because the water body subject to the discharge has been deemed outside of federal jurisdiction.

2. Dischargers are prohibited from discharging dredged of fill material to waters of the United States without first obtaining Certification from the applicable RWQCB or SWRCB.

CERTIFICATION

The undersigned, Clerk to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on November 19, 2003.

AYE: Arthur G. Baggett, Jr.
Peter S. Silva
Richard Katz
Gary M. Carlton
Nancy H. Sutley

NO: None.

ABSENT: None.

ABSTAIN: None.

Debbie Irvin

Debbie Irvin
Clerk to the Board

Central Valley Regional Water Quality Control Board

Responses to Written Comments
for the
PANOCHE VALLEY SOLAR, LLC
PANOCHE VALLEY SOLAR PROJECT
SAN BENITO COUNTY
Clean Water Act section 401 Water Quality Certification

0The following are Central Valley Regional Water Quality Control Board (Central Valley Water Board) staff responses to written comments received regarding the application for a Clean Water Act section 401 Water Quality Certification (401 Certification) for the Panoche Valley Solar, LLC (hereinafter referred to as Discharger), Panoche Valley Solar Project (Project).

According to Title 23, California Code of Regulations §3858, the executive director or the executive officer with whom an application for certification is filed shall provide public notice of an application at least twenty-one (21) days before taking certification action on the application, unless the public notice requirement has been adequately satisfied by the applicant or federal agency. On 20 February 2015, public notice regarding the 401 Certification application was posted on the Central Valley Water Board website. Written comments on the 401 Certification application were received from:

- Joint comments from Fresno Audubon Society, Santa Clara Valley Audubon Society, Ohlone Audubon Society, Citizens to Complete the Refuge, Defenders of Wildlife, Sierra Club, and Center for Biological Diversity (Environmental Groups) (13 March 2015)

- Kim Williams, Panoche Valley resident (13 March 2015)

Written comments are below, followed by the responses of Central Valley Water Board staff.

ENVIRONMENTAL GROUPS COMMENTS

Environmental Groups Comment 1:

"The project involves the construction of a 247 Megawatt solar photovoltaic energy generating facility on approximately 2,506 acres. The project will result in impacts to 5 waters of the United States in addition to thirty-two waters of the State. Based upon our review of the information provided, we urge the Central Valley Regional Water Quality Control Board (CVRWQCB) to suspend the public notice process. Failing suspension of the permit application review, the CVRWQCB has no recourse but to deny the permit application without prejudice as the California Environmental Quality Act (CEQA) Supplemental Environmental Impact Report (SEIR) has not yet been finalized, and the U.S. Army Corps of Engineers (Corps) Environmental Impact Statement (EIS) has not yet been released.

The "Instructions for Completing the Clean Water Act Section 401 Water Quality Certification Application" advise: If another local or State agency is the lead agency for CEQA, obtain the final environmental documentation and determination before the certification application is submitted. If the Regional (or State) Board must be the CEQA Lead Agency, contact that agency well before submitting the application." [Emphasis is as in the original instructions]

Clearly there is a strong preference that the CEQA environmental review process be completed prior to the submittal of any application for water quality certification, and with good reason. The purpose of the CEQA process is to identify and analyze all potential significant impacts to the environment, and provide mitigation measures to reduce significant adverse impacts to levels that are less than significant. Should the environmental review document fail to do so, resource and regulatory agencies and members of the public have the opportunity to inform the review process through the public comment process. As stated above, the SEIR for the revised Panoche Solar Facility has not yet been finalized. Neither the CVRWQCB, nor the public have had the opportunity to review the comments submitted, or the responses to the comments provided by the lead agency. Thus, it is impossible at this time to know whether substantive issues have been identified that could result in additional impacts to waters of the United States and waters of the State."

> **RESPONSE:** The commenter states that there is a "strong preference" that the California Environmental Quality Act (CEQA) environmental review process is completed prior to the submittal of an application for a 401 Certification, but there is no legal requirement to do so. Additionally, the *"Instructions for Completing the Clean Water Act Section 401 Water Quality Certification Application"* referred to in the comments are not from the Central Valley Water Board website. The Central Valley Water Board's website states, in accordance with Title 23, California Code of Regulations (CCR), Section 3856, that applicants should provide a "*copy of any draft or final CEQA document(s), if available, prepared for the activity. Although CEQA documentation is not required for a complete application, the certifying agency shall be provided with and have ample time to properly review a final copy of valid CEQA documentation before taking a certification action."*
>
> The Central Valley Water Board must comply with CEQA, and relied on the certification of the Final SEIR before issuing the 401 Certification. The San Benito County Planning Commission certified the Final SEIR on 25 April 2015. Furthermore, the Draft SEIR had previously been released on December 23, 2014 and was available for public review for more than 45 days, ending on February 10, 2015 and all interested parties and stakeholders, including the Central Valley Water Board had the opportunity to review the Draft SEIR and prepare comments.

Environmental Groups Comment 2:

"Similarly, an Environmental Impact Statement (EIS) is the National Environmental Policy Act (NEPA) disclosure document that is meant to identify and analyze all known impacts to the environment, including aquatic resources. Like CEQA review, an EIS must consider more than just the significant impacts to waters of the United States, including, but not limited to, geologic, hazardous materials, public safety, cumulative impacts, irretrievable commitment of resources, etc. It is entirely possible that mitigations proposed to address significant impacts to one resource (aesthetic, cultural, biological, geological, hydrological, public safety, etc.) could result in an alteration of the project design, and could result in greater impacts to Waters of the State. The Corps issued a Notice of Intent to prepare a Draft EIS July 19, 2012. It is our understanding that the Corps is still several months away from releasing the DEIS. Why would

the CVRWQCB issue its water quality certification in advance of the Corps' Record of Decision? Just as with the CEQA process, mitigation measures to address impacts to endangered species, public safety, geological and soil issues, etc., may result in additional changes to the proposed project. It is premature for the CVRWQCB to consider issuance of water quality certification for the proposed project until the NEPA and CEQA processes have concluded.

Initiation of the public notice process at this time, prior to the conclusion of the CEQA and NEPA review processes, is thwarting the public's ability to provide substantive comments regarding protection of waters of the State. Nor does it allow the CVRWQCB to review the finalized project."

> **RESPONSE:** The Central Valley Water Board is not required to review or comply with NEPA documents before issuing a 401 Certification, but rather is required to comply with CEQA as set forth in CCR Title 23. The central feature of the Clean Water Act Section 401 is the ability given to the states to grant, grant with conditions, deny, or waive the Certification that a Project will comply with state water quality standards. A federal agency cannot issue a Section 404 permit until the state has granted the 401 Certification, and state 401 Certification conditions become the conditions of the federal permit. The 401 Certification that the Central Valley Water Board issued includes conditions to protect water quality during construction and operation of the Project.
>
> Additionally, the 401 Certification addresses only water quality impacts to waters of the United States on the Project site, which include 0.122 acres of ephemeral streams. On 24 June 2015, the Army Corps of Engineers (Corps) approved a Preliminary Jurisdictional Determination concurring with the amount and locations of the water bodies identified on the Project site. The Project impacts to waters of the United States, primarily due to installation of low water crossings and installation of riprap for scour protection, appear to be insignificant. In addition, the impacts to waters of the United States will be adequately mitigated. If the Project design is modified based on the EIS to increase water quality impacts to waters of the United States, the 401 Certification will be amended.

Environmental Groups Comment 3:

Comment: "*Errata Sheet #2 to the Final EIR (2010) acknowledged that in accordance with the Basin Plan, all natural surface waters in the project area, including intermittent or ephemeral drainages, are considered "westside streams" and as designated in Table II-1 of the Basin Plan, are managed for the following Beneficial Uses:*

- *Agricultural supply*
- *Industrial Service and Process Supply*
- *Water Contact Recreation*
- *Non-Water Contact Recreation*
- *Warm Freshwater Habitat*

- *Wildlife Habitat*
- *Rare, Threatened or Endangered Species Habitat*
- *Groundwater Recharge*

In response to an email from the Central Valley Regional Water Quality Control Board (see attached), an Errata Sheet was introduced as a last-minute revision at the San Benito Board of Supervisor's meeting on the same night that the FEIR for Project was approved. The Final EIR was written based on the erroneous assumption that Panoche Valley streams, washes and surface flow had no identified beneficial uses. This error meant that there was no analysis or mitigation for impacts on the streams in the 2010 FEIR. This omission has not been corrected in the DSEIR, which is currently under consideration by San Benito County. Significant impact to beneficial uses can be expected. We attach the following comment letters on the SEIR and ask that you consider all the comments within these letters as comments on the Water Quality Certification Application for the Panoche Solar Facility. We are especially concerned with "take" of rare and endangered species, including the Blunt-nosed Leopard lizard, a fully protected species under California law.

- *A letter regarding blunt-nosed leopard lizard from the Department of Fish and Wildlife*
- *Comment letter on the Draft Supplemental EIR from the Department of Fish and Wildlife*
- *Comment letter on the Draft Supplemental EIR from the Sierra Club and Santa Clara Valley Audubon Society*
- *Comment letter on the DSEIR from Defenders of Wildlife, the Nature Conservancy, Santa Clara Valley Audubon, Sierra Club, Audubon California and Center for Biological Diversity*

Based on the information provided in these letters, we expect Project-related activities, including grading, to impact all the "westside streams", vernal pools and surface flows to cause significant and irreversible harm to the following beneficial uses:

- *Warm Freshwater Habitat*
- *Wildlife Habitat*
- *Rare, Threatened or Endangered Species Habitat*
- *Groundwater Recharge"*

RESPONSE: All attached letters referred to by the commenters have been reviewed and acknowledged. The Discharger has prepared a plan entitled Wetlands Mitigation Monitoring Program (WMMP) to meet permit conditions of the Corps, the California Department of Fish and Wildlife (CDFW), and the Central Valley Water Board. Section 3.2 of the WMMP has been revised to address the beneficial uses of the waters on the project site. In accordance with California Water Code §13050, all surface and groundwater resources in the Project area are waters of the State and are subject to designated Beneficial Uses identified in the Tulare Lake Basin Water Quality Control Plan. Surface waters on the project site are designated "westside streams" and have specific designated Beneficial Uses, per the Water Quality Control Plan for the Tulare Lake Basin as stated by the commenter.

The commenters indicate that significant impact to beneficial uses of surface waters can be expected; however, our review of the letters referenced by the commenters did not identify significant impacts to beneficial uses of surface waters on the project site that would occur due to the Project-related impacts to a cumulative total of 0.122 acres of ephemeral streams that were determined to be waters of the United States and subject to the section 401 Certification. The permitted discharges at seven different impact areas may cause some minor degradation to wetlands and other waters. Due to the minimal size of each area, beneficial use impact is not considered significant. In addition, the filling of these waters will also be mitigated by creation, enhancement, and preservation on Conservation Lands as described in the WMMP and the Final SEIR, further reducing any beneficial use impact.

Impacts to special-status species are be subject to conditions of the Incidental Take Permits from the U.S. Fish and Wildlife Service (USFWS) and CDFW.

Environmental Groups Comment 4:

Comment: *"The Basin Plan directs the Water Board to protect and enhance both existing and potential Beneficial Uses of Waters of the State. To offset the adverse impacts of the project on waters of the United States and waters of the State, the applicant has provided a Draft Mitigation and Monitoring Plan (MMP). We have only recently (March 10, 2015), received a copy of the MMP. Although we have only had a limited time to review the MMP, we find the MMP fails to adequately mitigate impacts to waters of the United States and State.*

The MMP states as mitigation for impacts to 0.12 acres (3,504 LF) waters of the United States and to 7.60 acres (16,935 LF) waters of the State, the project proponent will remove and enhance five debris dump sites (0.42 acres) "with seeding of native vegetation and potential erosion control measures if necessary," create a 0.15 acres California tiger salamander (CTS) breeding pond within the Valadeao Ranch Conservation Lands, and partially exclude livestock to restore native vegetation on portions of Panoche Creek totaling 11.16 acres within the Silver Creek Ranch Conservation Lands. Aside from the potential creation of the CTS breeding pond, the MMP focuses on preservation and enhancement of waters of the United States and State and does not ensure there will be no net loss."

RESPONSE: The WMMP mitigation activities include the total preservation of approximately 716,852 linear feet (approximately 136 miles) of stream/creek, ephemeral drainage, and wetland habitat within a total of approximately 24,176 acres in three large parcels of land (Conservation Lands), to be protected in perpetuity, resulting in a preservation to impact ratio of over 33 to 1. The preserved lands have been identified by the USFWS as core recovery habitat areas for threatened and endangered species in the Panoche Valley, including kit fox, giant kangaroo rat, antelope squirrels, and blunt nose leopard lizards.

The proposed mitigation also includes aquatic enhancement, restoration, and creation activities on approximately 12 acres in the Conservation Lands, resulting in an enhancement to impact ratio of 1.4 to 1.

Currently, there is no State policy or regulation specifying the methods for evaluating the achievement of the no net loss standard. Mitigation for impacts to waters of the United States will be required in the CWA section 404 permit that will be issued by the Corps. The Corps must determine mitigation according to federal regulations under 33 CFR Part 332: *Compensatory Mitigation for Losses of Aquatic Resources.*

Under 33 CFR 332, Section 332.3 (h):

(1) Preservation may be used to provide compensatory mitigation for activities authorized by [Corps] permits when all the following criteria are met:
- *(i) The resources to be preserved provide important physical, chemical, or biological functions for the watershed;*
- *(ii) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available;*
- *(iii) Preservation is determined by the district engineer to be appropriate and practicable;*
- *(iv) The resources are under threat of destruction or adverse modifications; and*
- *(v) The Conservation Lands will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).*

(2) Where preservation is used to provide compensatory mitigation, to the extent appropriate and practicable the preservation shall be done in conjunction with aquatic resource restoration, establishment, and/or enhancement activities. This requirement may be waived by the district engineer where preservation has been identified as a high priority using a watershed approach described in paragraph (c) of this section, but compensation ratios shall be higher.

We believe the mitigation activities proposed for the Project, a combination of preservation and enhancement to increase function, meet the federal mitigation criteria and are adequate to mitigate for the impacts to the 0.122 acres of waters of the United States. However, the mitigation will independently be determined by the Corps in the CWA section 404 permit. The Central Valley Water Board may require additional mitigation if it is warranted.

Environmental Groups Comment 5:

Comment: *"The CVRWQCB should require the MMP clarify how many linear feet of creeks these actions will enhance."*

RESPONSE: Section 6 Table B of the updated WMMP shows that there will be 2,370 linear feet of intermittent and ephemeral streams enhanced.

Environmental Groups Comment 6:

Comment: *""The MMP should incorporate monitoring of the creek beds upstream and downstream of the project impact sites to ensure the road crossings, etc., do not result in, or exacerbate, existing bed and bank instability."*

RESPONSE: Appropriate monitoring will be conducted during construction as required by the Storm Water Pollution Prevention Plan that is required under the State Water Resources Control Board National Pollutant Discharge Elimination System General Permit For Storm Water Discharges Associated With Construction And Land Disturbance Activities, Order No. 2009-0009-DWQ (Construction Storm Water Permit). The purpose of the Construction Storm Water Permit is to require implementation of erosion and sediment control measures to ensure the integrity of perimeter roads and the ability of water to flow across the site and discharge into the Panoche and Las Aguilas creeks without causing excessive erosion. Debris dumpsites will be monitored after large rain events for the first 2 years and annually during the wet season during years 3 to 5 to ensure that banks remain stable. Post construction monitoring of all impacted areas of waters of the United States is required by 401 Certification conditions.

Environmental Groups Comment 7:

Comment: *"The Draft MMP, contrary to the Errata Sheet mentioned above, states there are no Beneficial Uses for the surface waters occurring within the project site. The MMP should include a discussion of how the proposed mitigation measures will protect or enhance Beneficial Uses."*

RESPONSE: The WMMP has been revised to include an analysis of Beneficial Uses of surface waters within the Project Footprint.

Environmental Groups Comment 8:

Comment: *"The MMP states, "Mitigation activities within the Conservation Lands will occur six months to 12 months after completion of the Project." This is unacceptable. There is no reason the proposed mitigation should not be completed prior to the construction of the proposed project. If the CVRWQCB allows the mitigation to be constructed, after the project is completed, there is little incentive to the project proponent to implement the mitigation plan."*

RESPONSE: The revised WMMP was submitted addressing comments from the Central Valley Water Board staff. Section 7 establishes timelines for all mitigation activities. Any changes and/or updates to the timeline of mitigation activities will be determined by the Corps, Central Valley Water Board, and CDFW. Initial construction of the compensatory mitigation for discharge of fill to waters of the State must be completed within 1 year of initial impacts to waters of the State.

Environmental Groups Comment 9:

Comment: *"With regards to the debris dump sites, while it is certainly preferable from a water quality perspective that tires, appliances and old cars are removed from the drainages, the language in the MMP does not guarantee this action will occur. The MMP states, "During implementation, if it is determined that removing debris would cause instability in the drainage the material will be left in place." [emphasis added]*

And under the Performance Criteria, "Indicate that all debris has been removed (unless specifically left in the creek channel to maintain stability)..." [emphasis added]

The MMP also includes the following language:

...the Applicant will remove debris from these areas allowing the natural environment to stabilize. Once the debris is removed the Applicant will seed the area as deemed necessary by the biologist, with a native seed mix sourced locally to prevent erosion and allow the natural plant and animal species to thrive in the area. [emphasis added]

And, "Once the debris is removed the Land Manager will reseed with a native seed mix in the debris removal area as deemed necessary by a qualified biologist, with native plants locally sourced to prevent erosion."

This approach is completely inadequate. First, the question of whether the debris can and will actually be removed, should be determined in advance of proposing the action as a mitigation measure. Second, plans for bank and creek bed stabilization should be prepared and included within the MMP. Photos of "Trash Removal" sites 1a, 1b, 4, and 5, provided in the MMP, show signs of significant bank erosion. The MMP should include measures that will specifically ensure further bank-slope erosion will not occur once the debris is removed from the creek bed. Will the areas of debris removal be temporarily fenced to promote success of any seeding efforts? As a side note, any "native seed mix sourced locally" should be approved by the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW) in advance of its use."

> **RESPONSE:** The Trash Removal mitigation measure has been modified in the WMMP to include CDFW approval of the seed mix, temporary fencing as needed, and bank stabilization as needed. Additional monitoring of the cleanup areas after rain events has been included in the WMMP.
>
> Additional mitigation may be required by the Central Valley Water Board and/or other agencies if it is determined that a majority of the debris cannot be removed without causing stream instability.

Environmental Groups Comment 10:

Comment: *"The MMP discusses the creation of a breeding pond for the California tiger salamander. While the monitoring plan mentions specific depth and duration of ponding criteria, the plan does not consider the possibility of the CTS mitigation pond silting-in over time. It is impossible to determine from the information provided whether this is an issue for the site proposed. If it is, the MMP must acknowledge this concern, and discuss how this would be addressed in the long-term. The MMP should also include monitoring to determine if the pond is successfully used by CTS, and to ensure bullfrog do not utilize the pond during the CTS breeding season."*

> **RESPONSE:** The CTS pools will be monitored twice a year to remove potentially harmful plants and wildlife (such as bullfrogs) as stated in Section 7.2.2 of the WMMP. The original size and dimensions of the pools will be used as the control to determine whether maintenance or repair of the pool is necessary, and the hydrology will be monitored to confirm ephemeral conditions favorable to CTS breeding. The pools will be preserved and managed in perpetuity.

KIM WILLIAMS COMMENTS

Kim Williams Comment 1:

Comment: *"The Panoche Solar Project is currently under National Environmental Policy Act (NEPA) review. The Army Corp of Engineers (ACOE) has taken the lead. US Fish & Wildlife is the co-lead agency. According to Katarina Galacatos of the ACOE, the Draft Environmental Impact Statement (DEIS) has yet to be released for public comment and she does not know when it will be ready."*

> **RESPONSE:** The commenter is concerned that the Draft EIS has yet to be released for public comment. The DEIS was public noticed on 14 September 2015. Additionally, see response to Environmental Groups Comment 2 above.

Kim Williams Comment 2:

Comment: *"The Project is also in the process of undergoing additional review under the California Environmental Quality Act (CEQA). San Benito County (SBC) released a Draft Supplemental Environmental Impact Report (DSEIS) for public comment and is currently working on compiling their response.*

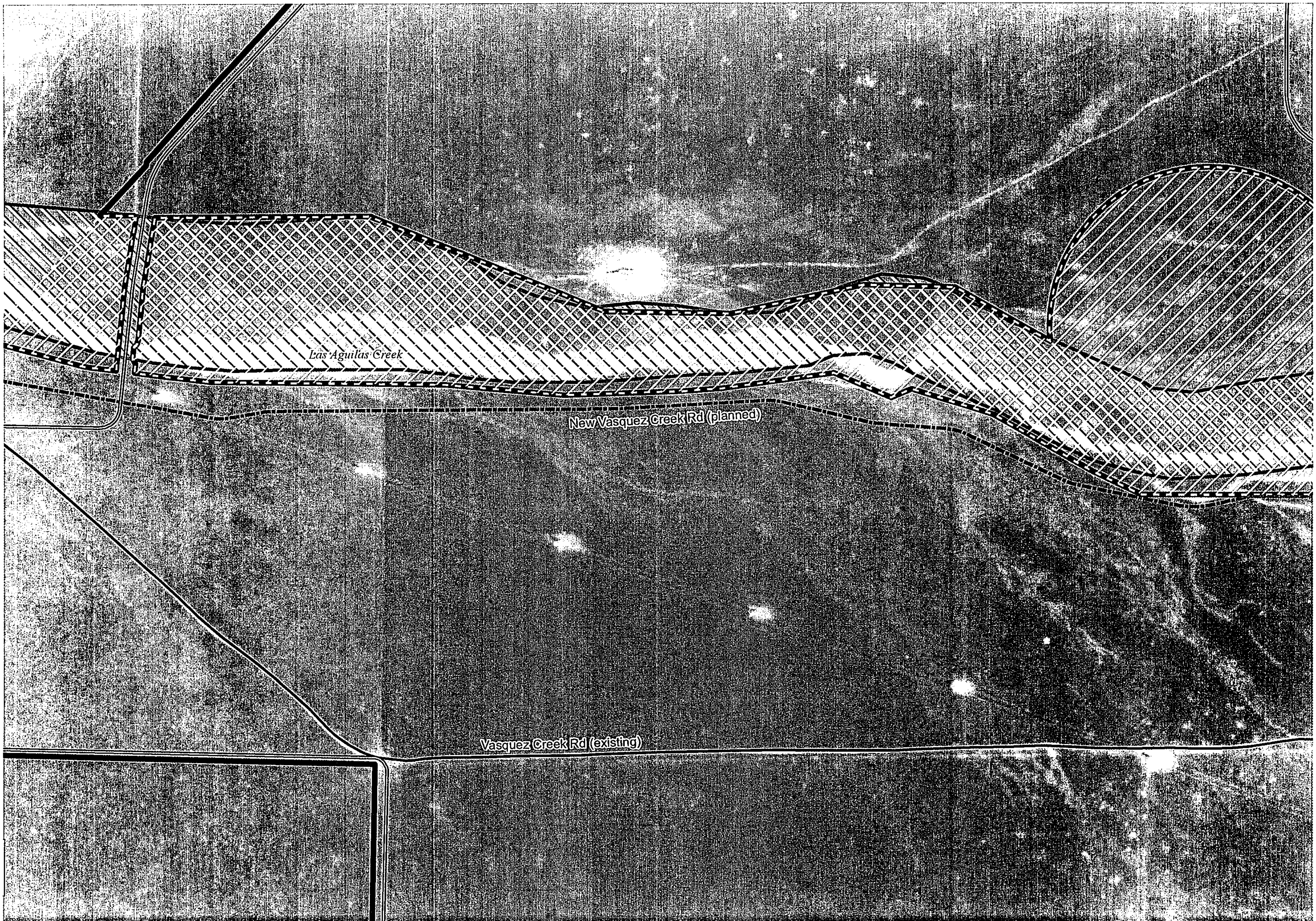
Until the ACOE releases the DEIS, accepts public comments and responds, and until San Benito responds to public comments on the DSEIS, impacts to the waters of the United States and California will not fully be revealed. Therefore it is imperative under the Clean Water Act, Section 401 that the Central Valley Regional Water Quality Control Board (CVRWQCB) suspends the permit application review until such time that the Supplemental Environmental Impact Report (SEIR) and EIS have been finalized by San Benito County and the ACOE respectively."

> **RESPONSE**: See responses to Environmental Groups Comments 1 and 2 above.

Kim Williams Comment 3:

Comment: *"As revealed in the DSEIR that SBC released this year, this project poses a multitude of significant impacts to waters of the United States and CA that have yet to be thoroughly analyzed. One such impact is the New Vasquez Creek Road that the applicant would like to build immediately adjacent to Las Aguilas Creek, the largest waterway located within the project site. Not only would this road, (which will be used for property owners to access their homes located to the west of the project site and provide fire access) be located within the floodplain of Las Aguilas Creek, it would be so close to the bank as to cause extensive erosion, potentially displacing soil that would inhibit water flow."*

RESPONSE: The New Vasquez Creek Road is designed to suit the needs of the Project and to provide access for the landowners and rancher, not to meet fire department standards as the Project's perimeter road is for fire access. Attachment 1 shows the location of the new road and was included in Appendix 4B-8 (New Vasquez Creek Alignment) to the Final SEIR. As the figure illustrates, the new road is outside of the 100- year floodplain for Las Aguilas Creek and is not permanently impacting a water of the United States or a water of the State. Construction of the road will require implementation of best management practices for erosion and sediment control under the State Water Resources Control Board National Pollutant Discharge Elimination System General Permit For Storm Water Discharges Associated With Construction And Land Disturbance Activities, Order No. 2009-0009-DWQ. This measure is in addition to the numerous other mitigation measures that will be implemented to minimize erosion and impacts on sensitive species.



Legend

Panoche Valley Solar Project

USFWS Biological Opinion

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
08EVEN00-2015-F-0328

October 5, 2015

Michael S. Jewell
Chief Regulatory Division
Army Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95814-2922

Subject: Biological Opinion for the Panoche Valley Solar Farm, San Benito County, California (File Number 2009-00443S)

Dear Mr. Jewell:

This letter transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion) on the U.S. Army Corps of Engineers (Corps) proposal to issue a permit pursuant to section 404 of the Clean Water Act of 1972, as amended (33 U.S.C. 1344 et seq.) to Panoche Valley Solar, LLC (PVS, the Applicant) for the Panoche Valley Solar Farm (project) and the permit's effects on the federally endangered giant kangaroo rat (*Dipodomys ingens*), San Joaquin kit fox (*Vulpes macrotis mutica*), and blunt-nosed leopard lizard (*Gambelia silus*), and threatened California tiger salamander (*Ambystoma californiense*). In addition, you determined the proposed project may affect, but is not likely to adversely affect the federally endangered California condor (*Gymnogyps californianus*), vernal pool tadpole shrimp (*Lepidurus packardi*), Conservancy fairy shrimp (*Branchinecta conservatio*), and longhorn fairy shrimp (*Branchinecta longiantenna*), and the threatened vernal pool fairy shrimp (*Branchinecta lynchi*). There is no designated critical habitat for any listed species within the project site or that would be affected by the proposed project.

We received your June 6, 2014, request for formal consultation on June 9, 2014. Your request and our response are made in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

In the accompanying Biological Opinion, we conclude that the proposed project is not likely to jeopardize the continued existence of the giant kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard, and the California tiger salamander. We also concur with your determination that the proposed project may affect, but is not likely to adversely affect the California condor, vernal pool tadpole shrimp, Conservancy fairy shrimp, longhorn fairy shrimp, and the vernal pool fairy shrimp.

As a reminder, the incidental take statement (ITS) in this Biological Opinion is effective only if and when the federal action is completed for the proposed project addressed in this consultation. In other words, the exemption from the take prohibitions of section 9 of the Act only applies to activities carried out as part of the proposed action when the Clean Water Act section 404 permit is issued to the Applicant. The measures set forth in the ITS must become binding conditions of your permit to the Applicant in order for the exemption in section 7(o)(2) of the Act to apply. As you are probably aware, in the September 29, 2015, decision in *Sierra Club v. U.S. Army Corps of Engineers*, the D.C. Circuit Court of Appeals found that the Service's issuance of an ITS in its role as a consulting agency did not authorize incidental take, and that, as here, the Applicant can only rely on the safe harbor provided by the take exemption in section 7(o)(2) of the Act if the Terms and Conditions of the ITS have been included as binding, enforceable terms of the Corps' permit.

Incidental take applies to takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal action agency or by an applicant in accordance with the authorization issued by the Federal action agency. To ensure any activity is otherwise lawful, it should not be in violation of any applicable local, County, State, or Federal law. To that end, the Applicant should obtain all necessary permits and authorizations from all appropriate local, County, State, and Federal agencies prior to initiating project activities.

If you have any questions about the accompanying Biological Opinion or our joint responsibilities under the Endangered Species Act, please contact Christopher Diel of my staff at 805-644-1766, extension 305 or by e-mail at christopher_diel@fws.gov.

Sincerely,

Stephen P. Henry
Field Supervisor

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
08EVEN00-2015-F-0328

October 5, 2015

Michael S. Jewell
Chief Regulatory Division
Army Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95814-2922

Subject: Biological Opinion for the Panoche Valley Solar Farm, San Benito County, California (File Number 2009-00443S)

Dear Mr. Jewell:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the U.S. Army Corps of Engineers (Corps) proposal to authorize Panoche Valley Solar, LLC (PVS, the Applicant) for the Panoche Valley Solar Farm (project) and its effects on the federally endangered giant kangaroo rat (*Dipodomys ingens*), San Joaquin kit fox (*Vulpes macrotis mutica*), and blunt-nosed leopard lizard (*Gambelia silus*), and threatened California tiger salamander (*Ambystoma californiense*). The Applicant proposes to place fill into 0.121 acre of ephemeral stream channels classified as "waters of the United States." The areas affected include Las Aguilas Creek on the western side of the project site and three unnamed drainages on the eastern side of the project site. In addition, the Applicant will potentially dredge approximately 0.096-acre of ephemeral stream channels during performance of compensatory mitigation activities on the Conservation lands. The Corps proposes to authorize this fill through issuance of a permit pursuant to section 404 of the Clean Water Act of 1972, as amended (33 U.S.C. 1344 et seq.). We received your June 6, 2014, request for formal consultation on June 9, 2014. Your request and our response are made in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

We have based this biological opinion on information that accompanied your June 6, 2014, request for consultation, including the biological assessment and addendums submitted to our office. We can make available a complete record of this consultation at the Ventura Fish and Wildlife Office.

As part of the request for consultation, you determined the proposed project may affect but will not likely adversely affect the federally endangered California condor (*Gymnogyps californianus*), vernal pool tadpole shrimp (*Lepidurus packardi*), Conservancy fairy shrimp

(*Branchinecta conservatio*), and longhorn fairy shrimp (*Branchinecta longiantenna*), and the threatened vernal pool fairy shrimp (*Branchinecta lynchi*).

The Applicant would implement the following measures to avoid adverse effects to California condor, vernal pool tadpole shrimp, Conservancy fairy shrimp, longhorn fairy shrimp, and vernal pool fairy shrimp:

1. All California condor sightings will be reported directly to the Service within 24 hours of the observation by the Project's Environmental Manager or Service-approved biologist.

2. Should a California condor be observed roosting within 0.5 mile of the construction area, no construction activity will occur within 0.5 mile of the observation between 1 hour before sunset to 1 hour after sunrise, or until the California condor(s) leave the area. The Applicant will coordinate with the California condor recovery program to determine whether any California condor is known to be roosting within 0.5 mile of the construction area.

3. Should condors be found nesting within 1.5 miles of the construction area, no construction activity will occur within 1.5 miles of the nest until further authorization from the Service. The Applicant will coordinate with the California condor recovery program to determine whether any California condor is known to be nesting within 1.5 miles of the construction area.

4. If a designated biologist observes a California condor land within the project footprint or Valley Floor Conservation Lands, the designated biologist will halt all work within 500 feet of the California condor until the bird has left the area on its own. If the bird fails to leave the area because of injury or other factors project proponent will contact the Service for direction.

5. All project-related electric distribution and substation structures will be constructed using Avian Power Line Interaction Committee (APLIC) protection guidelines. The APLIC-based avian protection guidelines are designed to reduce the operational and avian risks that result from avian interactions with electric utility facilities.

6. A 100-foot buffer will be established around the occupied habitat for vernal pool fairy shrimp.

7. Erosion control will be implemented to prevent sediment from entering occupied branchiopod habitat.

The proposed project is within the historical and expected future range of the California condor. California condors have not been recorded making flights through the proposed project area (Service 2015). The proposed project area provides potential foraging habitat for California condors. No suitable nesting habitat is within the proposed project area; however, the surrounding mountains and cliffs could provide suitable habitat.

One-hundred and twenty-one ephemeral pools were identified in the proposed project footprint, which were classified as ephemeral drainages in seasonal drainages (50 features, 1.88 acres), road puddle or roadside ditch (36 features, 0.22 acre), stock pond (5 features, 0.34 acre), trough puddles that were created by livestock around leaky troughs (15 features 0.13 acre), and vernal pools (15 features, 0.26 acre) (Live Oak Associates 2010a, 2010b).

During protocol vernal pool branchiopod surveys conducted in 2010, biologists identified vernal pool fairy shrimp in the project area (Live Oak Associates 2010a, 2010b). The vernal pool fairy shrimp were identified in two hydrologically connected pools within an unnamed tributary to Las Aguilas Creek. Protocol vernal pool branchiopod dry-season surveys conducted in 2010 confirmed the presence of vernal pool fairy shrimp in only the two pools; no vernal pool branchiopod cysts were identified elsewhere in the proposed project site (Live Oak Associates 2010a). The proposed project footprint was modified to exclude the occupied pools and a 100-foot buffer, now included in a noncontiguous portion of the Valley Floor Conservation Lands. Although potentially suitable habitat is present in the project area for Conservancy fairy shrimp, longhorn fairy shrimp, and vernal pool tadpole shrimp, the project area is outside of the known range of these species and they were not detected during the protocol surveys within the project area (Live Oak Associates 2010a, 2010b). A reconnaissance-level survey observed individuals of vernal pool tadpole shrimp in a pool in the Valadeao Ranch Conservation Lands however this location is approximately 35 miles from the nearest known location of the species (Live Oak Associates 2010c). Vernal pool tadpole shrimp are known to occur almost exclusively in the Central Valley of California and require large pool with a hydroperiod of a minimum of 25 days to mature and 54 days for reproduction (Ahl 1991, King et al.1996).

Based on implementation of the aforementioned avoidance measures and the best available information regarding distribution of the California condor, vernal pool tadpole shrimp, Conservancy fairy shrimp, longhorn fairy shrimp, and vernal pool fairy shrimp, we concur with the Corps' determination that the proposed project is not likely to adversely affect the endangered California condor, vernal pool tadpole shrimp, Conservancy fairy shrimp, longhorn fairy shrimp, and vernal pool fairy shrimp. California condors have not been observed or recorded by transmitters to be making flights through the project site. Should the California condor's flight patterns extend into the project site in the future, the protective measures incorporated into the project and identified above should effectively avoid condor interactions and project impacts on California condors. The amount of California condor foraging habitat lost due to the project is small in relation to the available foraging habitat in the area and would not have appreciable adverse impact on condor foraging, should California condors occupy this area in the future. Protocol surveys failed to detect the presence of Conservancy fairy shrimp, longhorn fairy shrimp, and vernal pool tadpole shrimp on the project site. Because the project site lies outside of the known range of these species, it is unlikely they would occur there in future. Because the two pools within the project site occupied by vernal pool fairy shrimp will be protected by a 100-foot buffer, we do not expect the hydrology of the pools to be altered, or the species to be adversely affected, by implementation of the proposed project. There is no critical habitat for any listed species within the project site or that would be affected by the proposed project. If the proposed project changes in any manner that may affect a listed species or critical habitat, or if any listed species are found within or in the vicinity of the project area and could be adversely affected during the project implementation, you must contact us immediately and the Applicant must suspend all activities until the appropriate level of consultation is completed.

Analysis of Effects and Incidental Take Exemption

The Corps has included the entire 2,506-acre project area and the compensatory mitigation activities in its scope of analysis under National Environmental Policy Act (NEPA). The Corps' Environmental Impact Statement (EIS) analyzes the direct and indirect effects of construction and operation and maintenance of the project following construction. When we analyze the Effects of the Action under the Act, we look at all of the direct and indirect effects the project would have on the listed species the biological opinion covers and how these effects would or would not result in jeopardy of the species. The proposed solar energy facility is expected to operate for approximately 30 years once constructed. At the end of the project's operational life, it would be decommissioned or potentially repowered with more efficient PV panels. Therefore, the jeopardy analysis in this biological opinion includes effects of operation, maintenance, and decommissioning or repowering (the effects of which are assumed to be similar to construction impacts) of the solar facility.

Federal action agencies have a continuing duty to regulate the activity covered by an Incidental Take Statement. In addition, the section 7 regulations contemplate the ability to reinitiate consultation if any of several criteria are met; including exceeding the level of take we anticipate would occur. The incidental take exempted for this Federal action under section 7(o)(2) of the Act, as identified in the Incidental Take Statement, is co-extensive with and limited to the scope of the Federal action under review, which is construction, operation, and maintenance of the proposed solar project.

Abbreviations/Acronyms/Definitions

The following abbreviations, acronyms, and terms occur frequently throughout this document. We define them here for clarification.

Act	Endangered Species Act of 1973, as amended
ACEC	Area of critical environmental concern
ADSS	All-Dielectric Self-Supporting
APLIC	Avian Power Line Interaction Committee
Applicant	Panoche Valley Solar, LLC
BA	Biological Assessment
Biological monitor	Applicant-proposed observer who will work on-site to perform biological surveys or provide oversight of ground disturbing activities as needed and receive instruction from and report to the Applicant-proposed Designated Biologist
BLM	Bureau of Land Management
BMPs	Best Management Practices
CAL FIRE	California Department of Forestry and Fire Protection
CDFW	California Department of Fish and Wildlife
Corps	U.S. Army Corps of Engineers

County	San Benito County
Designated biologist	Applicant-proposed biologist(s), approved by the Service, knowledgeable and experienced in the biology and natural history of the threatened and endangered species on the project site, who will be responsible for monitoring construction activities to help minimize or avoid the incidental take of species and to minimize disturbance to their habitat. The biologist(s) may appoint biological monitors to perform biological surveys or provide oversight of ground disturbing activities as needed in their place. The designated biologist(s) would hold appropriate permits, pursuant to section 10(a)(1)(A) of the Act, for any activity involving handling, capture, relocation, etc., of listed species.
EIS	Environmental Impact Statement
LGIA	Large Generator Interconnection Agreement
NEPA	National Environmental Policy Act
O&M	Operations and Maintenance
OPGW	Optical Ground Wire
PG&E	Pacific Gas and Electric Company
Project	Panoche Valley Solar Farm
PV	Photovoltaic
PVS	Panoche Valley Solar, LLC
ROW	Right of Way
Service	U.S. Fish and Wildlife Service
Service-approved biologist	A biologist approved by the Service, at the request of the Corps, to conduct any avoidance, minimization, and conservation measures including surveying; monitoring; conducting training sessions; and capturing, handling, and relocating giant kangaroo rats or California tiger salamanders.
SCADA	Supervisory Control and Data Acquisition
SWPP	Stormwater Pollution Prevention Plan
TSP	Tubular Steel Pole

Consultation History

The Service has had numerous meetings with the project proponent, Corps, and California Department of Fish and Wildlife (CDFW) regarding the proposed project since 2009. The design of the project has changed several times with the change in project proponents since 2009. In April 2009, Solargen Energy contacted the Service regarding a proposed 420-megawatt solar project. In May 2011, the Service was notified that Solargen Energy had sold its assets to PV2 Energy on April 19, 2011. In August 2012, Duke Energy joined PV2 Energy as a partner in developing the proposed project. Duke was designated as the partnership’s lead in coordination with the Service. In July 2014, Duke Energy notified the Service that they were no longer associated with the construction of the proposed project and would be removed from the consultation process. Panoche Valley Solar, LLC is the current Applicant. These changes to project design and species survey efforts have resulted in an atypical consultation history and schedule. We can make available a complete record of this consultation at the Ventura Fish and Wildlife Office.

The following dates represent the milestones and records of the request for formal consultation between the Corps and the Service and the changes that occurred with the project Applicant.

August 12, 2010: The Corps requests to initiate formal consultation for a 420-megawatt solar power project.

October 5, 2010: The Service submits a response asking for clarification on the Corps' scope of analysis for the consultation, details of a new project design not included in the biological assessment, and the results of recent species surveys.

December 10, 2010: The Service meets with Solargen Energy representatives to discuss outstanding data and survey needs.

December 17, 2010: The Corps requests to initiate formal consultation for a 399-megawatt solar power project.

February 18, 2011: The Service submits a response detailing the information needed for consultation as discussed and agreed upon during a meeting with the project proponent on December 10, 2010.

April 19, 2011: PV2 Energy purchases the assets of Solargen Energy, thereby taking over as the lead developer of the project.

November 4, 2011: The Corps submits a revised request to initiate formal consultation for a 399-megawatt solar power project.

March 8, 2012: The Service submits a response summarizing the agencies' agreement from a February 17, 2012, conference call that formal consultation has begun but establishing a timeline was infeasible due to the incomplete NEPA process. It was determined that the NEPA alternative analysis would influence the final project for consultation.

August 2012: Duke Energy joins with PV2 Energy in partnership for development of the project; Duke Energy would serve as the lead developer.

June 6, 2014: Due to changes in the proposed project, the Corps submits a new request for formal consultation on the proposed solar power project.

July 25, 2014: The Service is notified that Duke Energy has left the solar development partnership; Panoche Valley Solar, LLC takes over as the lead developer of the project.

November 20, 2014: After receiving additional information on new project designs, including the telecommunication upgrades, the Service submits a letter acknowledging initiation of formal consultation. The acknowledgement letter also detailed the agency agreed upon schedule for formal consultation that would coincide appropriately with the NEPA process. The draft biological opinion would be scheduled for release to the Corps and the Applicant shortly after the release of the public draft of the environmental impact statement (EIS). The Service agreed to complete the final biological opinion for transmittal to the Corps 45 days after the end of the public comment period for the draft EIS.

May 12, 2015: The Service is notified that the Corps will reassign the project from their San Francisco District Office to the Sacramento District Office.

July 22, 2015: The Service received a modified project description from the Applicant.

August 21, 2015: The Service transmitted a draft of this biological opinion to the Corps, who in turn also shared it with the Applicant.

August 28, 2015: The Service received comments on the draft biological opinion from the Corps and the Applicant.

August 31, 2015: The Service received a revised project description from the Applicant.

September 1, 2015: The Service received another revised project description from the Applicant.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Summary of the Proposed Project

Panoche Valley Solar, LLC (Applicant; PVS) proposes to develop and operate a 247-megawatt (MW) photovoltaic (PV) solar farm. The solar farm would consist of approximately 1,629 acres of PV panels installed on a 2,506-acre project site. PVS proposes to reduce the impacts of the solar farm on the San Joaquin kit fox, giant kangaroo rat, blunt-nosed leopard lizard, and California tiger salamander through implementation of avoidance and minimization measures and through the acquisition and protection in perpetuity of 24,185 acres of conservation lands. Construction of the solar farm is estimated to take approximately 18 months. Power generated by the solar farm would be delivered into the electrical grid via an existing Pacific Gas and Electric (PG&E) transmission line. Operation and maintenance of the project is expected to last 30 years. At the conclusion of the project’s expected 30-year lifespan, the solar facility would either be decommissioned or repowered with more efficient PV panels.

Location of the Project

The proposed project consists of the project footprint (the location of the proposed solar power facility) in San Benito County and the proposed conservation lands, which span both eastern San Benito and western Fresno Counties. The project site is located approximately 0.75 mile north of the intersection of Panoche Road and Little Panoche Road in eastern San Benito County, California. The project site is bordered by rangeland on the north and south, by the Gabilan Range on the west, and by the Panoche Hills on the east. Panoche Creek and Las Aguilas Creek flow through the project site. A PG&E 230-kilovolt (kV) transmission line runs in an east-west direction through the project site.

Proposed Project Features

The proposed project would consist of a solar field of ground-mounted PV modules, an underground electrical collection system that converts generated power from direct current to alternating current, a project substation that collects and converts the alternating current from 34.5 kV to 230 kV, and a switching station that would deliver the generated power to the electrical grid via the PG&E Moss Landing to Panoche and Coburn to Panoche 230-kV transmission line. Upgrades to the PG&E primary and secondary telecommunications networks are also proposed by the Applicant.

Key features and areal extent of the proposed project are summarized in Table 1.

Table 1
Project Features

Project Feature	Area Impacted
Solar arrays[1]	1,629 acres
Project perimeter roads (including pullouts)	30 acres
Substation, Switchyard, and O&M Building	12 acres
Graded Areas[2] (outside of other project features)	106.5 acres
230 kV Loop-in Tubular Steel Poles (TSPs)	250 square feet
Trenching and foundations adjacent to arrays	12.41 acres
Perimeter Fencing	0.06 acre
Vasquez County Road	4 acres
Total Permanent Disturbance	**1,794 acres**
TOTAL PROJECT FOOTPRINT	**2,506 acres**

1 Includes 2.33 acres for foundations, 26.64 acres of direct current trench, 8.84 acres of alternating current trench, 205.47 acres of grading, and 1,385.72 acres of solar array work areas. Solar panels and associated electrical equipment would be installed on approximately 185,000 support post foundations. Posts would be steel I-shaped sections with a cross sectional area of 4.5 square inches each.

2 Limited grading is expected to be required because of the nearly flat terrain. Grading would be required on slopes greater than 3 percent for PV power blocks. Final grading plans for the project are under development; however, the proposed project includes approximately 358 acres (205.47 acres for arrays; 30 acres for roads; 12 acres for the substation, switching station and O&M building; 4 acres for Vasquez County Road; and 106.53 acres for other grading areas) of proposed area that would be graded.

3 Vasquez County Road would be replaced with a new road that would run outside of the project fence line south of Las Aguilas Creek.

Solar Project Components

PV panels would be installed on approximately 1,629 acres of the project footprint. Approximately 360 acres of the project area would be graded. The proposed project would be installed in a clockwise progression beginning near the new substation location south of Las Aguilas Creek and west of Little Panoche Road (see Appendix B, (PVS 2014)). A single-axis tracker system would be used to support the PV panels. Each PV panel would be approximately 3 feet by 6 feet. Panels would be a maximum of 10 feet high at the point of highest tilt, and panel faces would be non-reflective and black or blue in color and mounted on direct-driven steel support structures up to 15 feet long. Steel poles may be placed in holes backfilled with concrete if difficult soil conditions are found based on additional geotechnical evaluations. Rows of panels would be spaced 10 to 35 feet apart to prevent shading of adjacent rows. Rows of panels would be configured into power blocks connecting to an inverter system to convert the direct current energy produced by the panels to alternating current energy that is required for electric transmission. The facility would consist of 145 1.67-MW power blocks and 6 0.83-MW power blocks. Each power block would be up to 520 feet by 90 feet.

The medium voltage collection lines would begin at the inverter-transformer foundation and would be located underground in trenches until the output from between 8 and 10 power blocks terminates in the collection breaker of the substation. The 34.5 kV collection wires located in the areas that are a distance of 1,000 feet or more from the collection breakers in the switchyard and outside the PV field may be mounted overhead on standard wood or steel poles along the site boundary. These poles would be approximately 25 feet in height and spaced about 250 feet apart. The most recent Avian Power Line Interaction Committee (APLIC) guidelines for avian protection will be followed on overhead structures and lines.

An electric substation would include transformers to convert power from 34.5 kV to 230 kV. The substation would be located north of the existing PG&E transmission line on the west side of Little Panoche Road. A new on-site access road would be constructed to serve the substation as well as an approximately 1-acre fenced in parking area. The substation would connect to a PG&E switching station, which would include an approximately 100-foot tall microwave tower. The substation and switching station area would be graded and compacted to an approximately level grade. One or more concrete pads would be constructed as foundations for equipment and structures and the remaining area would be primarily graveled or paved. Electrical transformers, switchgear, and related facilities would be designed and constructed to transform medium-voltage power from the project’s delivery system to the existing 230 kV transmission line.

Each of two substation transformers would contain approximately 12,500 gallons of mineral oil, and the substation would be designed to accommodate an accidental spill of transformer fluid by the use of a concrete foundation with containment. A modular protection automation and control building for PG&E’s switching station control and protection equipment would be located at the switching station site. A substation protection and control building would house the substation relaying and Supervisory Control and Data Acquisition (SCADA) equipment near the substation site.

There would also be a PV Plant Operations and Maintenance (O&M)/control building to house the plant system's relay, protection, and SCADA equipment. Worker parking would be provided in a designated area near the O&M building. The 1,800-square-foot O&M and control facility would be constructed, consisting of a standard steel building on a concrete slab. The facility would provide operations equipment and parts storage, security, and site monitoring.

Project roads would be limited to a 20-foot-wide perimeter road with pullouts every 2,500 to 3,000 feet. Pullouts would be approximately 20 feet wide by 300 feet long. Interstitial space between rows of panels would be used as transportation corridors between the rows of panels as needed for maintenance and access for site safety. Portions of the transportation corridors would be maintained vegetated or dirt paths to ensure needed access. An additional transportation corridor, a maintained fenced-off dirt path, would be placed south of Aguilas Creek but north of the perimeter fence line. This transportation corridor would provide access to the western portion of the Valadeao Ranch Conservation Lands from Little Panoche Road for landowners and ranchers. The perimeter road for the project would cross Las Aguilas Creek in one location. In addition, the perimeter road would cross three unnamed drainages on the eastern side of the project footprint.

The perimeter road designed for site and emergency access for the project would cross Panoche Creek in two locations and Las Aguilas Creek in one location (See Appendix C; PVS 2015). In addition, the perimeter road would cross three unnamed drainages on the eastern side of the project footprint. PVS would span the Las Aguilas Creek crossing using a single-span bridge.

Security fencing would be constructed around the project footprint. The chain-link fence will have a 5- to 6-inch gap along the bottom of the fence that would allow wildlife to travel through the site and link up with the existing travel corridors. The fence would be smooth-top chain link in the upper portion and smooth wire in the bottom portion. Temporary fencing may be placed around construction staging areas.

Temporary wildlife exclusion fencing would be placed around construction staging areas for wildlife protection at the discretion of the Designated Biologist. The primary function of the temporary species exclusion fencing is to prevent special status species from entering the construction sites. Wildlife exclusion fencing would be installed before any ground disturbance, equipment laydown, site preparation, or construction activities as deemed necessary by a designated biologist. The exclusion fencing will be equipped with one-way exits every 250 to 500 feet to avoid entrapment of animals inside the fence. The exclusion fencing would be removed after the completion of construction in the area.

To accommodate water usage during construction, PVS proposes to construct two temporary construction water ponds with a capacity of approximately 13.5 acre feet, along with three temporary 20,000-gallon water tanks. Temporary exclusionary fencing would be installed around the pond. The temporary pond would be removed at the end of construction. Temporary piping would be used to transport water from the pond to drop tanks at designated locations around the project site. Permanent piping would be installed from permanent water storage tanks to the O&M building for use during operations, including providing water to the fire suppression system. Four permanent 4,000-gallon water tanks would be located near existing well sites; this water would be used for washing solar panels, to provide water for facilities in the O&M building, and as part of the fire-fighting system.

Interconnection and Network Upgrades

Actions related to the interconnection and network upgrades are interrelated to the construction of the solar generation facility. PVS has signed a Large Generator Interconnection Agreement (LGIA) with PG&E. The LGIA allows PVS to connect to the existing 230-kV transmission line. The LGIA also details necessary telecommunication systems upgrades, for which PVS would be responsible. PG&E, instead of PVS, may conduct some of the activities described below through the contractual relationship established in the LGIA; however, PVS will remain responsible for implementation of all avoidance and minimization measures. Maintenance of the 230-kV transmission line and switching station is outside the scope of the proposed project and this consultation; any such work would be conducted by PG&E, which would seek independent regulatory and permitting compliance for such work.

The proposed project would interconnect to the regional electricity grid at the existing PG&E Moss Landing–Panoche/Coburn-Panoche 230-kV transmission line on the proposed project site. The primary interconnection facility for this project would be a switching station located to the north of the existing PG&E transmission line on site. The switching station, to be called the Las Aguilas switching station, would be constructed by the Applicant, and ownership would be transferred to PG&E.

Four pairs of new tubular steel poles would be required to interconnect the proposed project: two pairs in the existing transmission right-of-way and one pair on either side of the PG&E switching station. There would be four temporary work areas to allow for construction of up to eight approximately 135-foot-tall tubular steel poles. The tubular steel poles would facilitate connection of the conductor from the two existing 230kV transmission towers into the project switching station. Additional poles may be required once final design is complete; however, the number of poles would not exceed 12.

All ground-disturbing work associated with the construction of the new tubular steel poles that would loop into the switching station would be performed within the project footprint. Before installation of the tubular steel poles foundations, PVS would perform all required clearances for biological resources.

Two lattice towers would be removed from within the project footprint in the existing PG&E right-of-way. The tower foundations would be demolished to approximately 3 feet below grade. There would be an estimated three transmission line structures approximately 80 feet high connecting the generation tie line from the project substation to the project switchyard.

Primary Telecommunication Network Upgrades

PG&E would install new optical ground wire (OPGW) on its existing Panoche-Moss Landing 230 kV transmission line to establish the primary telecommunication service between the project switching station and PG&E's existing Panoche Substation, which is located 17 miles east of the

Panoche Valley in Fresno County. Of the 17 miles of OPGW, approximately 10 miles are in Fresno County and 7 miles are in San Benito County; approximately 8 miles (in both Fresno and San Benito Counties) are on Federal lands administered by the U.S. Bureau of Land Management (BLM).

PG&E proposes to replace the existing shield wire and install the OPGW on the north side of the 230-kV towers, at the top of each tower. PG&E estimates that 12 temporary pull/reel and splice sites would be established along the existing 17-mile transmission line corridor. Each splice and pull/reel sites would require an approximate 75-foot by 75-foot work area located mid-span of existing tower sites within the existing transmission corridor right-of-way.

The OPGW installation along the 17-mile segment would be completed in approximately 12-16 weeks, and at any one location the construction would take from 2 to 3 weeks. Existing roads and access along the transmission line would be used to install the OPGW.

The locations of the pull/reel sites have been identified through a combination of helicopter and ground surveys and a review of aerial imagery. PG&E would use the following criteria to select the final pull/reel sites: accessibility for vehicles, presence of flat or nearly flat land adjacent to existing transmission line route for equipment set-up, existing land use, absence of or minimal habitat for sensitive species, and the absence of resources that would restrict work.

Preparation of the temporary pull/splice sites would require some minor ground disturbance. Minor structural modifications would also be made to each of the transmission towers to allow the mounting of splice boxes where the sections of OPGW would be spliced (every 3 to 5 miles). Access to pull/reel sites and to each transmission tower would occur generally along existing unimproved roads or improved un-surfaced or surfaced roads that lead to many of the existing towers. No new roads would be constructed to access tower locations. Helicopters would be used to place materials at the point of installation for towers inaccessible by road.

At each of the 75 existing towers along the 17-mile 230-kV transmission line route, minor upgrades to the steel attachments on the towers would be required to accommodate installation of the OPGW. These upgrades would include only overhead work on the existing tower, such as replacement of the gode peaks with a pulley to accommodate the OPGW. The existing static wire would then be used to pull the new OPGW through each tower pulley. Existing roads or helicopters would be used to provide access to the sites necessary to fashion the attachments needed on each tower.

Helicopters would be used to transport electrical workers to the towers, deliver materials, and assist in pulling the OPGW from tower to tower. Approximately four 150- by 100-foot landing zones would be constructed approximately 5 miles apart using means similar to pull sites. Establishment of these landing zones would involve minimal temporary ground disturbance and would facilitate the use of helicopters and reduce overall impacts associated with the work. Landing zones would primarily be used for staging materials, picking up and transporting electrical personnel and equipment, and refueling helicopters.

Overhead crossings of public roadways or existing transmission or distribution lines would require the use of approximately 11 temporary guard structures at 7 crossings. The temporary guard structures would be designed to prevent tools or materials from falling into the roadway or utility. Guard structures typically consist of two to four wooden poles and cross beams attached between the poles. They are generally installed in pairs with a net strung between them, but in some cases a net would not be required. A PG&E line truck would be used to auger and set the wooden poles. For roadway crossings, PVS anticipates that the temporary poles would be placed in or adjacent to the disturbed road shoulder in an approximately 75-foot by 75-foot area. No grading or vegetation removal is anticipated associated with installation of the guard structures. Guard structure poles would be removed following OPGW installation and the holes would be backfilled.

The existing 230-kV transmission line crosses under two existing 500-kV transmission lines approximately 1.5 miles west of the Interstate 5 crossing. At this crossing, PG&E would splice in All-Dielectric Self-Supporting (ADSS) fiber optic cable from the 230 kV towers to the east and west sides of the 500-kV transmission line corridor and attach the ADSS to existing wood distribution poles. The ADSS would replace the OPGW for this 4,650-foot section.

To support the added weight of the ADSS, PG&E would replace approximately 12 wood poles with 12 new wood poles in the same locations. These poles are within the PG&E right-of-way on agricultural land. To replace the poles, a 30-foot by 40-foot work area would be required to accommodate one crew truck and a trailer truck to bring each pole to the site and a line truck to auger a hole approximately 8 feet deep and 2 feet wide. In addition, ADSS would be trenched from the easternmost 230-kV tower along an existing dirt road to the first distribution pole location. From the westernmost 230 kV tower to the distribution pole, the ADSS will run overhead approximately 100 feet.

Table 2 summarizes the total ground disturbance associated with the PG&E primary telecommunications upgrades.

Table 2

Primary Telecommunications Site Disturbance

Work Area Description	Total Impact (acres)
Temporary pull/splice sites (12 sites – 75 feet x 75 feet)	1.54
Temporary landing zones (4 zones – 150 feet x 100 feet)	1.38
Temporary guard structures (11 structures – 75 feet x 75 feet)	1.42
Wood pole temporary work areas (12 areas – 30 feet x 40 feet)	0.36
ADSS underground temporary work area (1,200 feet x 37.5 feet and 30 feet x 400 feet)	1.03
Total	**5.73 acres**

To meet PG&E’s communications reliability standards, two redundant communication paths are required. The microwave path would start at the project switchyard, where a new 100-foot microwave tower would be constructed. The path would continue to an existing California Department of Forestry and Fire Protection (CAL FIRE) microwave tower at Call Mountain, then to an existing American Tower Corporation at Panoche Mountain. The microwave path would then terminate at a new approximately100-foot microwave tower to be constructed at PG&E's existing Helm Substation in Fresno County. The new microwave towers at the project switching station and the Helm Substation would be within the fence lines of each site. The proposed tower at the project switching station would be a self-supporting, three-legged Valmont tower, and the proposed tower at Helm Substation would be a self-supporting, four-legged Valmont tower.

Distribution power already exists at microwave tower sites, so no new poles would need to be installed to provide power. In addition, existing roads would be utilized to access the proposed microwave tower sites, so no new roads would be constructed to bring equipment and materials to the work site.

Table 3 summarizes the total ground disturbance associated with the PG&E secondary telecommunications upgrades.

Table 3

Secondary Telecommunications Site Disturbance

Work Area Description	Total Impact
Microwave site permanent work area for new towers (2 areas – 100 feet x 100 feet)	0.46 acre
Microwave towers (2 towers – 100 feet x 100 feet)	0.46 acre
Total	**0.92 acre**

The Applicant and PG&E will implement the following measures to avoid and minimize potential impacts on special status species, including giant kangaroo rats, San Joaquin kit foxes, blunt-nosed leopard lizards, and California tiger salamanders, during the interconnection and telecommunication upgrade portions of the project:

1. The development of new access and right-of-way (ROW) roads will be minimized, and clearing vegetation and blading for temporary vehicle access will be avoided.

2. During fire "red flag" conditions, as determined by CAL FIRE, welding will be curtailed, each fuel truck will carry a large fire extinguisher with a minimum rating of 40 B:C, and all equipment parking and storage areas will be cleared of all flammable materials.

3. Personnel will avoid burrows occupied or potentially occupied by federally listed species as identified by a designated biologist. If a federally listed species is observed, the Applicant will proceed using one of the following options as determined by a designated biologist:

    a. A designated biologist will stake and flag an appropriate work-exclusion zone and remain on-site until construction is complete or stake and flag an appropriate work exclusion zone around active burrows prior to covered activities at the job site. The work-exclusion zone will be a 50-foot buffer or as determined by the designated biologist as necessary to avoid impact to occupied burrows.

b. If work must proceed in the exclusion zone due to limited space of the telecommunication right-of-way, crews will implement techniques to minimize direct mortality, including using designated biologists to trap and hold the species in captivity, and excavating and closing burrows. The designated biologist will hold a permit, pursuant to section 10(a)(1)(A) of the Act, for the species to be excavated. The designated biologist will release the mammals upon completion of work.

4. If San Joaquin kit fox dens are present, their disturbance and destruction will be avoided where possible. However, if dens are located within the proposed work area and cannot be avoided during construction, designated biologists will determine if the dens are occupied. If unoccupied, the designated biologist will remove these dens by hand excavating them in accordance with Service procedures (U.S. Fish and Wildlife Service 1999). The avoidance buffers will follow will follow Service standards or will be determined on a case-by-case basis in coordination with Service and CDFW.

Solar Project Site Design & Engineering

Construction in the project footprint would include the perimeter roads and emergency access/egress points, maintenance transportation corridors, the substation and switchyard, O&M facility, parking areas, collector lines, solar array footers, and equipment pads.

Grading would be required on approximately 360 acres for construction of PV power blocks with the general layout for trenching of underground electrical lines and maps of the perimeter access roads and other permanent facility components. Solar panels and associated electrical equipment would be installed on approximately 185,000 support post foundations. Posts would be steel I-shaped sections with a cross sectional area of 4.5 square inches each. Concrete foundations associated with inverters and MV transformers would impact approximately 96,000 square feet (151 foundations total). Combining switchgear concrete foundations would disturb approximately 9,000 square feet (11 foundations). The entire substation, switchyard, and O&M building areas would be prepared through grading, installation of concrete foundations, placement of a gravel base, and drilled concrete piers. Laydown areas would be located along Little Panoche Road near access points for the construction team. These areas would be graded and covered with aggregate material to allow for use of these areas during operation of the project. Laydown areas will be restored to pre-project conditions after construction. The existing Vasquez Road would be replaced with a new road that would run outside of the project fence line south of Las Aguilas Creek. Permanent impacts of project construction would total 1,94 acres (Table 4).

In addition to permanent impacts from project infrastructure, temporary impacts associated with construction of permanent project features and material and equipment staging would take place on the site. Temporary impacts caused by project construction would total 712 acres (Table 5).

Road construction buffers assume approximately 10 feet to 30 feet of temporary disturbance along perimeter roads, Vasquez Road, and the perimeter fence. Temporary work areas necessary for installation of crossings over Federal jurisdictional waters would be outside of the ordinary high water mark.

Areas of temporary disturbance would be restored in accordance with a revegetation plan to be developed prior to project construction. Disturbed areas would be recontoured, where appropriate, and planted with an approved seed mix. All seed mixtures would be certified "weed free." Noxious weeds would be controlled through implementation of a Weed Control Plan. Herbicides used for noxious weed control would be applied in accordance with Federal and State regulations.

Table 4
Permanent Disturbance

Work Area Description	Total Impact
Solar arrays	1,629 acres
Project perimeter roads (including pullouts)	30 acres
Substation, Switchyard, and O&M Building	12 acres
Graded Areas*	360 acres
230 kV Loop-in Tubular Steel Poles (TSPs)	12 2-foot diameter TSPs
Collector Lines (block feeder and switchgear feeder)	192,500 linear feet
Perimeter Fencing	99,575 linear feet
Vasquez County Road	4 acres
Total	**1,794 acres**

* Graded Areas total does include areas that overlap with other project elements. The total graded area for the project includes approximately 360 acres (205.47 acres for arrays; 30 acres for roads; 12 acres for the substation, switching station, and O&M building; 4 acres for Vasquez County Road; and 106.53 acres for other grading areas).

Table 5
Temporary Disturbance

Work Area Description	Total Impact
Road and Perimeter Fence Construction Buffers	72 acres
Federal Crossing Work Areas	4 acre
Work Areas and Buffers	527 acre
Construction pond	1 acre
Temporary Laydown Areas	108 acres
Total	**712 acres**

Solar Project Construction

The project would be constructed in a general clock-wise progression around the site over approximately 18 months. Construction work would begin near the proposed substation location south of Las Aguilas Creek and west of Little Panoche Road. Construction activities would be permitted from sunrise to sunset, as published by the National Oceanic and Atmospheric Administration, as early as 5:00 am to as late as 9:00 pm. No ground-disturbing activities would take place at night. From 7:00 pm to 7:00 am, generators within 350 feet of the project boundary would not run at 100 percent load, or would be less than 40 A-weighted decibels (dBA) at the property line.

Nighttime activities on the project site would be limited to minor non-ground-disturbing actions such as the following:

- Commissioning and maintenance activities to be performed when PV arrays are not energized
- Interior use of the operations and maintenance facility
- Unanticipated emergencies
- Special status species impact avoidance and minimization activities and research (e.g., giant kangaroo rat trapping and San Joaquin kit fox radio telemetry)
- Security patrols

No work would be completed during severe rain events unless it is required, such as an imminent threat to life or necessary sensitive species work. A designated biologist or biological monitor would be present during all construction activities. A designated biologist is a person with knowledge and experience in the biology and natural history of the threatened and endangered species on the project site, proposed by the Applicant to be responsible for monitoring construction activities to help minimize or avoid the incidental take of species and to minimize disturbance to their habitat. This biologist may appoint biological monitors to perform biological surveys or provide oversight of ground disturbing activities, as needed, in their place. A designated monitor is an Applicant-proposed observer who would work on-site to perform biological surveys or provide oversight of ground disturbing activities as needed and that receive instruction from and report to the Applicant-proposed designated biologist.

<u>Site Preparation</u>

Site preparation would mainly include pre-construction biological surveys, burrow excavation, relocation of special status species, construction of the perimeter road, intermittent stream crossings, and implementation of storm water best management practices (BMPs). Project grading requirements are anticipated to result in cut-and-fill activities with no export of materials. Aggregate would be imported for the permanent road, switching station, and the substation.

The majority of the PV array areas will not require ground preparation. However, for areas that overlap with the graded areas, preparation would involve trimming grassland vegetation (as needed), agricultural disking, harrowing, and/or rolling of PV array areas, selected compacting, and grading. For the majority of the project footprint, the ground under the PV arrays would not require grading or any land preparation, except for areas that are greater than 3 percent slope. Preparing the ground beneath PV arrays would begin by trimming existing vegetation, if required. Approximately 360 acres of the project footprint are expected to be graded.

<u>Panel Assembly and Installation</u>

Panel components, such as the PV panels and racks, would be transported by truck to the laydown areas and then distributed throughout the project footprint using various forms of rolling stock. During construction and installation, all traffic would enter the project footprint at specified access points along Little Panoche Road.

A prefabricated racking system would arrive on-site to be assembled and grounded at the site. Preassembled PV panels would be placed in a staging area inside or on shipping containers. Panels would be put in place manually and secured to the rack according to vendor specifications. The rack would be populated with panels, wired in series, and connected to a direct combiner box, which would deliver direct current power to the inverters. Equipment used for system installation would include forklifts, all-terrain vehicles, truck-mounted pile drivers, cranes, and pick-up trucks.

Approximately 108 acres are planned for laydown and staging. The laydown areas would require a power source for lighting, construction trailers, and parking. There would be no hazardous substances stored on-site outside of approved containment measures.

Construction Personnel

The workforce at the project would vary based on activity at the site during the course of construction. Nighttime activities would have crews of 20 to 50. Daytime crews would range from 100 to 500 individuals. There would be no on-site temporary workforce housing, and parking of employee recreational vehicles or trailers would be prohibited.

Personnel Traffic

As described above, the workforce for the project would vary based on activity at the site during the course of construction. PVS expects approximately 1,150 vehicles trips per day during project construction. This total includes construction workers driving to/from the site, truck traffic for equipment and other loads, security patrols, and biological monitors.

All truck traffic and deliveries, along with approximately 40 percent of personal vehicle traffic, would enter the site from the north on Little Panoche Road. To accommodate the increased daily traffic volume and decrease safety risks to personal traffic, the remaining personal vehicle traffic would enter the site from the west on Panoche Road.

Delivery Traffic

Routes for trucks hauling materials and construction equipment would primarily follow the I-5 corridor to Little Panoche Road, allowing for safer travel by larger container trucks and wide-load trucks carrying heavy equipment. It is anticipated that material deliveries would occur via I-5. Smaller deliveries may arrive to the site via Hollister and/or via county roads.

Vehicles Entering and Traversing the Site

During installation, traffic would enter the site at the specified laydown areas. Vehicles would travel along Little Panoche Road and Panoche Road. Vehicles needed for installation of PV panels would travel on both permanent and temporary site roads of compacted native soil. These vehicles would include trucks, drilling rigs, forklifts, water trucks, and cranes for lifting inverters onto piers.

On-Site Telephone and Data Service

Telephone and internet services to the project site would be provided by AT&T utilizing existing AT&T services located 2,000 feet south of the project site along Little Panoche Road. New underground cable would be installed in the public road shoulder from the existing connection point to the project site. Installation would include construction of a 2-foot-wide by 3-foot-deep trench to allow direct burial of the cable in compliance with State and local standards. Alternatively, the cable could be attached to existing wood distribution poles along the road from the existing AT&T connection point to the project site.

Landscape Design

Landscaping in disturbed areas would use native plant stock whose origin is close to the project area. Salvaged topsoil would be used to promote re-establishment of existing plant communities from the existing seed bank if available. Erosion and sediment control measures would be implemented in revegetated areas to minimize soil movement and improve the potential for revegetation. If revegetation cannot be conducted immediately following completion of construction, appropriate interim erosion control measures, as detailed in the SWPPP, would be installed until revegetation occurs. Examples of interim erosion control measures include certified weed-free straw mulch, fiber rolls, or straw bale barriers.

Erosion Control

A stormwater pollution prevention plan (SWPPP) outlining the various BMPs for minimizing erosion and runoff would be prepared prior to project construction. Typical erosion control devices would be used, including the following:

- Sandbags, straw bales, and temporary de-silting basins for project grading and construction during the rainy season (October 15–April 15) to prevent discharge of sediment-laden runoff into storm water facilities;
- Revegetation as soon as practicable after completion of grading to reduce sediment transport during storms;
- Installation of straw bales, wattles, or silt fencing around the perimeter of graded building pads for construction during the rainy season; and
- Structural BMPs (e.g., grease traps, debris screens, and oil/water separators) incorporated into substation design to minimize potential for contaminated storm water to leave the substation.

Fire Safety

Vegetation at the site would be kept to a height of less than approximately 18 inches. Short-duration intensive grazing by sheep may be used to maintain vegetation, depending on the amount of forage available on the site. The number of sheep required to appropriately graze the feed produced on the project site would vary seasonally depending on the rainfall and temperature of each grazing season. During normal rainfall years, anywhere from 1 to 3 bands of sheep (with each band consisting of between 750 and 1,200 adult sheep and offspring, depending on the season) would graze the project site during the winter and spring months (January to May) to use the amount of forage produced prior to and during that season. PVS would construct new sheep fencing as necessary. The sheep would be removed from the site during the remainder of the year. Interstitial space between rows of panels would be used as transportation corridors between the rows of panels as needed for maintenance and access for site safety. Emergency egress and access the perimeter roads for the project would cross Panoche Creek in two locations and Las Aguilas Creek in one location (PVS 2014).

Operations and Maintenance

The proposed project would be in operation for at least 30 years, with the possibility of a subsequent repowering for additional years of operation. The facility would operate 7 days per week during daylight hours. Operational activities would consist of monitoring system operational status, performance, and diagnostics from the control room in the O&M building.

Security

The project would be fenced to prevent access by the public to ensure public safety and protect equipment from theft and vandalism. Gates would be installed at all site access roads. PVS would provide 24-hour security at the site, along with maintenance personnel capable of responding to any upset conditions or other emergencies. Security staff would routinely traverse the site in lightweight vehicles and all-terrain vehicles.

Maintenance

Once installation is complete and the site is fully operational, all traffic would enter the site at the switchyard location off of Little Panoche Road. The facility would be restricted to O&M staff, security personnel, and PVS authorized guests. The O&M staff would use light-duty vehicles and all-terrain vehicles for traversing the site along transportation corridors.

The PV panels would be washed up to twice annually during the dry season. Inverters would be checked twice annually for general component maintenance. Panel washing would require an estimated 2.84 acre-feet of water annually. The panel washing crew would traverse the site in a small all-terrain vehicle fitted with a trailer containing a water tank and a high-pressure sprayer.

The PV arrays would be inspected once annually for degrading wires, panels, and combiner boxes, as well as for mechanical fastener tightening. The SCADA system would also identify underperforming system components; and these components would be checked as required.

Damaged or underperforming PV panels and mechanical fasteners would be replaced as required. Underperforming inverters would be serviced or replaced as required.

Erosion Control

During project operation, a vegetated understory composed of native plant species consistent with existing vegetation would be planted under the panels. The vegetation height would be minimized by planting slow-growing grasses native to the region and through short-duration intensive grazing by sheep, described under Fire Safety, below.

Decommissioning or Repowering

The project would be in operation for at least 30 years, with the possibility of a subsequent re-powering of the project for additional years of operation. Upon its eventual decommissioning, PVS or its successor in interest would be responsible for the removal and disposal of all solar arrays, inverters, transformers, fences, roads, and other structures on the site. The switching station and associated infrastructure would become a permanent asset of PG&E’s electrical transmission system. Any decommissioning plan for the solar project would exclude PG&E owned facilities.

Applicant Proposed Conservation Measures/Conservation Package

PVS has proposed the following general and species-specific conservation measures to minimize impacts to biological resources which may occupy the project footprint.

General Applicant Proposed Avoidance and Minimization Measures

PVS will implement the following measures to avoid and minimize potential impacts on special status species during construction, operations, and maintenance:

1. Before construction activities begin, PVS will submit to the Service for approval the name, qualifications, business address, and contact information of one or more designated biologists responsible for surveying, monitoring, or implementing any avoidance or minimization measures. PVS will ensure designated biologists are experienced in the biology and natural history of all special status species on the project site. The designated biologist will be responsible for monitoring construction activities to minimize or avoid incidental take of individual species and to minimize disturbance of special status species’ habitat. The designated biologist may appoint monitors to perform biological surveys or to oversee ground-disturbing activities. All on-site biological monitors will receive instruction from and will report to the designated biologists.

2. Before beginning work on the project site all project personnel will be required to participate in an environmental education program. Topics will include: occurrence and distribution of special status species within the project area; minimization and avoidance measures; reporting requirements if any listed species is injured or killed; and, applicable definitions and prohibitions under the Act and other measures regarding federally-listed species. This education program will be designed to ensure all personnel who work at the project site are aware of and can identify the federally- and State-listed species and measures to protect them. As part of this training, all project personnel will receive the contact names and numbers to report incidents involving federally- and State-listed species. On completion of the program, the employees will be given a badge or hard hat sticker for admittance to the project site. An environmental education program

attendance log with the names and dates of all personnel who completed the program will be maintained by the Applicant.

3. Posters with English and Spanish text and showing pictures of special status species, with information and protocols to be followed, will be placed in conspicuous locations, such as construction trailers.

4. A designated biologist or their representative biological monitor will conduct a preconstruction survey prior to any activity that could result in ground disturbance. The biologist will identify and clearly mark areas where federally-listed species were identified and where dens or burrows and habitats of special status species are to be avoided. Buffers will be established with highly visible markers. When burrows or dens could be damaged (occurring within 50 feet of project activities), a designated biologist will determine when special excavation procedures are necessary to protect special status species and when they are not necessary. If relocation of sensitive species is permissible, then the appropriate relocation plans will be followed.

5. Designated biologists or their representative biological monitor will be present during all ground-disturbing activities. In addition to conducting preconstruction surveys, the biologists will aid crews in implementing avoidance and minimization measures, documenting weekly all pertinent information concerning action effects on special status species, and helping minimize the adverse effects of project activities on special status species.

6. Designated biologists and biological monitors will have the authority and obligation to order cessation of activities if avoidance or minimization measures are violated and will notify the project proponent's environmental representative immediately.

7. All project vehicles will be confined to designated project roads or to prominently staked or flagged access routes that are surveyed before use. Designated access routes will be determined by the designated biologists or their representative biological monitors. Vehicle travel will not be permitted off designated transportation routes, except in emergencies or as permitted by the designated biologist. All observed special status species and their habitat features, such as dens, burrows, and specific habitats, will be flagged to alert project personnel to their presence. All project-related flagging will be collected and removed after construction. A daytime speed limit of 15 miles per hour and a nighttime speed limit of 10 mph will be adhered to on the site, and project personnel will not exceed 25 mph on public roads immediately adjacent to the project site, unless maintaining such speed would present a safety concern.

8. Designated biologists will keep an accurate tally of the sensitive resources listed above that are damaged or otherwise affected by project activities. Additionally, the biologists will count the number of small mammal burrows damaged or otherwise affected. This number will be reported in the post-activity compliance report and entered into a central database developed expressly for that purpose.

9. PVS will appoint a company representative as the contact for any employee or contractor who inadvertently kills or injures a special status species or who finds a dead, injured, or entrapped special status species. The representative will be identified during the pre-performance educational briefing. The name and contact information of this representative will be provided to the Service. Contractors, employees, and other personnel who inadvertently kill or injure a special status species will immediately report the incident to their representative. The representative will contact the project proponent's environmental representative and designated biologists. This person will then contact the Service immediately in the case of a dead, injured, or entrapped listed species. The designated biologist will also document all circumstances of death, injury, or entrapment and will take all reasonable steps to enable the animal to escape should it be entrapped, contact the Service to identify an approved rehabilitation center and appropriate capture and transport techniques should the animal be injured, and document circumstances of death in writing and if possible photograph the dead animal in situ before moving it (the animal would be moved only with permission from the applicable agencies).

10. If a special status species is injured or killed by project-related activities, the designated biologist will document the information reported. The Applicant will send the Service a written report within 2 calendar days of learning about the injury or death. It will include the date, time, and location of the finding or incident; location of the carcass; and, if possible, a photograph and any other pertinent information (Ventura Fish and Wildlife Office, 2493 Portola Road, Suite B, Ventura, CA 93003).

11. To prevent inadvertent entrapment of special status species, all excavated, steep-walled holes or trenches more than 2 feet deep (or of any depth if they contain water or other material) will be covered with plywood or other barrier materials. Alternatively, holes or trenches will include one or more escape ramps constructed of earth fill or wooden planks no less than 10 inches wide and reaching to bottom of trench at the close of each working day. Before holes or trenches are filled, a biologist will inspect them for trapped animals. If any worker discovers that special status species have become trapped, construction activities will cease in the vicinity and the designated biologist or representative will be notified immediately. Project workers and the biologist will allow the special status species to escape unimpeded, or the biologists will determine that activities be allowed to continue. If an injured special status species is discovered at any time, the designated representative will contact the Service for guidance.

12. The Applicant will limit pile driving activities to reduce noise levels by completing pile driving using sonic or vibratory pile drivers at reduced driving force instead of impact pile drivers, except in areas where pile driving is the only means of ground penetration, such as encountering hard pan layers or bed rock, and arranging multiple pile drivers so that no two are driving simultaneously within 160 feet of each other.

13. PVS will develop a spill prevention control plan. This plan will detail all actions to be taken in the case of a spill. All hazardous materials spills will be cleaned up

immediately, in accordance with the spill prevention control plan. PVS will provide to the Service a copy of this plan prior to the start of project activities.

14. PVS and its contractors will prohibit pets at the project site, with the exception of working dogs assisting ranchers. Any working dog handler entering the site will be required to provide proof of the animal's inoculations to prevent disease transmission.

15. PVS and its contractors will prohibit firearms within the proposed project footprint.

16. All food-related trash, such as wrappers, cans, bottles, bags, and food scraps, will be disposed of daily in containers with secure covers and regularly removed from the site.

17. Use of rodenticides and herbicides in project areas will be restricted, within the prescriptions of the noxious weed and invasive plant control plan. Herbicides will be applied in accordance with Federal and State regulations. They will be applied only by licensed applicators in accordance with label directions and other restrictions mandated by State and Federal legislation.

18. The width of vehicles in occupied special status species habitat will be limited to 25 feet.

19. On completion of any section, all areas that are significantly disturbed and not necessary for future operations will be stabilized to resist erosion, will be revegetated and recontoured if necessary, and will follow goals and methods in the habitat restoration and revegetation plan to promote restoration of the area to pre-project conditions.

In addition to the 19 General Applicant Proposed Avoidance and Minimization Measures, listed above, the Applicant and PG&E will implement the following minimization and avoidance measures for the telecommunication and powerline upgrades:

1. Development of new access and right-of-way (ROW) roads will be minimized, and clearing vegetation and blading for temporary vehicle access will be avoided.

2. During fire "red flag" conditions, as determined by CAL FIRE, welding will be curtailed, each fuel truck will carry a large fire extinguisher with a minimum rating of 40 B:C, and all equipment parking and storage areas will be cleared of all flammable materials.

3. Personnel will avoid burrows occupied or potentially occupied by federally listed species identified by a designated biologist. Irregular occurrences may arise when this avoidance is not possible. In these cases:

    a. If occupied or potentially occupied burrows cannot be avoided, a designated biologist will stake and flag a work-exclusion zone and remain on-site as a biological monitor, or the biologist will stake and flag a work exclusion zone around active burrows prior to covered activities at the job site.

b. If work must proceed in the exclusion zone, crews will implement techniques to minimize direct mortality, including using designated biologists to trap and hold the species in captivity, and excavating and closing burrows. The designated biologist will hold a permit, pursuant to section 10(a)(1)(A) of the Act, for the species. The approved biologist will release the mammals as soon as possible when the work is complete.

4. If San Joaquin kit fox dens are present, their disturbance and destruction will be avoided where possible. However, if dens are located within the proposed work area and cannot be avoided during construction, designated biologists will determine if the dens are occupied. If unoccupied, the designated biologist will remove these dens by hand excavating them in accordance with Service procedures (Service 1999). The exclusion zones for occupied dens will follow current standards or will be determined on a case-by-case basis in coordination with Service and CDFW.

5. If activities take place in blunt-nosed leopard lizard habitat, a designated biologist will determine if burrows are present and if work can avoid burrows. If work cannot avoid the burrows, a designated biologist will evaluate the site for occupancy and stake and flag an appropriate exclusion zone around the burrows prior to activities at the job site.

Species-Specific Proposed Avoidance and Minimization Measures

In addition to the general proposed conservation measures described above, the Applicant would implement species-specific conservation measures for giant kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard, and California tiger salamander during construction, operations, and maintenance activities.

<u>Giant Kangaroo Rat</u>

The Applicant would implement the following avoidance and minimization measures for protection of the giant kangaroo rat (PVS 2014):

Project Design. Surveys were conducted to document areas of high giant kangaroo rat occupancy. A total of 212 acres of giant kangaroo rat avoidance areas within the project footprint have been incorporated into the Valley Floor Conservation Lands. These areas were selected due to the large concentrations of active and inactive giant kangaroo rat precincts, presence of high quality habitat, and direct connectivity to protected lands including a 20-foot setback from Little Panoche Road, based on the number of giant kangaroo rat active and inactive precincts identified along the adjacent fence line. Habitat corridors would conform to contours of natural ecological features and most suitable habitat in the landscape to maintain functionality of the project site for giant kangaroo rats.

Giant Kangaroo Rate Relocation Plan Summary. All activities that would result in permanent or temporary ground disturbance would be preceded by a preconstruction survey for giant kangaroo rats conducted by the designated biologist no more than 30 days prior to commencement of ground disturbing activities. If giant kangaroo rat sign is observed in the work area, the area would be saturated with traps. All giant kangaroo rats would be relocated off-site within 15 miles of the proposed project footprint. Exclusion fencing would be installed to prevent giant kangaroo rats from re-entering the target burrow. The exclusion fencing would be buried deep enough to prevent giant kangaroo rats from digging under, and high enough to prevent them from jumping over. After trapping for 6 consecutive nights or successfully trapping an individual giant kangaroo rat, all burrows would be excavated to ensure no individuals remain. Giant kangaroo rat burrows/precincts would not be disturbed from January through June, which is the recognized breeding/mating season, unless a qualified biologist verifies by video that no young are present in the burrow. Construction would not begin in an area until trapping efforts have ceased, burrow excavation is complete, and no more giant kangaroo rats are expected to use the area, as determined by the designated biologists. The full Giant Kangaroo Rat Relocation Plan is included in the biological assessment (PVS 2014).

<u>San Joaquin Kit Fox</u>

The following avoidance and minimization measures would be implemented to reduce effects to the San Joaquin kit fox (PVS 2014):

San Joaquin Kit Fox Den Avoidance. After pre-ground disturbance surveys, the designated biologists would identify and clearly mark the areas where San Joaquin kit foxes were identified, along with their dens and burrows. All known or occupied San Joaquin kit fox dens would be identified by flagging a 100-foot buffer. All known San Joaquin kit fox natal dens would be identified by flagging and a 150-foot buffer; all occupied San Joaquin kit fox natal dens would be identified by flagging and a 200-foot buffer. No work activities that would result in effects to the den or occupants would occur within the buffers until it is determined to be unoccupied by the designated biologist. If a road is to be constructed adjacent to a den buffer, a speed limit of 10 mph would be implemented and the den would be monitored for disturbance by a designated biologist. Any potential kit fox dens that cannot be avoided may be excavated and backfilled in accordance with Service (2011a) guidelines without prior notification, provided that excavation is approved and supervised by a biological monitor or other designated biologist. If avoidance of known dens is not possible, the project proponent would take the following sequential steps when working in such areas:

1. Allow for 3 consecutive days of monitoring to determine the occupancy status of each den. Activity at the den will be monitored by using tracking medium at the entrance or stationary infrared beam cameras and by spotlighting. If no activity is observed, actions described below under Step 3 may be implemented. If San Joaquin kit fox activity is observed, the den will be monitored for an additional 5 days from the date of observance. Repeated use of the den during this time will be discouraged by partially plugging its entrances with soil so that any resident animal can escape easily. If San Joaquin kit fox are still using the den after 5 days, den excavation, discussed below under Step 3, may proceed when, in the judgment of the biologist, it is determined to be vacant (San Joaquin kit fox not present at the time).

2. Once the San Joaquin kit fox has vacated the den, methods such as one-way doors will be taken to prevent reentry until construction is complete in these areas. At that point, access to the burrows will be restored.

3. Once it has been confirmed that the dens have been vacated, if construction related impacts will crush or destroy a den, it will be excavated by hand under the supervision of a biologist; no more than 4 inches will be removed at a time. If at any time during excavation a San Joaquin kit fox is discovered inside the den, all activity will cease immediately, and monitoring described above under Step 1 will resume. As indicated above, natal dens will not be disturbed at any time.

Measures during Construction. Construction materials would not be stacked in a manner that allows San Joaquin kit fox to establish den sites. Construction items such as solar panels and equipment transported to the project site on pallets would be placed directly on the ground, and the pallets would be removed from the site. High visibility signs would be posted at the boundary of the project site along Little Panoche Road to alert drivers both to construction traffic and to the presence of special status species. The signs would include a posted speed limit. The designated biologist or biological monitors would trap and radio collar San Joaquin kit foxes for location monitoring during construction. The daily telemetry location of the collared San Joaquin kit fox would inform construction personnel of San Joaquin kit foxes in the area and locations to avoid and minimize effects to the species.

Project Design. San Joaquin kit fox permeable perimeter fencing would be constructed to allow movement through the proposed project footprint. A 5- to 6-inch gap along the bottom of the chain-link fence would allow San Joaquin kit foxes to travel through the site to existing travel corridors, including the creek washes and the Valley Floor Conservation Lands. It would also allow a link to prey base areas, such as the giant kangaroo rat precinct/colony avoidance areas. A fencing option to the chain-link fence would be an inverted "deer fence" that would have larger rectangular openings on the bottom to allow kit foxes to pass through. Fences surrounding the substation and O&M building would be constructed to restrict San Joaquin kit fox access.

Movement corridors through the site would be protected with little disturbance to the existing habitat. The exceptions would be the existing road, emergency access crossing, and the planned project perimeter road, during project construction and operations and maintenance. Measures added to the project description to provide the San Joaquin kit fox with additional movement corridors through the project include:

1. An approximately 1,640-foot-wide by 8,000-foot-long corridor associated with the Las Aguilas Creek/Valley Floor Conservation Lands corridor will be protected and is expected to be beneficial in providing additional undisturbed connectivity. The corridor would promote movement through the site and north to the Panoche Hills and BLM landholdings. The undisturbed Valley Floor Conservation Lands along Las Aguilas Creek will be widened to accommodate this San Joaquin kit fox enhancement.

2. The Panoche Creek Corridor intersects the southern portion of the Valley Floor Conservation Lands in a west to southeast direction. This corridor provides connectivity to the large block and high quality habitats to the west of the project, including the Gabilan Range and eventually through to the Silver Creek Ranch Conservation Lands and the BLM lands beyond. The southern portion of the Valley Floor Conservation Lands also provides unimpeded west to east travel ways from the Panoche Creek wash (and adjacent flats) to the Valadeao Ranch Conservation Lands and adjacent Tumey Hills/Panoche Hills BLM landholdings, including the Las Aguilas Creek drainage.

3. The Moss-Panoche 230kV Transmission Line Corridor bisects the southwestern portion of the proposed project footprint and associated Valley Floor Conservation Lands in a northwest to southeast direction. This 75-foot corridor provides connectivity to the habitats (e.g., grassland flats and Panoche Creek wash) to the west of the project, including the Gabilan Range, and eventually through to Silver Creek Ranch Conservation Lands and adjacent BLM landholdings.

Blunt-Nosed Leopard Lizard

The Applicant would implement the following avoidance and minimization measures to reduce effects to the blunt-nosed leopard lizard (PVS 2014):

Blunt-nosed Leopard Lizard Surveys. In the areas closer to previous observations, such as in the vicinity of Las Aguilas Creek, enhanced preconstruction surveys for adult blunt-nosed leopard lizards would be conducted. These enhanced surveys would consist of focused protocol-level blunt-nosed leopard lizard surveys during the adult breeding season preceding the ground disturbance. The survey method would be based on the CDFW Approved Survey Methodology for the Blunt-Nosed Leopard Lizard (CDFW 2004). All observed blunt-nosed leopard lizards would be avoided by a flagged 52.4-acre buffer to alert project personnel to their presence. Motorized vehicles would be prohibited within the 52.4-acre buffer surrounding all blunt-nosed leopard lizard observations, except where those buffers intersect an existing road. If a blunt-nosed leopard lizard is observed on the proposed project footprint, the Service would be contacted.

Blunt-nosed Leopard Lizard Avoidance during Construction. Biological monitors would accompany vehicles and crews throughout the project area if the designated biologist considers it necessary in order to avoid individual blunt-nosed leopard lizards. Biological monitors would be given the authority and obligation to order cessation of activities as follows: if an immediate threat of take is identified, if take avoidance or minimization measures are violated, or if a blunt-nosed leopard lizard is located in the construction area. The biological monitor would notify the project environmental representative of a stop work order.

California Tiger Salamander

The Applicant would implement the following avoidance and minimization measures to reduce effects to the California tiger salamander (PVS 2014):

California Tiger Salamander Surveys. The designated biologists or their representatives would survey the work site before the project proponent begins any ground-disturbing activities. If the designated biologists find any adults, eggs, or larvae of California tiger salamander they would relocate them to suitable habitat that is being preserved. The designated biologists would hold the appropriate Federal and State permits, including State scientific collecting permits (SCPs), for amphibians so they could capture and handle the salamanders. The designated biologists may be assisted by approved biologists who do not have SCP; these biologists would be identified as designated monitors.

California Tiger Salamander Exclusion Fencing. At the discretion of the designated biologist California tiger salamander exclusion fencing will be installed in construction areas within 1.2 miles of potential or known California tiger salamander breeding sites. These areas would be fenced before the rainy season and before construction begins. Before the exclusion fencing is installed, a preconstruction survey would conducted by a designated biologist or representative. The project proponent would maintain the California tiger salamander exclusion fencing throughout the rainy season during all construction activities. The project proponent would use wildlife fencing equipped with one-way exits every 250 to 500 feet to avoid entrapping amphibians inside the fence. The project proponent would bury fencing to a depth of 6 inches, and fencing would be a minimum of 30 inches above grade. California tiger salamander exclusion fencing would be designed to exclude other species as well.

Entrances to construction areas would be minimized and would be equipped with a gate that could be closed after each working day. This would prevent California tiger salamanders from entering the site. The project proponent would avoid damaging or destroying small mammal burrows to the during installation of the exclusion fencing. The exclusion fencing would be removed after construction or at the end of the rainy season for construction within 1.2 miles of a known or potential breeding pond.

California Tiger Salamander Relocation Plan. If a California tiger salamander is observed, the designated biologist(s) would capture it and place it in a suitable bucket or insulated cooler in the shade with a wetted sponge and an ice pack wrapped in a clean cloth (if required) to mimic subterranean conditions. The biologist would record his or her name and the date, time, and California tiger salamander location using a handheld GPS and digital camera. The sex, age, condition, diagnostic markings, and general condition and health would also be recorded and the salamander would be photographed. The salamander would be released into a suitable burrow as close to a suitable pond as possible, most likely on the Valadeao Ranch or Valley Floor Conservation Lands, as quickly as possible. The salamander's time out of the ground would not exceed 1 hour. If a dead or injured California tiger salamander is located during the burrow excavations or construction, the Service would be contacted immediately. The project proponent and designated biologists would follow direction from the Service for the next steps to take. Finally, the actions undertaken and the habitat description and location of the California tiger salamander would also be recorded and photographed. All of the above information and any field notes would be submitted to the Service. In addition, this information would be recorded in a California Natural Diversity Database (CNDDB) report and the report would be submitted to the CDFW.

California Tiger Salamander in Project Footprint. If a California tiger salamander is found by any person in areas that would be impacted by the proposed project, the project proponent would immediately stop all work that could harm the salamander until the permitted designated biologists can capture and relocate it to an appropriate burrow, in accordance with the approved relocation plan. Before surface disturbance or other covered activity, a designated wildlife biologist would conduct a tailgate briefing for all project personnel. This would include an explanation of how to identify California tiger salamander and applicable reporting procedures.

Open Trenches. All open holes, sumps, and trenches within the project area would be inspected at the beginning and end of each day during the rainy season for trapped animals. The project proponent would provide earthen or wood escape ramps at least 10-inch-wide of no more than 3:1 slope every 250 to 500 feet.

Rain Forecast. The designated biologists or their representative would monitor the National Weather Service 72-hour forecast for the project area. Additionally, a rain gauge installed at the project site would be monitored and refreshed every morning. If rain exceeds 0.25 inch during a 24-hour period, the project proponent would cease work within 1.2 miles of potential or known breeding ponds until no further rain is forecast. This includes stopping construction-related traffic moving though areas, except on public roads. In areas within 1.2 miles of potential or known breeding ponds that have been encircled with California tiger salamander exclusion fencing or if existing burrows have been excavated in compliance with the Project's California tiger salamander Pre-construction Avoidance and Minimization Plan, construction would be allowed to continue during rainstorms. This includes structures to permit one-way movement of California tiger salamander off the work site. During periods of rain, no work would be conducted at night, even within the exclusion fencing, unless there is an imminent threat to life, necessary special status species work, or a significant property or construction interest. PVS would restrict night work in areas within 1.2 miles of potential or known California tiger salamander breeding sites when a 70 percent or greater chance of rainfall is predicted within 48 hours. This would apply to project areas that have not been encircled with exclusion fencing or where burrows have not been excavated until the chance of rain decreases below this threshold. However, even after exclusion fencing is installed or burrows excavated, this condition still applies to construction-related traffic moving though areas within 1.2 miles of potential or known salamander breeding sites but outside of the exclusion fencing (e.g., on roads). If work must be completed at night in the rain and within the exclusion fencing, it would be due to such things as an imminent threat to safety or necessary special status species work.

Soil Stockpiles. The project proponent would ensure that soil stockpiles are placed where soil would not pass into potential California tiger salamander breeding pools or into any other Waters of the State, in accordance with Fish and Game Code 5650. The project proponent would appropriately protect stockpiles to prevent soil erosion.

Barriers to California Tiger Salamander Movement. Any roadways that the project proponent needs to construct within 1.2 miles of known or potential California tiger salamander breeding sites would be constructed without steep curbs, berms, or dikes, which could prevent California tiger salamander from exiting the roadway. If curbs are necessary for safety or surface runoff, the project proponent would design and construct them to allow California tiger salamanders to walk over them. If steep dikes are required, the project proponent would design and construct them to include over-side drains or curb/dike breaks spaced at intervals of 25 feet to allow California tiger salamander passage.

Fieldwork Code of Practice. To ensure that disease is not conveyed between work sites, all biologists would follow the Declining Amphibian Populations Task Force Fieldwork Code of Practice. The designated biologists may substitute a bleach solution of 0.5 to 1 cup of bleach to 1 gallon of water for the ethanol solution. Care will be taken so that all traces of the disinfectant are removed before entering the next aquatic habitat.

Breeding Ponds. Three potential breeding ponds would be created on conservation lands. The purpose of the pond creation is to create new breeding habitat on the conservation lands, which would be preserved and managed in perpetuity. Through coordination with the Service and CDFW, adaptive management would be used to ensure the success of the created ponds.

Conservation Lands

The three primary conservation lands (Valley Floor, Valadeao Ranch, and Silver Creek Ranch) would be preserved and managed for the benefit of special status species. These conservation lands would include corridors between the conservation lands to provide connectivity. The following measures would be implemented to protect and enhance all conservation lands.

The perimeter of the conservation lands would be fenced to exclude unauthorized access, where appropriate. If new fencing is installed, fencing would be designed with at least three-strand barbed wire, with a fourth (bottom) strand of smooth wire at least 8 inches above the ground or other fence design approved by the Service. This fencing design would reduce potential injury to wildlife while clarifying conservation land boundaries to the public. Signs would be placed on boundary fencing adjacent to public roads or property accessible by the public at 150-500 feet intervals, indicating that entry without access permission is prohibited, and the lands are protected.

Litter and illegally dumped wastes as prescribed in the Habitat Management Plan would be removed from the property within the first year of establishing the conservation easement, and at least on an annual basis thereafter as needed. The conservation easement will be recorded on all the proposed conservation lands prior to the start of project construction. The initial cleanup areas would include at least the sites identified in the Habitat Management Plan.

Any areas where human disturbance already exists that are not needed for long term maintenance, landowner/lessee access, grazing activities, etc. would be restored in such a way as to blend the area into the surrounding habitat. A revegetation specialist with experience restoring western San Joaquin Valley plant communities would assess individual sites to determine restoration methods and appropriate planting procedures and species. If restoration is determined to be warranted, methods would follow the Habitat Restoration and Revegetation Plan to be developed for the site.

Actions that facilitate regional connectivity for the special status species through enhancement of corridors and connected portions of the conservation lands would be implemented. Implementation would include: a) habitat enhancement and restoration within the conservation lands, and b) maintain movement corridors to the connected conservation lands and adjacent protected properties.

In addition to the avoidance and minimization measures described above, the project proponent would implement a habitat management plan. This would consist of the permanent preservation and management of three large parcels of land to offset potential impacts. These lands—Valley Floor Conservation Lands, Valadeao Ranch Conservation Lands, and Silver Creek Ranch Conservation Lands—would be enhanced and managed for the species through implementation of the habitat management plan. A goal of the habitat management plan is to provide a sufficient population level of special status species to offset the effects of construction of the project. The entire habitat management plan is attached as Appendix F to the biological assessment (PVS 2014).

The project includes the preservation and management of approximately 24,176 acres of conservation lands. The conservation lands would be preserved in perpetuity with endowments to the Center for Natural Lands Management. The conservation easement will be recorded and the nonwasting endowment for all management activities will be funded prior to initiation of project construction. Details of the habitat management plan are included in the biological assessment (PVS 2015).

ANALYTICAL FRAMEWORK FOR THE JEOPARDY DETERMINATION

Jeopardy Determination

Section 7(a)(2) of the Endangered Species Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. "Jeopardize the continued existence of" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02).

The jeopardy analysis in this biological opinion relies on four components: (1) the Status of the Species, which describes the range-wide condition of giant kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard, and California tiger salamander, the factors responsible for that condition, and the species' survival and recovery needs; (2) the Environmental Baseline, which analyzes the condition of the giant kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard, and California tiger salamander in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the giant kangaroo rat, San

Joaquin kit fox, blunt-nosed leopard lizard, and California tiger salamander; (3) the Effects of the Action, which identifies the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the giant kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard, and California tiger salamander; and (4) the Cumulative Effects, which evaluates the effects of future, non-Federal activities, that are reasonably certain to occur in the action area, on the giant kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard, and California tiger salamander.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the current status of the giant kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard, and California tiger salamander, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to reduce appreciably the likelihood of both the survival and recovery of the giant kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard, and California tiger salamander in the wild by reducing the reproduction, numbers, or distribution of that species.

STATUS OF THE SPECIES

Giant kangaroo rat

The giant kangaroo rat was federally listed as endangered on January 5, 1987 (52FR283) and was listed by the State of California as endangered on October 2, 1980. The Recovery Plan for Upland Species of the San Joaquin Valley (Service 1998) includes the giant kangaroo rat. The giant kangaroo rat was distributed historically from southern Merced County, south through the San Joaquin Valley, to southwestern Kern County and northern Santa Barbara County. Significant populations survive only in a few areas of remaining habitat, including the Panoche Hills, Cuyama Valley, Carrizo and Elkhorn Plains, and the Lokern area.

The giant kangaroo rat is the largest of more than 20 species in the genus *Dipodomys,* which is in the family Heteromyidae. This family includes kangaroo rats, kangaroo mice, and pocket mice. Adult giant kangaroo rats weigh from 4.6 to 6.4 ounces. They are 12.2 to 13.7 inches long and adapted for bipedal hopping. The hind limbs are large compared to the size of the forelimbs. The head is large and flattened, and the neck is short. The tail is longer than the length of the head and body combined. The tail has a crest of long hairs, terminating in a large tuft. Large, fur-lined cheek pouches open on each side of the mouth. The pouches extend as deep pockets of skin along the sides if the head.

Giant kangaroo rats are primarily seed eaters, but they also eat green plants and insects. They cache ripening seed heads in small surface pits or large stacks on the surface over their burrow system. After curing for several weeks, seeds are transported to underground larders. Giant kangaroo rats forage on the surface from around sunset to near sunrise, with most activity taking place in the first two hours after dark. Foraging is greatest in the spring as seeds of annual plants ripen. Commonly consumed seeds include peppergrass (*Lepidium* spp.), filaree (*Erodium cicutarium*), Arabian grass (*Schismus arabicus*), and brome grasses (*Bromus* spp.; Williams 1992).

Giant kangaroo rats develop burrow systems with one or more separate openings. There are two types of burrow: a vertical shaft with a circular opening and no dirt apron, and a larger, more horizontally opening shaft, usually wider than high, with a well-worn path leading from the opening.

Historically, and at the time of listing, the giant kangaroo rat was believed to inhabit open, annual grassland communities with few or no shrubs and sandy-loam soils on gentle slopes of less than 10 percent, and in areas receiving 6 to 7 inches of rain per year but free from flooding (Grinnell 1932; Shaw 1934; Hawbecker 1951). However, most remaining populations are on poorer and marginal habitats, including shrub communities on a variety of soil types and on slopes up to 22 percent (Service 2010a). This broader concept of habitat suggests that current populations are found on lands that are less than optimal, now that optimal grassland habitats of historical populations are under cultivation.

Changes in annual rainfall totals are the major natural ecosystem process throughout the range of giant kangaroo habitat (Single et al. 1996). Changes in weather patterns were linked to expansion and declines in giant kangaroo rat populations in the recovery plan (Service 1998). Changes in annual rainfall can affect forage availability (Williams 1992; Williams and Germano 1994), the development of pathogenic toxic molds (Frank 1988; Single et al.1996; Germano et al. 2001), and the availability of fuels for habitat-altering wildfire (Germano et al. 2001; Sugihara et al. 2006; Warrick 2006).

Until the 1950s, colonies of giant kangaroo rats were spread over hundreds of thousands of acres of continuous habitat in the western San Joaquin Valley, Carrizo Plain, and Cuyama Valley (Grinnell 1932; Shaw 1934; Hawbecker 1944, 1951). In the listing rule, the estimated historical range of the giant kangaroo rat was from 1,300,000 to 2,500,000 acres. In 1992, Williams estimated the historical habitat to be approximately 1,600,000 acres; however, the distribution at that time was limited to approximately 27,450 acres, or less than 2 percent of the species' former distribution.

The decline of giant kangaroo rats is attributed primarily to habitat loss from the conversion of native scrub and grasslands to agriculture (Service 1998). Habitat destruction resulting from the development of small cities and towns along the western edge of the San Joaquin Valley, between Coalinga and Maricopa, have contributed to the endangerment of the giant kangaroo rat. Other collective factors are development of the infrastructure for petroleum and mineral exploration and extraction, roads and highways, energy and communications infrastructures, and agriculturally related industrial developments. Widespread use of rodenticides and rodenticide-treated grain to control ground squirrels and kangaroo rats may also have contributed to the decline of giant kangaroo rats in some areas.

Grazing occurs over the entire range of the giant kangaroo rat. While overgrazing can have negative effects on habitat quality through competition for food and potential precinct[1] collapse, recent long-term grazing studies have reported declines in the number of kangaroo rats (including the giant kangaroo rat) on ungrazed relative to grazed plots during wet years

1 A "precinct" is a colony of burrows in which multiple giant kangaroo rats reside.

(Williams and Germano 1994; Germano et al. 2001; Kelly et al. 2004; Germano et al. 2005). Livestock grazing is thought to control the dense growth of nonnative grasses that threaten giant kangaroo rats during wet years, as these grasses reduce the open character of the landscape. Therefore, while overgrazing may disturb individual giant kangaroo rat precincts, the cessation of grazing may lead to a significant decline in giant kangaroo rat numbers particularly during wet years.

There are no long-term studies of the population trend of giant kangaroo rats in the northern range (i.e., the Ciervo-Panoche region) because of lack of funding (Service 2010a). However, the decline in kangaroo rat abundance and distribution has been well documented in the southern San Joaquin Valley (Single et al. 1996). In the Lokern area, the decline in giant kangaroo rats may have been caused by the combination of an extremely hot fire in spring 1997 that burned approximately 5,800 acres and several years of heavier than normal precipitation. Giant kangaroo rats are especially vulnerable to local extirpation from random environmental events such as fires, flooding, or unpredictable land use changes. This is because of the small, isolated nature of many remaining populations, their lack of genetic diversity, and low dispersal capability.

Continuing threats to giant kangaroo rat habitat are urban and industrial developments, roads, petroleum and mineral exploration and extraction, new energy and water conveyance facilities, and construction, communication, and transportation infrastructure. These activities also increase the threats to the species by reducing and further fragmenting populations. Rodent control programs have also contributed to the species' decline. Habitat degradation due to lack of appropriate management on conservation lands, especially lack of grazing or fire to control density of vegetation (including shrubs), may be an additional threat to giant kangaroo rats (Williams and Germano 1994).

Relatively new threats throughout the species' range are development of large-scale renewable solar energy projects and construction of associated transmission lines (Service 2010a). These projects can impact giant kangaroo rat habitat by altering landscape topography, vegetation, and drainage patterns. Other impacts are from reducing habitat quality by intercepting solar energy that would normally reach the ground, thereby affecting ambient air temperatures through habitat shading and altering soil moisture regimes (Smith 1984; Smith et al. 1987). Moreover, recently proposed solar projects tend to be large contiguous blocks of disturbance in undeveloped habitat lands, ranging from hundreds to several thousand acres. Associated transmission towers impact giant kangaroo rat habitat by construction of roads and ROWs in natural lands, operation and maintenance, and the potential for off-road vehicle operators along maintenance roads to trespass (Service 2010a).

Current populations of the giant kangaroo rat fluctuate widely in response to changing weather patterns (Williams 1992; Service 1998). Since the giant kangaroo rat was listed as endangered, conversion of its habitat has slowed substantially. This is because most tillable land has already been brought into cultivation and there is a lack of water for additional irrigated acres. However, during and following the 1994-1995 winter, biologists noted a decline in abundance of kangaroo rats in the southern San Joaquin Valley; decreased sign of activity and lower than expected trapping results were observed at several dispersed sites. Dramatic declines were noted for short-nosed (*Dipodomys nitratoides brevinasus*), Tipton (*D. nitratoides nitratoides*), and Heermann's kangaroo rats (*D. heermanni*), although only modest reductions were noted for giant kangaroo rat populations on the valley floor (Single et al. 1996).

The BLM, in cooperation with species experts, initiated giant kangaroo rat population monitoring studies in the Lokern and Carrizo Plains Natural Areas. Results showed significant declines in giant kangaroo rat numbers in response to both drought and above average rainfall conditions and overall wide and drastic population fluctuations over time.

In 1995, the most recent year in which substantial information is available, the Service concluded that the giant kangaroo rat was present in only a few remaining isolated populations: Cuyama Valley, San Juan Creek Valley, and the Carrizo Plain in San Luis Obispo County; the Panoche Hills on the Fresno-San Benito County line; in the Kettleman Hills of Kings County; and in western Kern County (Service 1998).

From 1980 to 1985, the population of the giant kangaroo rats in the northern range was estimated at only 2,000 over 709 acres (2.8 individuals per acre; Williams 1992). Beginning in summer 1991, at the end of a 5-year drought, the population of the giant kangaroo rat increased dramatically. From 1992 to 1993, the population in the northern range was estimated to be 37,125 over an area of 4,653 acres (8.0 individuals per acre; Williams et al. 1995). More recently, Loew et al. (2005) estimated the population of the giant kangaroo rat in the northern range to be approximately 12,375, based on burrow and food-cache counts, as well as mark-recapture methods. The authors further estimated the subpopulations of the giant kangaroo rat within the northern range to be approximately 80 in the Ciervo Hills, 1,194 in Tumey Hills, 5,480 in Monocline Ridge, and 5,621 in the Panoche Valley.

Approximately 95,000 acres of giant kangaroo habitat remain in the Ciervo-Panoche Natural Area (Service 2010a). Of this, only approximately 16,048 acres (17 percent) of habitat has been protected from incompatible uses, primarily through the establishment of BLM Areas of Critical Environmental Concern (ACECs) and private land easements. We do not know how much of this protected habitat is occupied by giant kangaroo rat (Service 2010a). Most of the Panoche Valley area is in private ownership and is considered the primary source of regional expansion of the giant kangaroo rat in the northern range (Good et al. 1997; Loew et al. 2005).

In their research on genetic structure and diversity of giant kangaroo rat populations in the northern range, Good et al. (1997) and Loew et al. (2005) found that while genetic diversity remains high between subpopulations, the topographic complexity, isolation, and small size of the subpopulations has reduced the amount of within-group genetic diversity. Low within-group diversity increases the risk that random events such as disease or fire may eliminate subpopulations (Service 2010a); this would in turn lower the overall diversity of the northern population of giant kangaroo rat (Good et al. 1997; Loew et al. 2005).

Evidence of connectivity between northern subpopulations has been found, including between the Panoche Valley and Ciervo and Tumey Hills subpopulations (Good et al. 1997; Loew 2005). Dispersal is primarily by long-distance migrants or "stepping-stone" subpopulations. Loew et al. (2005) noted the importance of Panoche Creek as a dispersal corridor between the Monocline

Ridge and Tumey Hills subpopulations. Loew et al. (2005) also suggest that habitat along Silver Creek could be managed as another dispersal corridor in the region. In general, these studies highlight the importance of small stepping-stone populations and dispersal corridors, such as Panoche Creek and Silver Creek, to the continued genetic health of the northern population of giant kangaroo rats.

The range of this species has increased by 40 percent on the Carrizo and Elkhorn Plains since 2001. In addition, surveys of active precincts in the Cuyama Valley show that since 2001 the range of giant kangaroo rat there has doubled. The status of giant kangaroo rat in the San Juan Creek Valley and in Kettleman Hills has yet to be monitored and therefore remains unknown.

Recovery Objectives

The giant kangaroo rat is included in the Recovery Plan for Upland Species of the San Joaquin Valley, California (Service 1998). According to the plan, giant kangaroo rat populations can be considered recovered when the three largest populations (western Kern County, Carrizo Plain Natural Area, and the Panoche Region) and the populations in the Kettleman Hills, San Juan Creek Valley, and Cuyama Valley are protected and managed appropriately. The principal factor in recovery of giant kangaroo rats is protecting existing habitat and key populations. Population responses to environmental variation seen during the last 16 years (Williams 1992; Williams et al. 1993; Williams and Nelson in press in Service 2011b; Williams unpublished data in Service 2011b) suggest that random catastrophic events (e.g., drought, flooding, and prolonged rainfall) pose the greatest risk to long-term survival of the species. Protection from random catastrophic events requires both relatively large habitat areas with varying topography and habitat conditions and land uses that provide optimum habitat conditions.

However, in its 5-year review of the species' status, the Service showed that the giant kangaroo rat continues to meet the definition of endangered and is in danger of extinction throughout its known range (Service 2010a). This conclusion was reached due to:

- Restriction of giant kangaroo rats to less than five percent of their historical range on highly fragmented, suboptimal habitat;
- Continuation of threats from oil and gas extraction, urban and residential development, and large solar power plants;
- Genetic isolation of populations in the Tumey Hills and Ciervo Hills;
- Lack of protection of the populations in the Panoche Valley; and
- Protection of less than 20 percent of populations in western Kern County.

San Joaquin Kit Fox

The San Joaquin kit fox was listed as an endangered species on March 11, 1967 (Service 1967). The San Joaquin kit fox is the umbrella species for the Recovery Plan for Upland Species of the San Joaquin Valley, California, indicating that measures used for recovery of the species would also benefit other species with overlapping ranges and habitat requirements (Service 1998).

The kit fox is the smallest canid species in North America, and the San Joaquin kit fox is the largest subspecies in skeletal measurements, body size, and weight. Adult males average 31.7 inches in total length, and adult females average 30.3 inches in total length (Grinnell et al. 1937). All kit foxes have long slender legs and are approximately 12 inches high at the shoulder. The average weight of adult males is 5.0 pounds, and the average of adult females is 4.6 pounds (Morrell 1972). General physical characteristics of kit foxes include a small, slim body, relatively large ears set close together, narrow nose, and a long, bushy tail tapering slightly toward the tip. The tail is typically carried low and straight.

Color and texture of the fur coat of all kit foxes varies geographically and seasonally. The most commonly described colorations are buff, tan, grizzled, or yellowish-gray dorsal coats (McGrew 1979). Two distinctive coats develop each year: a tan summer coat and a silver-gray winter coat (Morrell 1972). The ear pinna (external ear flap) is dark on the back side, with a thick border of white hairs on the forward-inner edge and inner base. The tail is distinctly black-tipped.

In the San Joaquin Valley before 1930, the range of the San Joaquin kit fox extended from southern Kern County north to Tracy, San Joaquin County, on the west side, and near La Grange, Stanislaus County, on the east side (Grinnell et al. 1937; Service 1998). Historically, this species occurred in several San Joaquin Valley native plant communities. In the southernmost portion of the range, these communities included Valley Sink Scrub, Valley Saltbush Scrub, Upper Sonoran Subshrub Scrub, and Annual Grassland. San Joaquin kit foxes currently inhabit some areas of suitable habitat on the San Joaquin Valley floor. They can be found in the surrounding foothills of the coastal ranges, Sierra Nevada, and Tehachapi Mountains, from southern Kern County north to Contra Costa, Alameda, and San Joaquin Counties on the west, and near La Grange, Stanislaus County, on the east side of the valley. They also inhabit some of the larger scattered islands of natural land on the valley floor in Kern, Tulare, Kings, Fresno, Madera, and Merced Counties.

The largest extant populations of kit foxes are in western Kern County on and around the Elk Hills and Buena Vista Valley and in the Carrizo Plain Natural Area, San Luis Obispo County. The Ciervo-Panoche core area in eastern San Benito, western Fresno, and southern Merced Counties, while not one of the largest extant populations, includes over 52,000 acres of BLM-administered land that offer some protection to the kit fox. Even so, much of the BLM-administered land in the core area is not suitable for kit fox due to its rugged character and shallow soils. Most suitable kit fox habitat in the core area is on private land in the valley floors (O'Farrrell 1981).

Though the central and northern portions of the range have not been continuously monitored, populations were recorded in the late 1980s at San Luis Reservoir, Merced County (Briden et al. 1987); North Grasslands and Kesterson National Wildlife Refuge (NWR) on the valley floor, Merced County (Paveglio and Clifton 1988); and in the Los Vaqueros watershed, Contra Costa County in the early 1990s (Service 1998). Smaller populations are also known from other parts of the San Joaquin Valley floor, including Madera County and eastern Stanislaus County (Williams 1990).

Kit foxes occur at varying densities in the areas between the core populations (e.g., Panoche-Coalinga and Kettleman Hills). These populations provide links between core populations and also probably with smaller, more isolated populations in adjacent valleys (e.g., Panoche Valley) and in the Kreynhagen Hills and Anticline Ridge around Coalinga and Avenal.

Kit foxes prefer loose-textured soils (Grinnell et al. 1937; Hall 1946; Egoscue 1962; Morrell 1972), but are found on virtually every soil type. Dens appear to be scarce in areas with shallow soils because of the proximity to bedrock (O'Farrell and Gilbertson 1979), high water tables (McCue et al. 1981), or impenetrable hardpan layers (Morrell 1972). However, kit foxes will occupy soils with high clay content where they modify burrows dug by other animals (Orloff et al. 1986). Sites that may not provide suitable denning habitat may be suitable for feeding or providing cover. Kit fox dens are commonly located on flat terrain or on the lower slopes of hills. Common locations for dens are washes, drainages, and roadside berms. Kit foxes also commonly den in human-made structures, such as culverts and pipes (O'Farrell 1984; Spiegel and Tom 1996).

In the San Joaquin Valley, optimal habitats for San Joaquin kit foxes generally are those in which conditions are more desert-like, such as arid shrublands and grasslands (Service 1998). These areas are characterized by sparse or no shrub cover, sparse ground cover with patches of bare ground, short vegetative structure less than 18 inches tall, and sandy to sandy-loam soils.

Tall or dense vegetation generally is less optimal for foxes (Smith et al. 2005). Such conditions make it difficult for foxes to detect approaching predators or capture prey. Kit foxes also tend to avoid rugged steep terrain; predation risk apparently is higher for foxes under such topographic conditions (Warrick and Cypher 1998). In general, flat terrain or slopes less than 5 percent are optimal, slopes of 5 to 15 percent are suitable, and slopes greater than 15 percent are unsuitable. For this reason, the foothills of the Coast Ranges generally are considered to demark the western boundary for suitable kit fox habitat.

Ground disturbance from tilling, maintenance, and harvesting is frequent and can destroy dens. Also, most agricultural lands in the San Joaquin Valley are irrigated, which can flood and collapse dens. Agricultural lands also are subject to intensive chemical applications, including fertilizers, pesticides, defoliants, and weed suppression; these practices can result in a lack of prey availability for kit foxes. Use of rodenticides is common in some agricultural environments and is particularly problematic for kit foxes due to the potential for secondary poisoning.

San Joaquin kit foxes appear to be strongly linked ecologically to kangaroo rats. San Joaquin kit foxes are especially well adapted for preying on kangaroo rats, and consequently, San Joaquin kit fox abundance and population stability are highest in areas where kangaroo rats are abundant (Service 1998; Cypher 2003).

The diet of the San Joaquin kit fox varies geographically, seasonally, and annually, based on temporal and spatial variation in abundance of potential prey. Kangaroo rats, pocket mice, white-footed mice, and other nocturnal rodents can comprise about one-third or more of their diets. Kit foxes are also known to prey on California ground squirrels, black-tailed hares, San

Joaquin antelope squirrels, desert cottontails, ground-nesting birds, and insects (Scrivner et al. 1987a).

Adult San Joaquin kit foxes are typically solitary during late summer and fall. In September and October, adult females begin to excavate and enlarge natal dens (Morrell 1972). Pups are born between February and late March (Egoscue 1962; Morrell 1972). Mean litter sizes reported for San Joaquin kit fox range from 2.0 to 3.8 individuals at the Naval Petroleum Reserve (White and Ralls 1993; Spencer et al. 1992; Spiegel and Tom 1996; Cypher et al. 2000). Pups appear above ground at about age 3 to 4 weeks, and are weaned at age 6 to 8 weeks.

Estimates of fox density vary greatly throughout its range and have been reported as high as 1.2 animals per square kilometer in optimal habitats in good years (Service 1998). At the Elk Hills in Kern County, density estimates varied from 0.3 animal per square mile in the early 1980s to 0.004 animal per square mile in 1991 (Service 1998). Kit fox home ranges vary in size are generally approximately 1.0 square mile (Knapp 1979; Spiegel and Tom 1996; Service 1998). Individual home ranges overlap considerably, at least outside the core activity areas (Morrell 1972; Spiegel 1996).

Although most young kit foxes disperse less than 8 kilometers (Scrivner et al. 1987b), dispersal distances of up to 75 miles have been documented for the San Joaquin kit fox (Scrivner et al. 1993; Service 1998). Dispersal can be through disturbed habitats, such as agricultural fields, and across highways and aqueducts. The age at dispersal ranges from 4 to 32 months (Cypher 2003). Among juvenile kit foxes surviving to July 1 at the Naval Petroleum Reserve, 49 percent of the males dispersed from natal home ranges while 24 percent of the females dispersed (Koopman et al. 2000). Among dispersing kit foxes, 87 percent did so during their first year. Some kit foxes delay dispersal and may inherit their natal home range.

San Joaquin kit foxes are primarily nocturnal, although individuals (mostly pups) are occasionally observed resting or playing near their dens during the day (Grinnell et al. 1937). A mated pair of kit foxes and their current litter of pups usually occupy each home range. Other adults, usually offspring from previous litters, also may be present (Koopman et al. 2000), but individuals often move independently within their home range (Cypher 2003). Average distances traveled each night range from 5.8 to 9.1 miles and are greatest during the breeding season (Cypher 2003).

Kit foxes maintain core home range areas that are exclusive to mated pairs and their offspring (White and Ralls 1993; Spiegel 1996; White and Garrott 1997). This territorial spacing behavior eventually limits the number of foxes that can inhabit an area, owing to shortages of available space and per capita prey. Hence, as habitat is fragmented or destroyed, the carrying capacity of an area is reduced and a larger proportion of the population is forced to disperse. Increased dispersal generally leads to lower survival rates and, in turn, decreased abundance. This is because greater than 65 percent of dispersing juvenile foxes die within 10 days of leaving their natal range (Koopman et al. 2000).

The distribution and abundance of the San Joaquin kit fox has decreased since its listing in 1967. This trend is almost certain to continue into the foreseeable future unless measures are implemented to protect, sustain, and restore suitable habitats and alleviate other threats to their survival and recovery.

Less than 20 percent of the habitat in the historical range of the San Joaquin kit fox remained when the subspecies was listed as endangered in 1967, and there has been a substantial net loss of habitat since that time. Historically, San Joaquin kit foxes occurred throughout California's Central Valley and adjacent foothills. Extensive land conversions in the Central Valley began as early as the mid-1800s. By the 1930s, the range of the kit fox had been reduced to the southern and western parts of the San Joaquin Valley (Grinnell et al. 1937). The primary factor contributing to this restricted distribution was the conversion of native habitat to irrigated cropland, industrial uses (e.g., hydrocarbon extraction), and urbanization (Laughrin 1970; Jensen 1972; Morrell 1972; 1975). Approximately half the natural communities in the San Joaquin Valley were tilled or developed by 1958 (Service 1980).

This rate of loss accelerated following the completion of the Central Valley Project and the State Water Project, which diverted and imported new water supplies for irrigated agriculture (Service 1995). From 1959 to 1969 alone, an estimated 34 percent of natural lands were lost within the then-known kit fox range (Laughrin 1970). Most of the documented loss of habitat has been the result of conversion to irrigated agriculture.

The conversion of natural lands to agriculture continues to be a threat on private lands on the western side of the San Joaquin Valley floor; here agriculture has been extended west to the base of the foothills since the 1960s (Kelly et al. 2005). Large blocks of suitable habitat that support kit fox do remain in the Panoche and Pleasant Valleys in the foothills slightly to the west of the San Joaquin Valley (Cypher et al. 2007). However, including both these areas and the western uplands of Fresno County, there were only 5,559 acres of suitable habitat and 20,543 acres of less than optimal habitat remaining by 2007 (Cypher et al. 2007).

Land conversions contribute to declines in kit fox abundance through direct and indirect mortalities, displacement, prey population and denning site reduction, changes in the distribution and abundance of larger canids that compete with kit foxes for resources, and carrying capacity reductions.

Extensive habitat destruction and fragmentation have contributed to smaller, more isolated populations of kit foxes. Small populations have a higher probability of extinction than large populations because their low abundance renders them susceptible to random events, such as high variability in age and sex ratios, and catastrophes, such as floods, droughts, and disease epidemics (Lande 1988; Frankham and Ralls 1998; Saccheri et al. 1998). Similarly, isolated populations are more susceptible to extirpation by accidental or natural catastrophes because the likelihood of recolonization has been diminished.

These stochastic events can adversely affect small, isolated populations with devastating results. Extirpation can even occur when the members of a small population are healthy, because whether the population increases or decreases in size depends less on the age-specific probabilities of survival and reproduction than on chance. Owing to the probabilistic nature of extinction, many small populations will eventually go extinct when faced with these random risks (Caughley and Gunn 1996).

Vehicles appear to be the primary cause of mortality for urban kit foxes, and most strikes occur on arterial roads, which have higher traffic volumes and speed limits (Bjurlin et al. 2005; Cypher et al. 2005). Two-lane roads may not be as dangerous for kit foxes as are major arterial roads (Cypher et al. 2005). Kit foxes are more frequently struck near intersections between major roads and other linear rights-of-way, such as railroads, canals, and other roads. These most likely function as movement corridors for kit foxes, and the foxes do not appear to avoid roads for denning sites (Bjurlin et al. 2005).

The diets and habitats selected by coyotes (*Canis latrans*) and kit foxes living in the same areas are often quite similar (Cypher and Spencer 1998). Hence, the potential for resource competition between these species may be quite high when prey resources are scarce, such as during droughts, which are quite common in semiarid central California. Land conversions and associated human activities have led to changes in the distribution and abundance of coyotes, which compete with kit foxes for resources.

Coyotes are the primary cause of mortality for kit foxes in most areas (Cypher et al. 2003). The threat to kit foxes from red foxes (*Vulpes vulpes*) is still being evaluated, but the potential for both interference and exploitative competition is high (Cypher et al. 2001). The red fox is a highly adaptable species, able to persist in agricultural lands; they do not depend on dens for cover, they are highly mobile, which facilitates avoiding dangers and locating food, and they are highly omnivorous. Coyotes occur in most areas with abundant populations of San Joaquin kit foxes. During the past few decades, coyote abundance has increased in many areas owing to a decrease in ranching, favorable landscape changes, and reduced control efforts (Orloff et al. 1986; Cypher and Scrivner 1992; White and Ralls 1993; White et al. 1996). Although coyotes are common in both natural and agricultural landscapes, they pose a greater predation threat to the kit fox on agricultural lands because of the decreased availability or absence of escape dens and vegetative cover (Cypher et al. 2005).

Coyotes may kill San Joaquin kit foxes in an attempt to reduce resource competition. Injuries from coyotes accounted for 50 to 87 percent of the mortalities of radio-collared kit foxes at Camp Roberts, the Carrizo Plain Natural Area, the Lokern Natural Area, and the Naval Petroleum Reserves (Cypher and Scrivner 1992; Standley et al. 1992; Ralls and White 1995; Spiegel 1996).

Some methods of pest and rodent control pose a threat to kit foxes through direct or secondary poisoning, and these threats are often encountered in agricultural settings. Kit foxes may be killed if they ingest rodenticide in a bait application, or if they eat a rodent that has consumed the bait. Even sublethal doses of rodenticides may lead to the death of these animals by impairing their ability to escape predators or find food. Pesticides and rodenticides may also indirectly affect the survival of kit foxes by reducing the abundances of their staple prey species. For example, the California ground squirrel, which is the staple prey of kit foxes in the northern portion of their range and on agricultural lands, was thought to have been eliminated from Contra Costa County in 1975, after extensive rodent eradication programs. Field observations indicated that the long-term use of ground squirrel poisons in this county severely reduced kit fox abundance through secondary poisoning and the suppression of populations of its staple prey (Orloff et al. 1986).

Historically, kit foxes may have existed in a metapopulation structure of core and satellite populations, some of which periodically experienced local extinctions and recolonization (Service 1998). However, today's populations exist in an environment drastically different from the historical one, and extensive habitat fragmentation has resulted in geographic isolation, smaller population sizes, and reduced genetic exchange among populations. This increases the vulnerability of kit fox populations to extirpation.

Populations of kit foxes are extremely susceptible to the risks associated with small population size and isolation because they are characterized by marked instability in population density. For example, the relative abundance of kit foxes at the Naval Petroleum Reserves, California, decreased ten-fold between 1981 to 1983, increased seven-fold between 1991 to 1994, and then decreased two-fold in 1995 (Cypher and Scrivner 1992; Cypher and Spencer 1998).

The destruction and fragmentation of habitat could also eventually lead to reduced genetic variation in populations of kit foxes that are small and geographically isolated. Genetic assessments indicate that historical gene flow among populations was quite high, and that gene flow between populations is still occurring (Schwartz et al. 2005). Kit fox dispersal likely still maintains genetic variation throughout the range of the kit fox. Disruption of kit fox dispersal abilities through habitat loss, however, could result in an increase in inbreeding and a loss of genetic variation. These factors could increase the extinction risk for small, isolated populations of kit foxes by interacting with demography to reduce fecundity, juvenile survival, and lifespan (Lande 1988; Frankham and Ralls 1998; Saccheri et al. 1998).

Recovery Objectives

The San Joaquin kit fox is included in the Recovery Plan for Upland Species of the San Joaquin Valley, California (Service 1998). The primary goal of the recovery strategy for kit foxes identified in the plan is to establish a complex of interconnected core and satellite populations throughout the species' range. The long-term viability of each of these core and satellite populations depends partly on periodic dispersal and genetic flow between them. Therefore, kit fox movement corridors between these populations must be preserved and maintained.

The Service and cooperating public, nonprofit, and private stakeholders are working to conserve habitat by establishing preserves, conservation banks, and conservation easements. Threats to recovery of San Joaquin kit fox include loss of habitat to agricultural and urban development, effects of pesticide exposure, competitive exclusion by other canids, highly fluctuating population dynamics, isolation and loss of small subpopulations due to random events, habitat fragmentation, vehicle strikes, predation, and loss of prey.

Blunt-nosed Leopard Lizard

The blunt-nosed leopard lizard was federally listed as endangered on March 11, 1967 (Service 1967). A recovery plan for the blunt-nosed leopard lizard was first prepared in 1980, revised in 1985, and then superseded by the Recovery Plan for Upland Species of the San Joaquin Valley (Service 1998).

The species is a relatively large lizard in the Iguanidae family, with a long regenerative tail, long powerful hind limbs, and a short blunt snout (Smith 1946; Stebbins 1985). Though their under surface is uniformly white, the species exhibits tremendous variation in color and pattern on the back (Montanucci 1965, 1970), ranging from yellowish or light gray-brown to dark brown. Males are typically larger and weigh more than females; adults range in size from 3.4 to 4.7 inches (Tollestrup 1982) and weigh between 0.8 and 1.5 ounces; (Uptain et al. 1985).

The blunt-nosed leopard lizard is endemic to the San Joaquin Valley of Central California (Stejneger 1893; Smith 1946; Montanucci 1965, 1970; Tollestrup 1979a). The species typically inhabits open, sparsely vegetated areas on the San Joquin Valley floor and surrounding foothills (Smith 1946; Montanucci 1965) in nonnative grassland and valley sink scrub communities (Holland 1986). Other suitable habitat (Holland 1986) includes valley needlegrass (*Nassella* sp.) grassland, alkali playa, and *Atriplex* grassland (Tollestrup 1976).

Blunt-nosed leopard lizards feed primarily on insects (mostly grasshoppers, crickets, and moths) and other lizards, although some plant material is eaten occasionally or, perhaps, unintentionally consumed with animal prey. They appear to feed opportunistically on animals, eating whatever is available in the size range they can overcome and swallow (Service 2010b).

Adult lizards often seek safety in burrows, while immature lizards use rock piles, trash piles, and brush. The lizards use burrows constructed by mammals, such as kangaroo rats, for overwintering and aestivation. Adult lizards hibernate during the colder months of winter and are less active in the hotter months of late summer. Adults are active above ground from about March or April through September. Hatchlings are active until mid-October or November, depending on weather.

Blunt-nosed leopard lizards use small rodent burrows for shelter from predators and temperature extremes (Tollestrup 1979b). Burrows are generally abandoned ground squirrel (*Spermophilus beecheyi*) tunnels or occupied or abandoned kangaroo rat (*Dipodomys* spp.) tunnels (Montanucci 1965). Each lizard will use several burrows but will avoid burrows occupied by other leopard lizards or predators (Service 2010b). In low density burrow areas, lizards can construct shallow, simple tunnels in earth berms or under rocks (Montanucci 1965).

Microhabitat use and home range characteristics of blunt-nosed leopard lizards were compared at two sites that differed in ground cover near Elk Hills in Buena Vista Valley that differed in ground cover (Warrick et al. 1998). The authors reported that blunt-nosed leopard lizard microhabitat use differed significantly between the two study sites. At the more densely vegetated site, blunt-nosed leopard lizards used dry wash areas significantly more than grassland, floodplain, and road habitats. Conversely, at the more sparsely vegetated site, grassland was used more than wash habitat, and hills were used less than all other habitats.

Home ranges of individual blunt-nosed leopard lizards have been examined in several studies (Tollestrup 1979b; Warrick et al. 1998; and Germano et al. 2004). Early studies estimated home ranges for both male and female individuals at less than 2.4 acres, but subsequent studies by Warrick et al. (1998) found the average male home range to be 10.48 acres and the average female home range size to be 4.99 acres. Female ranges overlapped with up to four males' home ranges but were not observed to overlap with other females' ranges.

Historically, blunt-nosed leopard lizards occurred in arid lands throughout much of the San Joaquin Valley and adjacent foothills. This ranged from San Joaquin County in the north to the Tehachapi Mountains in the south, as well as in the Carrizo Plain and Cuyama Valley (Montanucci 1965; Germano and Williams 1992; McGuire 1996). Lizard habitat has been significantly reduced, degraded, and fragmented by roads, agricultural development, petroleum and mineral extraction, livestock grazing, pesticide application, and off-road vehicle use. Due to the expansion of agriculture and grazing, oil extraction, and urban development, the species is restricted to less than 15 percent of its historical range (Williams and Germano 1992; Jennings 1995). A comprehensive survey of the species' entire historical range has never been completed. Thus, any changes in the range of the species from the time of listing are currently unknown (Service 2010b).

The current known occupied range is in scattered parcels of undeveloped land and margins of developed land on the valley floor and in the foothills of the Coast Range. Blunt-nosed leopard lizards occur from Merced and Madera Counties in the north through Fresno, Kings, Tulare, and Kern Counties to San Luis Obispo, Santa Barbara, and Ventura Counties in the south (Service 1998).

Comprehensive monitoring studies have not been conducted in the Ciervo-Panoche Natural Area or Merced and Madera Counties, in the northern portion of the species' range. However, such studies have been conducted in the southern portion of the its range, at Elkhorn Plain (Germano et al. 2004; Germano and Williams 2005), Semitropic Ridge (Warrick 2006), Lokern (Germano et al. 2005; Warrick 2006), Elk Hills (Quad Knopf 2006), Pixley National Wildlife Refuge (NWR; Service 2010c), Buttonwillow Ecological Reserve, Allensworth Ecological Reserve (Service 2010c), and Coles Levee Ecosystem Preserve (Quad Knopf 2005). The studies show that population densities decreased below 5 individuals per acre during the wet years in the late 1990s at Pixley NWR, while the density remains below 5 individual per acre in the Lokern area, the Elk Hills, and Coles Levee Ecosystem Preserve. Population density estimates at Semitropic Ridge Preserve were also well below 4 individuals per acre during spring road surveys in 2005. Elkhorn Plain, however, has been reported to have the highest abundance and density of blunt-nosed leopard lizards recorded in any area, with densities up to 40 adults per acre and 89 hatchlings per acre (Germano and Williams 2005).

Though population density estimates do not exist for the Ciervo-Panoche natural area, where suitable habitat exists in this area, the habitat has been noted as some of the best in the region

(Service 2010b). Although most of this habitat remains on private lands, current land use is compatible with blunt-nosed leopard lizard persistence.

Overall, the blunt-nosed leopard lizard is considered to be decreasing in abundance across its range (Service 2010b). This conclusion is based on population instability and ongoing modification and conversion of existing habitat to agriculture, residential and commercial developments, and petroleum and mineral extraction. Long-term studies conducted on the valley floor and foothill regions of southern San Joaquin Valley show blunt-nosed leopard lizard population instability, especially during years of above-average precipitation (Germano et al. 2004; Germano et al. 2005; Germano and Williams 2005; Service 2010b). The largest and most stable population of blunt-nosed leopard lizards on the valley floor is thought to be at Semitropic Ridge Preserve; however, the number of all lizards there has been decreasing since 2003 for unknown reasons.

At the time the blunt-nosed leopard lizard was listed, the conversion of native habitat to agriculture was considered to be its primary threat. Additional threats to the blunt-nosed leopard lizard were habitat fragmentation, mineral development (primarily for oil and gas extraction), inappropriate grazing levels, and agricultural pest control, primarily spraying for the beet leafhopper (Montanucci 1965). Habitat disturbance, destruction, and fragmentation continue as the greatest threats to blunt-nosed leopard lizard populations. Disturbances and modifications of habitats in areas of urban development, oil and natural gas exploration, and water banking development pose lesser but continuing threats because they degrade the habitat. Direct mortality occurs when animals are killed in their burrows during construction, are killed by vehicle traffic, drown in oil, or fall into excavated areas from which they are unable to escape.

Presently, additional habitat loss can be expected due to ongoing modification and conversion of existing habitat for agriculture, residential and commercial developments, oil and gas exploration, water banking facilities construction, and solar power developments.

The Panoche Valley was identified as an important area for blunt-nosed leopard lizard within the Ciervo-Panoche Natural Area (Service 1998). Panoche and Silver Creeks were identified as important dispersal corridors in the Ciervo-Panoche Natural Area (Service 1998; Loew et al. 2005), but most of these areas remain unprotected and subject to residential and agricultural development.

Livestock overgrazing may negatively affect blunt-nosed leopard lizards by soil compaction, damaging rodent burrows that the lizards depend on for cover, and stripping away vegetative cover used by both the lizard and its prey (Hansen et al. 1994). However, the cessation of grazing is likely to be even more detrimental to blunt-nosed leopard lizard due to the dense growth of exotic grasses (Germano et al. 2001; Germano et al. 2005). Annual grazing studies in the Lokern area from 1997 to 2005 have demonstrated the benefits of livestock grazing in reducing exotic grasses and increasing blunt-nosed leopard lizard numbers (Germano et al. 2005). As of 2015, the BLM office in Hollister, California, is updating its resource management plan (RMP) with respect to grazing in the Ciervo-Panoche area.

Recovery Objectives

A recovery plan for the blunt-nosed leopard lizard was first prepared in 1980, was revised in 1985, and was finally superseded by the Recovery Plan for Upland Species of the San Joaquin Valley, California (Service 1998). According to the recovery plan, substantial habitat for blunt-nosed leopard lizard is already in public ownership or a conservation program; however, appropriate habitat management prescriptions for these parcels are mostly unknown, and no parcels are being managed specifically for this species. Therefore, three important factors in recovering the species are: determining appropriate habitat management prescriptions, protecting additional habitat within the range of the species, and gathering data on population responses to environmental variation throughout the range.

The 5-year review for the species recommended that it remain listed as endangered, based on habitat loss, fragmented populations, and current threats (Service 2010b). According to the five-year review, the downlisting criteria require the protection of 5 or more areas, each at least 5,997 acres in size, including one area in the foothills of the Ciervo-Panoche natural area. In the Ciervo-Panoche Natural Area, two BLM ACECs, separated by 2 miles, protect 4,800 acres and 3,800 acres of contiguous blunt-nosed leopard lizard habitat. Panoche Valley and dispersal corridors in western Fresno County, including Panoche and Silver Creeks, are specifically identified as important actions to facilitate recovery (Service 2010b).

The recovery strategy requires that the Service takes the following actions:

- Determine appropriate habitat management and compatible land uses for the blunt-nosed leopard lizard
- Protect additional habitat for them in key portions of their range
- Gather additional data on population responses to environmental variation at representative sites in their existing geographic range (Service 1998)

California Tiger Salamander

The Service recognizes three distinct populations of the California tiger salamander: one in Sonoma County; one in northern Santa Barbara County; and the one under consideration in this biological opinion in central California. On September 21, 2000, the Service listed the Santa Barbara County distinct population segment of the California tiger salamander as endangered (Service 2000). On March 19, 2003, the Service listed the Sonoma County distinct population segment of the California tiger salamander as endangered (Service 2003). On August 4, 2004, the Service published a final rule listing the California tiger salamander as threatened range-wide, including the previously identified Sonoma and Santa Barbara distinct population segments (Service 2004). On August 19, 2005, U.S. District Judge William Alsup vacated the Service's downlisting of the Sonoma and Santa Barbara populations from endangered to threatened. Thus, the Sonoma and Santa Barbara populations are listed as endangered, and the central California population is listed as threatened.

The central California tiger salamander is endemic to the grassland community found in California’s Central Valley, the surrounding foothills, and coastal valleys (Fisher and Shaffer

1996). The distribution of breeding locations of this species, and the other two distinct populations, does not naturally overlap with that of any other species of tiger salamander (Loredo et al. 1996, Petranka 1998, Stebbins 2003).

The California tiger salamander is a large and stocky terrestrial salamander with small eyes and a broad, rounded snout. Adults may reach a total length of 8.2 inches, with males generally averaging about 8 inches total length, and females averaging about 6.8 inches in total length. For both sexes, the average snout-to-vent length is approximately 3.6 inches (Service 2000). The small eyes have black irises and protrude from the head. Coloration consists of white or pale yellow spots or bars on a black background on the back and sides. The belly varies from almost uniform white or pale yellow to a variegated pattern of white or pale yellow and black. Males can be distinguished from females, especially during the breeding season, by their swollen cloacae (a common chamber into which the intestinal, urinary, and reproductive canals discharge), larger tails, and larger overall size (Loredo and Van Vuren 1996).

Historically, natural ephemeral vernal pools were the primary breeding habitats for California tiger salamanders (Twitty 1941, Fisher and Shaffer 1996, Petranka 1998). However, with the conversion and loss of many vernal pools through farmland conversion and urban and suburban development, ephemeral and permanent ponds that have been created for livestock watering are now frequently used by the species (Fisher and Shaffer 1996, Robins and Vollmar 2002).

California tiger salamanders spend the majority of their lives in upland habitats and cannot persist without them (Trenham and Shaffer 2005). The upland component of California tiger salamander habitat typically consists of grassland savannah, but includes grasslands with scattered oak trees, and scrub or chaparral habitats (Shaffer et al. 1993, Service 2000). Juvenile and adult California tiger salamanders spend the dry summer and fall months of the year in the burrows of small mammals, such as California ground squirrels and Botta's pocket gopher (*Thomomys bottae*) (Storer 1925, Loredo and Van Vuren 1996, Trenham 1998). Burrow habitat created by ground squirrels and utilized by California tiger salamanders suggests a commensal relationship between the two species (Loredo et al. 1996). Movement of California tiger salamanders within and among burrow systems continues for at least several months after juveniles and adults leave the ponds (Trenham 2001). California tiger salamanders cannot dig their own burrows, and as a result, their presence is associated with burrowing mammals (Seymour and Westphal 1994). Active ground-burrowing rodent populations likely are required to sustain California tiger salamanders because inactive burrow systems become progressively unsuitable over time (Service 2004). Loredo et al. (1996) found that California ground squirrel burrow systems collapsed within 18 months following abandonment by, or loss of, the mammals.

California tiger salamanders have been found in upland habitats various distances from aquatic breeding habitats. In a trapping study in Contra Costa County, California tiger salamanders were trapped approximately 2,625 feet to 3,940 feet away from potential breeding habitat (Service 2004). During a mark and recapture study in the Upper Carmel River Valley in Monterey County, Trenham et al. (2000) observed California tiger salamanders dispersing up to 2,200 feet between breeding ponds between years. In research at Olcott Lake in Solano County, Trenham and Shaffer (2005) captured California tiger salamanders in traps installed 1,312 feet from the breeding pond.

Adults enter breeding ponds during fall and winter rains, typically from October through February (Storer 1925, Loredo and Van Vuren 1996, Trenham et al. 2000). Males migrate to the breeding ponds before females (Twitty 1941, Shaffer et al. 1993, Loredo and Van Vuren 1996, Trenham 1998). Males usually remain in the ponds for an average of about 6 to 8 weeks, while females stay for approximately 1 to 2 weeks. In dry years, both sexes may stay for shorter periods (Loredo and Van Vuren 1996, Trenham 1998).

Females attach their eggs singly or, in rare circumstances, in groups of two to four, to twigs, grass stems, vegetation, or debris in the water (Storer 1925, Twitty 1941). In ponds with little or no vegetation, females may attach eggs to objects, such as rocks and boards on the bottom (Jennings and Hayes 1994). In drought years, the seasonal pools may not form and the adults may not breed (Barry and Shaffer 1994). The eggs hatch in 10 to 14 days with newly hatched salamanders (larvae) ranging in size from 0.5 to 0.6 inch in total length (Petranka 1998). The larvae are aquatic. Each is yellowish gray in color and has a broad, plump head; large, feathery external gills; and broad dorsal fins that extend well onto its back. The larvae feed on zooplankton, small crustaceans, and aquatic insects for about 6 weeks after hatching, after which they switch to larger prey (Anderson 1968). Larger larvae have been known to consume smaller tadpoles of tree frogs (*Pseudacris* spp.) and California red-legged frogs (*Rana draytonii*) (Anderson 1968). California tiger salamander larvae are among the top aquatic predators in seasonal pool ecosystems.

The larval stage of the California tiger salamander usually lasts 3 to 6 months, because most seasonal ponds and pools dry up during the summer (Petranka 1998). Amphibian larvae must grow to a critical minimum body size before they can metamorphose to the terrestrial stage (Wilbur and Collins 1973). Larvae collected near Stockton in the Central Valley during April varied from 1.9 to 2.3 inches in length (Storer 1925). Feaver (1971) found that larvae metamorphosed and left the breeding pools 60 to 94 days after the eggs had been laid, with larvae developing faster in smaller, more rapidly drying pools. The longer the inundation period, the larger the larvae and metamorphosed juveniles are able to grow, and the more likely they are to survive and reproduce (Semlitsch et al. 1988, Pechmann et al. 2001). The larvae perish if a site dries before they complete metamorphosis (Anderson 1968, Feaver 1971). Pechmann et al. (2001) found a strong positive correlation between inundation period and total number of metamorphosing juvenile amphibians, including tiger salamanders.

Metamorphosed juveniles leave the breeding sites in the late spring or early summer. Like the adults, juveniles may emerge from these retreats to feed during nights of high relative humidity (Storer 1925, Shaffer et al. 1993) before settling in their selected upland sites for the dry, hot summer months. While most California tiger salamanders rely on rodent burrows for shelter, some individuals may utilize soil crevices as temporary shelter during upland migrations (Loredo et al. 1996). Mortality of juveniles during their first summer exceeds 50 percent (Trenham 1998). Emergence from upland habitat in hot, dry weather occasionally results in mass mortality of juveniles (Holland et al. 1990).

We do not have data regarding the absolute number of California tiger salamanders due to the fact that they spend most of their lives underground. Virtually nothing is known concerning the historical abundance of the species. At one study site in Monterey County, Trenham et al.

(2000) found the number of breeding adults visiting a pond varied from 57 to 244 individuals. A Contra Costa County breeding site approximately 124 miles north of the Trenham et al. (2000) study site in Monterey County showed a similar pattern of variation, suggesting that such fluctuations are typical (Loredo and Van Vuren 1996). At the local landscape level, nearby breeding ponds can vary by at least an order of magnitude in the number of individuals visiting a pond, and these differences appear to be stable across years (Trenham et al. 2001).

Lifetime reproductive success for California tiger salamanders is typically low. Less than 50 percent breed more than once (Trenham et al. 2000). In part, this is due to the extended length of time it takes for California tiger salamanders to reach sexual maturity; most do not breed until 4 or 5 years of age. Combined with low survivorship of metamorphs [in some populations, less than 5 percent of marked juveniles survive to become breeding adults (Trenham 1998)], low reproductive success limits California tiger salamander populations. Because of this low recruitment, isolated subpopulations can decline greatly from unusual, randomly occurring natural events as well as from human-caused factors that reduce breeding success and individual survival. Based on metapopulation theory (Hanski and Gilpin 1991), factors that repeatedly lower breeding success in isolated ponds that are too far from other ponds for migrating individuals to replenish the population further threaten the survival of a local population.

The California tiger salamander is threatened primarily by the destruction, degradation, and fragmentation of upland and aquatic habitats, primarily resulting from the conversion of these habitats by urban, commercial, and intensive agricultural activities (Service 2000; 2003; 2004). Additional threats to the species include hybridization with introduced nonnative barred tiger salamanders (*A. tigrinum mavortium*) (Service 2000, 2004), destructive rodent-control techniques (e.g., deep-ripping of burrow areas, use of fumigants) (Service 2003), reduced survival due to the presence of mosquitofish (*Gambusia affinis*) (Leyse and Lawlor 2000), and mortality on roads due to vehicles (Service 2000). Disease, particularly chytridiomycosis and ranaviruses, and the spread of disease by nonnative amphibians, are discussed in the listing rule as an additional threat to the species (Service 2004).

Recovery Objectives

A recovery plan for the central California population of the California tiger salamander has not been completed; however, the 2004 listing rule (Service 2004) outlines conservation measures for protection and recovery of the species. The Service has concluded that protection and recovery of the California tiger salamander will require reduction of the threats from destruction, fragmentation, and degradation of wetland and associated upland habitats due to urban development, conversion of habitat to intensive agriculture, predation by nonnative species, disease, contaminants, agricultural and landscaping contaminants, rodent and mosquito control, road-crossing mortality, hybridization with nonnative tiger salamanders, and some livestock grazing practices. Threats from pesticide drift also must be reduced. These threats should be considered when management actions are taken in habitats currently and potentially occupied by the California tiger salamander, and areas deemed important for dispersal and connectivity or corridors between known locations of this species. Monitoring also should be undertaken for any management actions or scientific investigations designed to address these threats or their impacts.

ENVIRONMENTAL BASELINE

Action Area

The implementing regulations for Section 7(a)(2) of the Act define action area as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR, Part 402.02). The action area for this biological opinion encompasses all areas that may be directly or indirectly affected by construction and operation activities for the proposed project. It also encompasses the broader area that, while outside and next to the construction zone, may be directly or indirectly affected by vibrations, noise, dust, or movement associated with the proposed project. It also includes areas that may be affected by the implementation of the conservation measures.

The Action Area for this consultation consists of the following:

- 2,506-acre project footprint
- 2,514-acre Valley Floor Conservation Lands
- 10,722-acre Valadeao Ranch Conservation Lands
- 10,890-acre Silver Creek Conservation Lands
- Little Panoche Road from the Interstate 5 staging area to the intersection with Panoche Road
- County Roads where the speed limit of project vehicles is reduced

Habitat Characteristics of the Action Area

The action area is in Fresno and San Benito Counties and lies on the western edge of the San Joaquin Valley in the Diablo Range. Soils in the area are derived predominantly from marine sediments (sandstone and shale). These support a sparse vegetative cover on most hillsides, with more vegetative cover generally associated with flatter valley floor areas and hillslopes at higher elevations.

The action area experiences a Mediterranean climate, with dry hot summers and cool wet winters. However, this region does not experience heavy rainfall. Annual precipitation in the general vicinity of the site ranges from 8 to 10 inches. Approximately 85 percent of precipitation falls between October and March. Temperatures average approximately 80 degrees Fahrenheit (˚F) in the summer and 40˚F in the winter; mid-summer temperatures are often over 100˚F, and winter lows can be close to freezing. Nearly all precipitation infiltrates the site’s soils and flows in creeks and drainages when soil capacity has been reached.

Habitats in the action area are largely composed of annual nonnative grasslands. Other habitats identified in the Action Area include subshrub/scrub lands, oak woodlands, and wetlands (PVS 2014). For a full description of habitat types, see Appendix F of the biological assessment (PVS 2014).

Existing Conditions in the Action Area

The land in the general vicinity of the action area has been grazed for over 150 years. The Panoche Valley has historically been sparsely inhabited, with few buildings.

The proposed project footprint is dominated by introduced annual grasslands, but this area supports several seasonally flooded pools and stock ponds, predominantly in the northern portion along unnamed washes. Habitat for aquatic species and amphibians in the proposed project footprint is limited to the few stock ponds and ephemeral pools.

The Valley Floor Conservation Lands are dominated by introduced annual grasslands. These lands also contain Panoche and Las Aguilas Creeks, which are ephemeral streams that are dry in the summer. Smaller washes and drainages feed these larger creeks. The conservation lands also support seasonally flooded pools and stock ponds.

The Valadeao Ranch Conservation Lands are dominated by introduced annual grasslands and ephedra shrublands, though they support several relatively small upland habitats. The Valadeao Ranch Conservation Lands also contain wetlands: ephemeral, seasonal, and perennial springs and seasonally flooded ponds, stock ponds, and riparian habitats.

The Silver Creek Conservation Lands are also dominated by introduced annual grasslands and ephedra shrublands. These Lands also contain wetland habitats: seeps and springs, stock ponds, and riparian habitats along Panoche and Silver Creeks.

The conservation lands are surrounded by private cattle ranches and BLM-administered lands. The surrounding land uses are primarily cattle ranching and open space. BLM-administered lands are extensive in the Ciervo-Panoche Natural Area surrounding the site.

Previous Consultations in the Action Area

We have no record of previous section 7 consultations or existing Section 10 habitat conservation plans in the action area.

Status of the Species in the Action Area

Information to develop this section includes CNDDB records, reports submitted to the Service, published literature, and surveys completed specifically for this project. A complete description of the survey methods utilized for this project can be found in the biological assessment and its appendices (PVS 2014).

Giant Kangaroo Rat

The total giant kangaroo rat source population area in the Panoche Valley is estimated at 2,288 acres (Service 1998; Service 2010a). The Silver Creek Ranch supports approximately 90 percent (2,065.8 acres) of the source population area (Service 2010a).

Density estimates were not conducted for the entire action area. A literature review revealed estimates of giant kangaroo rat density, ranging from less than 1 to 271.7 per acre rangewide. Williams (1992) estimated the Panoche Valley population at 0.82 per acre. Most giant kangaroo rat research and studies to date have occurred in the southern portion of the range; however, three papers presented population density estimates for the northern portion of their range in the vicinity of the action area (Grinnel 1932; Williams 1992; and Williams et al. 1995). All three researchers presented densities estimated in above average precipitation years; therefore, the assumption is that the estimates in these papers are on the high end of population densities that may occur in normal precipitation years. The project proponents' biological assessment summarizes the results of these studies as they pertain to the vicinity of the action area (PVS 2014).

Biologists conducting reconnaissance surveys in April 2009 found evidence of giant kangaroo rat precincts and scat throughout the action area. Multiple focused biological surveys were conducted in the action area between 2009 and 2013; these surveys documented the presence of giant kangaroo rats in multiple locations. Survey methods included distance sampling, occupancy sampling, and 100 percent coverage surveys for the species, as well as additional biological surveys where evidence of giant kangaroo rat was observed incidentally.

Distribution surveys

A 100 percent coverage survey for giant kangaroo rat in the proposed project footprint was conducted, and a grid-based population estimate was completed in February/March 2013. Follow-up surveys were conducted in July 2013, to verify and update the status of inactive sites.

For field surveys, biologists used a grid sampling system whereby 30-meter by 30-meter grids were evaluated for the presence or sign of giant kangaroo rats. Grids were arranged along north-south parallel transects. Surveyors inspected each grid square for evidence of giant kangaroo rat precincts. Burrow precincts were considered occupied based on presence of scat, tracks, tail-drags, pit caches, fresh excavations, and cropped vegetation around a series of suitably sized horizontal and vertical burrow openings. Precincts that did not appear to be occupied were identified and mapped as inactive. Precincts were considered unoccupied when characteristic horizontal and vertical burrow openings and the surrounding area were devoid of fresh scat, tracks, fresh digging, and cropped vegetation. Evidence of other congeneric species was also noted and recorded as "other kangaroo rat."

In the proposed project footprint and Valley Floor Conservation Lands, the surveyed grid accounted for 100 percent coverage plus a 152-meter (500-foot) buffer in areas where landowner access was granted. Transects were systematically distributed across the proposed project footprint and Valley Floor Conservation Lands and included areas identified as high and low suitability habitats in past studies. The Valadeao Ranch and Silver Creek Conservation Lands were surveyed using the same method described above but with wider transects. No buffers were surveyed for these conservation lands since surveyors did not have landowner access outside these areas. These surveys were designed to cover approximately 20 to 30 percent of the conservation lands; therefore, transect spacing was approximately 148 meters.

A total of 48,446 survey grid cells were evaluated for giant kangaroo rat presence in the proposed project footprint (16,775 cells), Valley Floor Conservation Lands (11,190 cells), Valadeao Ranch Conservation Lands (10,166 cells), and Silver Creek Ranch Conservation Lands (10,309 cells). Active cells comprised 1.8 percent of cells in the footprint, 9 percent of cells in the Valley Floor Conservation Lands, 1 percent of cells in the Valadeao Ranch Conservation Lands, and 23 percent of cells in the Silver Creek Ranch Conservation Lands (PVS 2014).

Based on this survey information, giant kangaroo rat colonial concentrations were delineated and mapped. Four of the larger colony concentrations within the proposed project footprint were converted to avoidance areas and added to the Valley Floor Conservation Lands. These areas were selected due to the large numbers of concentrated active and inactive giant kangaroo rat precincts, the presence of high quality habitat, and direct connectivity to protected lands, such as the Valley Floor Conservation Land, Valadeao Ranch Conservation Lands, and adjacent BLM-administered land.

The survey results were used to estimate the number of giant kangaroo rats potentially supported in the proposed project footprint. Project biologists performing the surveys assumed, conservatively, that all 197 active cells were in high quality habitat, even though habitat quality in much of the proposed project footprint appears to be compromised due to past land use practices such as agriculture (PVS 2014). Without a density estimate of individuals per active cell, project biologists assumed that each active cell in the proposed project footprint is occupied by a minimum of at least one individual giant kangaroo rat. Using this minimum density estimate of one individual per active survey cell in the proposed project footprint, a minimum of 197 individuals would be expected to occur. Giant kangaroo rat populations can fluctuate significantly from year to year. It is reasonable to expect through natural recruitment that an increase in population would result in greater occupancy of the proposed project footprint.

Using a minimum density estimate of one individual kangaroo rat per active cell is likely to result in a severe underestimate of the actual number of individuals present. However, scientifically-derived densities of giant kangaroo rat in the proposed project footprint are not available in the literature. The only colony evaluated in Williams (1992) from the Panoche Valley was not trapped, and no density estimate for that colony was calculated. More broadly across the Panoche region, other density estimates are available for Silver Creek Ranch, in the vicinity of Valadeao Ranch, and on the east side of the Panoche Region in the vicinity of the Panoche Creek alluvial fan. Of these, the proposed project footprint is most likely more similar to Valadeao Ranch than Silver Creek Ranch or Panoche Creek, given the very high quality habitat conditions on the latter two compared to the lower quality of the project site habitat. Therefore, to develop a more accurate estimate of the number of individuals in the project area we used the maximum measured density for the Valadeao Ranch area, 7.9 giant kangaroo rats per acre (based on Williams et al. 1995) as a surrogate estimate for the project site. Using this approach, we determine that up to 347 giant kangaroo rats may be present in the proposed project footprint. After 4 years of drought conditions, the current population (in 2015) is expected to be lower than this projected density. We then applied a conservative 50 percent increase in the population ("Anticipated Population Growth Rate") from 2014 due to reproduction during several years of drought conditions. Based on these calculations, presented in Table 6, we estimate that 521 individuals may be affected by project activities.

The giant kangaroo rat is a species that has periodic population irruptions, resulting in large increases in numbers and potentially large areas of adjacent habitat becoming occupied over very short periods. Although these population increases may follow years of favorable precipitation, a direct causative link has not been determined. When these events occur, populations can increase greatly. While this type of population increase is an observed phenomenon, predicting the resulting population in a particular area (e.g., the proposed project footprint) is problematic and not the typical condition.

Threats to giant kangaroo rats in the action area include the conversion of native habitats to agriculture and other land uses, construction of solar energy facilities, and fragmentation of habitat from roads, transmission lines, and other linear features.

Table 6

Population estimate for giant kangaroo rat on the project site.

(note: the estimate for the number of individuals is rounded up to the nearest whole individual, because you cannot have a fraction of an animal)

Active Survey Cells		**Survey cell size**		**Active Acres**
197	x	0.2224 acres	=	43.8128
Active Acres		**Density Estimate (Individuals per Acre)**		**Number of Individuals**
43.8128	x	7.9	=	347
Number of Individuals		**Anticipated Population Growth Rate**		**Number of Individuals Expected in Project Footprint**
347	x	1.5	=	521

Recovery

The population of giant kangaroo rats in the action area is part of the Panoche Region population, one of the three largest populations of the species remaining (Service 1998). Specific recovery actions to protect habitat include protecting additional lands supporting key populations of the species. The Silver Creek Ranch is specifically identified as needing protection in the recovery plan. Project biologists used different survey methods for estimating the population levels on the conservation lands compared to the methods used for the project site. As a result, it is difficult to make an accurate comparison of the population size of giant kangaroo rats on the project site and on the conservation lands. Using the information provided by project biologists, 2,837 active surveys cells were identified on the conservation lands. If we apply the same estimate of 7.9 individuals per acre (Williams et al. 1995), presented in Table 7, we estimate the population of giant kangaroo rats on the conservation lands is 4,985 individuals. However, the methods of assessing population levels on the conservation lands were significantly different than those used on the project site. Due to these different methods, the population estimate derived in Table 7 should be used cautiously in comparison to the estimate for the project site. Rather, we use these calculations to provide a coarse comparison between the areas; we conclude that giant kangaroo rats are present and likely in significantly higher numbers on the conservation lands compared to the project site.

Table 7
Population estimate for giant kangaroo rat on conservation lands.
(note: the estimate for the number of individuals is rounded up to the nearest whole individual, because you cannot have a fraction of an animal)

Active Survey Cells		Survey cell size		Active Acres
2,837	x	0.2224 acres	=	630.9488
Active Acres		**Density Estimate (Individuals per Acre)**		**Number of Individuals**
630.9488	x	7.9	=	4,985

San Joaquin Kit Fox

San Joaquin kit foxes are known to occur in the proposed project footprint. In addition to data collected in 2010 (135 5-acre plots visited 5 times each), a series of focused biological surveys have been performed on the proposed project footprint since April 2009. These surveys have provided general information about the abundance and distribution of San Joaquin kit foxes in the action area.

Scat-Sniffing Dog Surveys

Evidence of San Joaquin kit fox in the proposed project footprint, Valley Floor Conservation Lands, and portions of the Valadeao Ranch Conservation Lands was gathered during scat-sniffing dog surveys. These surveys were conducted between July 30 and August 16, 2010, and consisted of walking transects with dogs trained to detect San Joaquin kit fox scat (PVS 2014). During these surveys, scat specimens were collected and sent to the Smithsonian Institution for DNA analysis. Results of analysis indicate that 11 male and 11 female San Joaquin kit foxes were identified in the survey area. Sixteen San Joaquin kit fox occurred either in the proposed solar generation facility area or in close proximity to the proposed solar generation facility. Thirteen were located exclusively on the conservation lands. As the scat-sniffing dog surveys were conducted at the end of the summer 2010, the data collected represents an estimate of the number of individuals in the study area during a year of normal precipitation cycle.

Spotlight Surveys

Twenty full nighttime spotlight surveys on the Silver Creek Ranch Conservation Lands produced between 2 and 10 San Joaquin kit fox observations per night. A total of 137 detections of San

Joaquin kit fox and 11 detections classified as probable San Joaquin kit fox have occurred to date. Individuals were detected in drainages, on flat land, on hillslopes, and even on ridges or hills. The spotlight survey results provide information for presence of the species but were not able to distinguish individuals thus providing density or population size.

Camera Trap Surveys

San Joaquin kit foxes were recorded at 17 out of 20 camera stations on the Silver Creek Ranch Conservation Lands in October 2012. All camera traps were placed at least a half-mile from each other. The 17 detections occurred during 119 of 275 trap nights, resulting in approximately 43 percent detection rate. Individual camera trap detections of San Joaquin kit fox ranged from 0 percent to almost 64 percent detection. Only one station detected two individual kit foxes in the same photo; all other stations detected one at a time.

San Joaquin kit foxes rarely exhibit unique identifying features; thus, individuals are difficult to distinguish in a camera trap survey. Therefore, it is not possible to confirm the exact number that visited any given camera trap location (PVS 2014).

Den locations

Concurrent with the 2013 giant kangaroo rat surveys, all known San Joaquin kit fox den and natal den locations were recorded and mapped. A total of 45 dens was observed in the action area, 37 known adult dens and 8 natal dens. The Valley Floor Conservation Lands supported the highest number of dens (17 dens and 5 natal dens), followed by the Valadeao Ranch Conservation Lands (11 dens and 1 natal den), Silver Creek Ranch Conservation Lands (7 dens and 1 natal den), and the proposed project footprint (2 dens and 1 natal den).

Threats to San Joaquin kit fox in the action area include the conversion of native habitats to agriculture and other land uses, construction of solar energy facilities, and fragmentation of habitat from roads, transmission lines, and other linear features.

Recovery

The Ciervo-Panoche Natural Area of western Fresno and eastern San Benito Counties is identified as one of the three core populations of San Joaquin kit fox (Service 1998); San Joaquin kit fox in the action area would be included in this core population. Protection of natural lands in the Ciervo-Panoche Natural Area is identified as a specific recovery action in the recovery plan.

Impacts of genetic isolation may already be apparent in the Panoche population revealed by low allelic diversity. The Panoche population is located in a small, relatively isolated valley and also appears to be experiencing a low number of migrants into the population (Schwartz et al. 2005).

Blunt-Nosed Leopard Lizard

The blunt-nosed leopard lizard is known to occur in the action area and in the vicinity of the project footprint.

Few study authors have calculated population density estimates for the blunt-nosed leopard lizard. Studies conducted in the Elkhorn Plain and Pixley National Widlife Refuge estimated population density of blunt-nosed leopard lizard to be between 0.1 and 33.32 individuals per acre. None of these studies took place in a shrubless grassland habitat found in the Panoche Valley and proposed project footprint, so these population density estimates may not directly compare to the Panoche Valley but are the best density estimates available.

Abridged Surveys

Abridged protocol-level adult blunt-nosed leopard lizard surveys (i.e., not for the complete duration required by the protocol) were completed between June 10 and July 15, 2009, on USGS Sections 10 and 15 of the USGS 7.5-minute Panoche quadrangle, in portions of the proposed project footprint and Valley Floor Conservation Lands. Surveys consisted of the following:

- 3.5 full-coverage surveys for adult blunt-nosed leopard lizard on Section 15 between June 10 and July 15, 2009
- Eight full-coverage adult blunt-nosed leopard lizard surveys on Section 10 between June 10 and July 15, 2009
- Five full-coverage juvenile blunt-nosed leopard lizard surveys Sections 10 and 15 between August 3 and September 1, 2009

In late April 2010, the project proponent initiated surveys and sampling spread over the entire proposed project footprint and Valley Floor Conservation Lands. This entailed full-protocol adult season blunt-nosed leopard lizards on Section 16, covering portions of both the proposed project footprint and the Valley Floor Conservation Lands.

No blunt-nosed leopard lizards were observed in Section 10 at any time during the 2009 surveys; however, two adults were detected in Section 10, in the 100-year floodplain of Las Aguilas Creek, during the occupancy sampling in 2010. The adult blunt-nosed leopard lizards in Section 15 were mainly found in association with Panoche and Las Aguilas Creeks, which is consistent with known habitat preferences of washes and floodplains (Warrick et al. 1998), especially in areas where dense vegetation comprises the upland habitat. Juvenile blunt-nosed leopard lizards were found along washes and farther into the upland habitat as they dispersed. Adult blunt-nosed leopard lizards were observed in and near Panoche Creek in Sections 10, 14, 15, and 16 during the 2010 surveys (see Figure 21 of PVS 2014).

No blunt-nosed leopard lizards were observed on the Valadeao Ranch Conservation Lands, although suitable habitat is contiguous with the western and southeastern edges of the proposed project footprint. Additional potential habitat occurs on the floor of Little Panoche Valley, in the northern portion of the Valadeao Ranch Conservation Lands.

Silver Creek Ranch Surveys

Four blunt-nosed leopard lizards were observed on the Silver Creek Ranch Conservation Lands in dry washes during reconnaissance surveys between August 30 and September 3, 2010. In addition, focused blunt-nosed leopard lizard surveys were conducted on the Silver Creek Ranch

Conservation Lands in September of 2012. Because all blunt-nosed leopard lizards were observed in or near washes in the abridged protocol-level surveys in 2009 and full protocol-level surveys in 2010, the Silver Creek Ranch Conservation Land surveys targeted survey areas on the drainages of the ranch.

Blunt-nosed leopard lizard focused surveys were conducted from September 10 through 17, 2012, on the Silver Creek Ranch Conservation Lands. Surveys consisted of a team of three biologists traversing drainages on foot; one biologist walked in the drainage and two biologists walked on either side. Focused blunt-nosed leopard lizard surveys were conducted according to specifications in the survey protocol, except that drainages were targeted and surveys were conducted on September 17 (2 days past the range of survey dates in the protocol). However, Dr. Jennings, a noted California herpetologist assisting with the surveys, determined that the weather was still warm enough to continue with surveys, as evidenced by incidental blunt-nosed leopard lizard sightings through September 21, 2012.

During blunt-nosed leopard lizard focused surveys, juvenile blunt-nosed leopard lizards were observed in drainages, on hillslopes, and even on rocks on top of ridges. In addition, blunt-nosed leopard lizards were incidentally observed during giant kangaroo rat focused surveys from September 11 through 21, 2012. Most of these incidental observations were not associated with a drainage. Thirty-one blunt-nosed leopard lizards were observed during focused surveys, and there were 30 incidental blunt-nosed leopard lizard detections during giant kangaroo rat focused surveys. Sixty-one blunt-nosed leopard lizards were detected in a 2-week period. All blunt-nosed leopard lizards observed were juveniles, except for two subadults.

Full Protocol Surveys

Adult surveys were conducted over the 2013 season, between May 9 and July 13, 2013. No blunt-nosed leopard lizards were found in the proposed project footprint during the 2013 adult season surveys. During the same period, biologists observed a total of 27 blunt-nosed leopard lizards in the Valley Floor Conservation Lands with the majority of the observations associated with the wash habitat along Panoche Creek. This indicates that blunt-nosed leopard lizards were active in the area, with no observations in the project footprint.

Biologists completed hatchling and subadult 2013 season surveys between August 2 and September 10, 2013, during which a total of 13 blunt-nosed leopard lizards was observed. Most of the observations made during the hatchling and subadult season surveys were associated with the wash habitat along Panoche Creek in the Valley Floor Conservation Lands; however, there was one observation of a hatchling made in the proposed project footprint, just north of the Valley Floor Conservation Lands boundary that encompasses Las Aguilas Creek (PVS 2014). The proposed project footprint boundaries were modified to avoid this observation using a 52.4-acre buffer.

Conservation Lands Surveys

No species-specific surveys for blunt-nosed leopard lizard have been conducted in the Valadeao Ranch Conservation Lands, and no blunt-nosed leopard lizards have been incidentally observed there during other surveys. Population density cannot be estimated for the Valadeao Ranch Conservation Lands until surveys have been completed; however, the assumption is that low-lying areas extending from the proposed solar facility footprint onto the Valadeao Ranch Conservation Lands may be included as suitable habitat for blunt-nosed leopard lizards based on the similarity of habitat characteristics in those low-lying areas to occupied areas identified during surveys.

Four blunt-nosed leopard lizards were observed on the Silver Creek Ranch Conservation Lands in 2010. These observations were made during reconnaissance-level surveys (not targeted to a specific species), all in the same drainage system. Sixty-one blunt-nosed leopard lizards were observed during the September 2012 focused surveys on the Silver Creek Ranch Conservation Lands (see Figure 22 in PVS 2014). Because the Silver Creek Ranch Conservation Lands provide more complex habitat than the proposed project footprint or Valley Floor Conservation Lands, blunt-nosed leopard lizard observations appear more widely distributed across the landscape and are not restricted to drainages.

Threats to blunt-nosed leopard lizards in the action area include the conversion of native habitats to agriculture and other land uses, and fragmentation of habitat from roads, transmission lines, and other linear features.

Recovery

The Panoche Valley portion of the Silver Creek Ranch is identified in the recovery plan (Service 1998) as a high-priority target for land acquisition and protection. This area is included in the action area and is proposed for permanent conservation as the Silver Creek Ranch Conservation Lands.

California Tiger Salamander

California tiger salamanders are known to occur with the Action Area and specifically within the Valley Floor Conservation Lands (CNDDB 2015; D. Hacker, pers. comm.).

California tiger salamander larvae were observed in two ponds just west of the proposed project footprint during the 2009-2010 rainy season, protocol-level, vernal pool branchiopod surveys. One of the ponds is a large stock pond that still contained sufficient water for complete metamorphosis of California tiger salamander larvae by May 21, 2010. Seven larvae were netted at this location. The other pond is a vernal pool where California tiger salamander larvae were first observed in February 2010 during branchiopod surveys. During the May 21, 2010, sampling event, there were several dozen larvae in the pond attempting to metamorphose due to the drying of the pond. Some individuals may have metamorphosed successfully, though 10 larvae were observed desiccated in the shallow and muddy portions of the pond. Biologists conducting California tiger salamander larval surveys in March, April, and May 2010 also noted larval California tiger salamanders in these two ponds.

Two ponds occur in close proximity to each other in the northwestern portion of the project area in the Valley Floor Conservation Lands. California tiger salamanders were documented in one of the ponds in 1996 and again in 2015 (CNDDB 2015; D. Hacker, pers. comm.). Without protocol level surveys of both ponds and due to the close proximity to each other and the similar size and depth, we assume that both ponds are occupied by California tiger salamanders.

No California tiger salamanders were observed in the proposed project footprint during the 2009-2010 rainy season. However, breeding was confirmed in the two nearby off-site ponds discussed above. California tiger salamanders breeding in those ponds could estivate on portions of the proposed project footprint.

EFFECTS OF THE ACTION

Effects of the Proposed Action on the Landscape

The project would permanently impact 1,794 acres of suitable and/or occupied habitat for the giant kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard, and California tiger salamander. Approximately 360 acres of the 1,794 acres of the permanent impacted area would be graded. In addition to the 1,794 acres of permanently impacted habitat, 712 acres of habitat would be temporarily impacted. To compensate for the effects of the project, the PVS has committed to permanently conserve and manage approximately 24,176 acres of adjacent lands supporting similar habitat.

The effects analysis for the proposed construction of the solar arrays, associated infrastructure, and telecommunication and powerline upgrades is unique in that grassland habitat potentially suitable for the species would still be present around and under the solar arrays and most areas of the transmission lines post-construction. Because little information exists on such effects to breeding, feeding, and sheltering, and based on information included in the biological assessment, we use the precautionary principle and postulate these "unnatural" structures in an otherwise undeveloped, open, flat landscape would alter the habitat such that the species may not use the habitat in the same way, or at all, as prior to the project. For the purposes of our analysis, we are assuming that the habitat beneath the solar arrays would not be used by giant kangaroo rats, San Joaquin kit foxes, or blunt-nosed leopard lizards after construction. Due to the life history of California tiger salamanders, we believe that they could potentially continue to use the panel arrays for movement to and from breeding ponds. However, California tiger salamanders would be captured and relocated from a majority of the project area (approximately 1,500 acres). Early observations on the California Valley Solar Ranch in the Carrizo Plain, California, indicate that giant kangaroo rats and San Joaquin kit foxes may, in at least the short term, continue to utilize areas with solar panel arrays in some capacity (H.T. Harvey 2015).

Rows of panels would be spaced approximately 10 to 35 feet apart to prevent shading of adjacent rows. It is expected that all areas under and between the panel arrays would receive shade throughout a portion of the day. Shading from the panel arrays could affect the composition and structure of the annual grassland and could affect federally listed species in the area. Studies have shown that shading can enhance the production of herbaceous vegetation, cause a shift from small to large seeded grasses and legume species, and suppress native perennial grasses (Frost and McDougald 1989; Dyer and Rice 1999).

Reduced evapotranspiration and water stress from partial shading and water input from panel washing would likely result in increased dominance (taller and denser stands) of non-native grasses. We assume that the species composition would shift slightly to a larger percentage of shade-tolerant species and a change in composition and structure different from that of existing open grassland conditions. The proposed grazing of the area under and around the panel arrays is expected to reduce the effects from this change in vegetative structure. The area of the project site that would be disturbed by construction would be revegetated with native species that occur in the vicinity of the project site. From strictly a vegetative species perspective, the grassland community in the panel arrays could remain suitable for the giant kangaroo rat, San Joaquin kit fox, and blunt-nosed leopard lizard, particularly with a focused grazing management regime to maintain a suitable vegetative structure; however use by these species may not occur due to other factors such as vegetation density and the presence of unnatural structures. In summary, the increased ground shading caused by the solar arrays may change the vegetative species composition and structure. We anticipate the composition would likely shift towards more shade tolerant species. These shade tolerant species may not be a preferred forage source for giant kangaroo rats; therefore, the species may not use the area even if the grazing program maintains a suitable vegetation density. San Joaquin kit foxes may be less likely to use the area if giant kangaroo rats are not present as a prey source. Blunt-nosed leopard lizards and California tiger salamanders may experience a reduced number of burrows for sheltering if giant kangaroo rats are not present.

The amount of solar energy reflected from an area is dependent on the solar energy impacting that area and the property of the material or surface receiving that incoming energy. Very dark materials would reflect less energy than very bright surfaces. Solar energy that is not reflected is absorbed and stored as heat, and then dissipated over time. The installation of solar arrays would introduce structures that would alter the solar energy exchange on the grasslands. Current conditions at the project site allow for 100 percent of sunlight to reach the ground with a portion reflected and the remaining absorbed and stored as heat. With the installation of solar arrays, a change in reflectance and absorption is important to consider if phenomena of a heat island might occur (Bornstein 1968). An Urban Heat Island is a phenomenon whereby a developed area is significantly warmer than surrounding undeveloped areas. Bornstein (1968) showed that the Urban Heat Island is caused by three factors: (1) waste heat from energy usage, such as engines that run on electricity, natural gas, and oil, (2) use of massive materials which store more heat and dissipate heat slowly, and (3) use of materials which absorb more solar radiation. Although waste heat may be emitted by the inverters and other equipment on-site, it is not expected to be a significant source of heating in a photovoltaic array. An analysis for the California Valley Solar Ranch determined the arrays similar to those proposed for this project would absorb slightly more, approximately 0.4 MW hour/acre/day (the constant rate of energy absorption per hour), solar radiation than a grassland with no panels (SunPower 2010). The lower mass of the thin and lightweight PV panels would dissipate heat more quickly than the ground. Although we do not have site specific information, studies at solar generation facilities in the Mojave Desert have shown an increase of approximately one degree Celsius as a result of the Urban Heat Island effect (B. Sinervo, pers. comm.). Considering the factors discussed above, we anticipate the area under, above, and around the solar arrays may experience subtle heating and cooling changes, but are not expected to be substantially different from current conditions. For the purposes of our analysis because we lack scientific information on how species are affected by the installation of panel arrays, we are assuming the species would not use these areas for most of their needs because the natural conditions to which they are adapted would have changed.

Effects of Decommissioning and/or Repowering

We cannot specifically analyze the effects of decommissioning at this time. The specific actions that will be undertaken and the status of the species in the future (minimum 30 years) are uncertain. We anticipate the effects of decommissioning to each species will be similar to those described for construction activities below so that our analysis of construction impacts to species also applies to decommissioning and repowering. Decommissioning and repowering impacts are not discussed separately below.

Effects of the Proposed Action on Giant Kangaroo Rat

Development of the solar arrays and associated infrastructure would result in the temporary and permanent disturbance of 2,506 acres. Construction of the panel arrays, project roads, and telecommunication and powerline infrastructure would result in a permanent loss of 1,794 acres of suitable and/or occupied giant kangaroo rat habitat. Approximately 360 acres of the 1,794 acres would be graded to reduce the slope of the land for panel installation or for road construction. The remaining area will not require grading. An additional 712 acres would be temporarily impacted during construction of roads, installation of the perimeter fence and collector lines, work areas, and the construction pond. These 2,506 acres of temporary and permanent impacts would occur within suitable habitat for the giant kangaroo rat, primarily on the solar generation facility site. Early observations at the California Valley Solar Ranch indicate that giant kangaroo rats have inhabited the solar arrays areas (H.T. Harvey 2015). Because literature on the long-term effects of solar arrays on terrestrial wildlife is limited, the potential for this species to re-inhabit the land under panel arrays after installation is possible, but cannot be expected. Therefore, we conclude that the 2,506 acres of giant kangaroo habitat affected permanently or temporarily by construction activities would likely not be re-occupied by the species.

Effects of the Giant Kangaroo Rat Relocation Plan

Per the Giant Kangaroo Rat Relocation Plan, the Applicant’s biologists would capture and relocate individuals within the 2,506 acres of temporary and permanent impacts (PVS 2014). Based on 2014 survey efforts, giant kangaroo rats currently occur on a portion of the proposed solar generation project site. Surveys were not completed for the power line and telecommunication improvement portions of the project; however, the areas identified for those portions support suitable habitat for the giant kangaroo rat. Surveys to collect density estimates were not conducted, so there is no site-specific way to determine the number of individuals that may be present in the affected areas, therefore we use the best information available. As discussed in the Status of the Species section, we used a density estimate developed by Williams et al. (1995) to derive a population estimate for giant kangaroo rats on the project site (refer to Table 6, in the Status of the Species section of this document).

Based of the best information available, the Service estimates that 521 giant kangaroo rats would be captured and relocated from the project footprint and the proposed 50-foot buffer around project construction for relocation. This number accounts for a conservative 50 percent increase in the population ("Anticipated Population Growth Rate") from 2014 due to reproduction during several years of drought conditions. The Giant Kangaroo Rat Relocation Plan was developed to capture and remove all individuals from the areas of disturbance. At the discretion of the designated biologist, exclusion fencing would be in place to prevent potential re-occupation of the area until construction is complete and the fencing is removed. If exclusion fencing is not used, individuals would be subject to recapture if they disperse back into the project site before all precincts are excavated. Based on the comprehensive nature of the proposed Giant Kangaroo Rat Relocation Plan, we anticipate that with implementation of the plan all individuals within the 1,794 acres of permanent impact would be captured and relocated. Prior to construction in any area, all precincts, occupied or unoccupied, will be excavated. We do not anticipate that giant kangaroo rats will attempt to create new precincts during construction activities. Captured individuals may burrow under their relocation enclosures and could disperse back in to a burrow in the project area that has not yet been excavated. These individuals are expected to be captured and relocated during future efforts on the project area. The risks of capture and relocation, and measures to minimize and avoid these risks, are fully described in the biological assessment and the Giant Kangaroo Rat Relocation Plan (PVS 2014). Survivorship of translocated wildlife, in general, is reduced due to intraspecific competition, lack of familiarity with the location of potential breeding, feeding, and sheltering habitats, and increased risk of predation. The Giant Kangaroo Rat Relocation Plan addresses these issues through a robust relocation strategy. Individuals would be released in adjacent areas providing suitable refugia, including inactive precincts and/or artificial burrows and provisioned with seed reserves. We anticipate that giant kangaroo rats could attempt to disperse from the relocation area or be reluctant to use new burrows; these individuals could be subject to increased predation, or could disperse into unsuitable habitat where their survival or reproduction would be reduced. Also, some individuals may suffer mortality in traps or during handling. There is some potential for injury or mortality of individuals during this translocation process. Based on a similar capture and relocation plan for the California Valley Solar Ranch, approximately 2 percent of captured individuals died as a result capture activities (J. Sloan, pers. comm.). We expect the similar rate of injury and mortality from the capture and relocation activities on the project site. Thus, we conclude that 11 individuals may be subject to injury or mortality from capture/relocation activities.

Effects of Project Construction

Solar arrays would be installed in areas that are characteristic of optimal giant kangaroo rat habitat: open, low relief, with a slope less than 11 percent. The area underneath and within shading distance of the array structures may be altered due to changes in vegetation structure and environmental conditions to such an extent that giant kangaroo rat abundance or use is reduced. This would constitute a loss of suitable habitat for foraging, shelter, and breeding.

Giant kangaroo rats avoid areas of dense shrub cover and the solar arrays could create an artificial structure similar to tall vegetation or shrubs that would be avoided by the species. We expect the effects from shading, increased soil moisture, and change in vegetation composition under the solar arrays to render 1,629 acres of currently suitable and/or occupied habitat to no longer be suitable for the species (Smith 1984; Smith et. al 1987). The 1,629 acres under the panel arrays and the estimated 165 acres of other permanent impacts such as the roads and the O&M building (1,794 acres total), are considered removed from potential inhabitation by the giant kangaroo rat.

Employing underqualified monitors could result in adverse effects to giant kangaroo rats. If monitors do not have adequate training to detect sign of giant kangaroo rat, presence of the species in the area may not be recognized. Any giant kangaroo rats or their habitat not correctly identified would be subject to the effects described below. Service review and approval of the designated biologists would ensure that the monitors are appropriately qualified.

Vehicles and construction equipment could destroy or damage giant kangaroo rat habitat. Vehicles driven through burrow precincts could crush burrows and pit-caches or “haystacks” (above ground seed curing areas), disrupt paths, and vehicles would compact loose soils used by giant kangaroo rats for sand bathing. Vehicular traffic could also damage vegetation and degrade food resources. Construction equipment could crush individual kangaroo rats or entomb individuals in burrows as a result of soil compaction.

Ground disturbance would affect any giant kangaroo rats present in areas impacted by construction activities. The solar panels would be mounted on metal frames anchored with a foundation piles. Piles driven into the ground to anchor the solar arrays would disrupt burrows if placed within precincts and may result in mortality or injury through direct contact or as a result of burrows crushed by vehicles or equipment or potential entombment of individuals from vibrational collapse of burrows. However, capture and relocation of all giant kangaroo rats out of the project area prior to construction, as proposed by the Applicant, would eliminate this risk of injury or mortality to individuals.

Trenching required for burial or repairs of power and communications cables would directly affect giant kangaroo rats where trenches are excavated through precincts. Open trenches would create impassable barriers that could disrupt movement between burrows and foraging areas. Giant kangaroo rats could fall into the trenches and be vulnerable to predation, starvation, and entombment. Placement of escape ramps in trenches or other excavated areas, as proposed by the Applicant, would minimize this risk.

Noise and ground vibrations from the use of heavy equipment during construction could result in temporary threshold shifts in hearing sensitivity for giant kangaroo rats (reduction in hearing ability) that are in the vicinity of the project activities have not yet been captured and relocated. Shifts in hearing sensitivity could negatively affect foraging success as this nocturnal species relies primarily on hearing to detect predators and other threats (Vernon et al. 1971). Noise generated by the rotary drill and other heavy equipment could cause temporary threshold shifts that could last for an extended period of time (i.e., up to 30 days). Giant kangaroo rats communicate through drumming of their hind feet. The drumming is used to defend territories and warn of the presence of predators. Noise impacts from construction machinery or array pile driving could disrupt giant kangaroo rat hearing to a point that this means of communication is ineffective and could lead to increased intraspecific competition and an increased rate of predation.

Spillage or leakage of industrial chemicals, fuels, and lubricants could result in fouling or poisoning of giant kangaroo rats and contamination of their habitat. Properly enforced, the spill prevention plan proposed by the Applicant would minimize, if not eliminate, this risk to giant kangaroo rats.

Giant kangaroo rats could be killed or injured due to predation by species such as red fox, coyote, or domestic dogs that are attracted to the area by trash discarded by personnel during construction. However, capture and relocation of all giant kangaroo rats out of the project area prior to construction, as proposed by the Applicant should minimize, if not eliminate the risk of predation within the solar generation facility. In addition, the Applicant's plan to regularly remove trash from the project area would eliminate the attractant for other wildlife and reduce the potential for predation of giant kangaroo rats during construction.

New structures in the project area would provide new perching structures for avian predators, such as barn owls (*Tyto alba*) and great horned owls (*Bubo virginianus*); this could enhance their ability to prey on giant kangaroo rats. Kangaroo rats have shown a decrease in activities during bright moonlight (Upham and Hafner 2013). Any nighttime lighting on the project site could result in better visibility for predators and a decrease in activity for giant kangaroo rats. Giant kangaroo rats remaining in the areas adjacent to the new structures or lighting outside of the areas of the capture and relocation activities could be subject to these effects. Similarly, any giant kangaroo rats that do migrate back towards or near the project area after construction activities cease would be subject to this effect.

Effects of Operations and Maintenance

Preliminary results at the California Valley Solar Ranch indicate that giant kangaroo rats have re-inhabited the panel arrays shortly after construction activities ceased (H.T. Harvey 2015). Based on this information, we believe some giant kangaroo rats may attempt to recolonize the areas within the panel areas following construction of the project. However, we do not have research to indicate what the long-term effects might be. In particular, we do not have information to inform what giant kangaroo rat response may be to vegetation changes caused by shading from the solar panels; the effects of shading and potential changes in vegetative composition may render the habitat under and around the solar panel arrays unsuitable or suboptimal for giant kangaroo rats. Therefore, we cannot expect the species to re-inhabit the areas under the panel arrays on a long-term basis. If the species does re-inhabit the area following construction, even in the short-term, those individuals would be subject to the effects of operations and maintenance activities as described below. If the recolonizing individuals are subsequently killed or injured due to the effects described below, the habitat is anticipated to remain available to other individuals of the species and could be re-occupied again. These effects could be repeated over the duration of the operation and maintenance period and affect multiple individuals over time. The likelihood of impacts from these effects would increase with any increase in the number of individuals that re-occupy the area. In this manner, the project site could act as an ecological trap (Kristan 2003) resulting in ongoing impacts to the species throughout the existence of the facility.

The project would result in a change to the current grazing regime from cattle to sheep. While working dogs used by ranchers conducting the grazing and management programs could chase, injure, or kill giant kangaroo rats, changing the grazing regime could have a greater effect on the abundance or distribution of giant kangaroo rats. Under the current land use in the proposed Action Area, intensive cattle grazing reduces vegetation height, density, and maintains species composition, which provides beneficial habitat conditions for the giant kangaroo rat. The areas that are currently occupied by giant kangaroo rats are dominated by a sparse to dense but closely cropped cover of annual grasses and forbs. Any changes in vegetation resulting from the change in grazing regime could be either beneficial or detrimental to giant kangaroo rats, which prefer grassy habitat and avoid areas with dense shrub cover. However, any effect from the change in grazing from cattle to sheep and goats in the array footprint is not likely to significantly change vegetation conditions such that it reduces habitat suitability for giant kangaroo rats. A change in the grazing regime alone is not considered a restriction to the potential for giant kangaroo rats to re-inhabit area under the solar arrays. This area is already considered lost for the species because it would occur under or next to the panel arrays and subject to the effects described above.

Vehicles used for maintenance and panel washing could destroy or damage giant kangaroo rat habitat if the species re-inhabits the panel arrays. Vehicles driven off established roads and potentially through burrow precincts could crush burrows and pit-caches or “haystacks”, disrupt paths, and vehicles would compact loose soils used by giant kangaroo rats for sand bathing. Vehicular traffic could also damage vegetation and degrade food resources. Construction equipment could crush individual kangaroo rats or entomb individuals in burrows as a result of soil compaction.

Giant kangaroo rats could be killed or injured by being hit or run over by nighttime worker traffic or security patrols during project construction or operations and maintenance activities. All nighttime traffic would be required to maintain a posted 10 mph speed limit on the project site, and would be required to remain on the existing roads except when emergency response requires vehicle access to off-road areas. Nighttime security patrols during operations and maintenance of the proposed project could result in vehicle strikes and mortality or injury to giant kangaroo rats if they re-inhabit the panel arrays. The likelihood of vehicle strikes would increase during nighttime activities when giant kangaroo rats would be out of their burrows foraging.

Use of rodenticides could directly affect giant kangaroo rats through poisoning resulting in mortality or sublethal doses. Sublethal doses could result in changes in the behavior that may increase individual giant kangaroo rats to the effects of exposure and predation. Limiting the use of rodenticides as described in the Project Description section would minimize the risk to giant kangaroo rats.

New structures in the project area would provide new perching structures for avian predators and could enhance their ability to prey on giant kangaroo rats. Any nighttime lighting on the project site could result in better visibility for predators and a decrease in activity for giant kangaroo rats.

Effects of Conservation Lands

The conservation measures including habitat preservation and management would protect suitable habitat for giant kangaroo rats. The Valley Floor Conservation Lands and large portions of the Silver Creek Ranch Conservation Lands are currently occupied habitat. Current land use in the conservation lands is compatible with giant kangaroo rat persistence and conditions appear to be near optimal for the species. The proposed management actions and enhancements will provide protection from incompatible future land uses and maintain an optimal grazing regime for the species. Despite the conservation of existing habitat, the project would still result in a net loss of suitable and occupied habitat for the species. The ultimate effect of conservation of the Valley Floor and Silver Creek Ranch areas would be preservation of suitable habitat.

Effects on Recovery

The permanent removal of 1,794 acres of suitable habitat would reduce the overall area of potential population and meta-population expansion in the Ciervo-Panoche Natural Area. It would also reduce protection for the giant kangaroo rat against stochastic events (e.g., landslides, floods) that require large areas to allow the species to redistribute across the landscape during or after an event. The capture and relocation efforts should reduce the overall impact to recovery of the species by moving all individuals in the project area from harm's way to areas that are protected and managed for the species. We have concluded that a small portion (2 percent) of individuals captured would be killed or injured and thus removed from the local population. The ultimate success of the relocation would be difficult to determine given the biology of the species and natural local population extinction and repopulation cycles.

If successful, the capture and relocation of giant kangaroo rats could alter the genetic structure of the metapopulations in the Ciervo-Panoche Natural area. Relocating individuals as close to the capture location and in proximity to neighboring individuals would reduce the potential for adverse artificial genetic manipulation and maintain the function of the metapopulation structure in the area.

We expect the relocation of giant kangaroo rats would be mostly successful and would reduce the overall impact from the proposed project. We do not expect many giant kangaroo rats to re-inhabit the lands under the panel arrays; although any that do attempt to re-inhabit the area are likely to experience reduced reproductive fitness and would be subject to other adverse effects, including injury or death, caused by operations and maintenance activities. Because we expect the relocation efforts to be largely successful and we expect relatively few individuals to recolonize the habitat under the panel arrays, we expect operations and maintenance activities to affect a small number of individuals. Therefore we conclude the effects to the species and to recovery are expected to be minimal.

The Silver Creek Conservation Lands would protect and manage an area identified in the Recovery Plan as important for recovery of the species (Service 1998). Although occupied and suitable habitat would be removed and mortality of some individuals is expected, we conclude that implementation of the proposed project is expected to have minimal effect on recovery of the species due to preservation of occupied habitat in the conservation lands and minimizing mortality of individuals through the capture and relocation efforts.

Summary of Effects to Giant Kangaroo Rat

In determining whether the effects of a proposed action are likely to jeopardize the continued existence of the giant kangaroo rat, we must consider whether the effects will reduce the reproduction, numbers, and distribution of the species and the impacts on recovery. In assessing these factors, we take into account measures proposed to avoid and minimize impacts to giant kangaroo rats during project activities.

Reproduction

If capture and relocation activities were to occur during mating season, individual giant kangaroo rats captured and relocated to burrows with inclusion fencing (to prevent immediate dispersal) would be removed from reproduction for the year. If any lactating females are captured during relocation efforts, the female would be returned to the burrow until the young have matured to be on their own. Burrows with young present would not be excavated. However, we do not expect implementation of the proposed project to affect overall reproduction of the giant kangaroo rat in the action area because the individuals that may be captured and relocated only represent a small portion of the individuals in the region. At the species level, the minor effect to the local reproduction of the giant kangaroo rat likely to result from the proposed action would not reduce the ability of the species to reproduce rangewide. We anticipate that the reproduction dynamics of the local metapopulation may shift slightly but the ability for the species to reproduce across all metapopulations in the Ciervo-Panoche Natural Area and the rangewide population would not be affected.

Numbers

We expect that some giant kangaroo rats will be killed or injured during the construction and future operation and maintenance of the proposed solar facility. The capture and relocation efforts, and other minimization and avoidance measures incorporated into the project including avoiding areas of high density, are expected to reduce the potential loss of individuals that would otherwise be killed or injured by construction activities and vehicles. Mortality of a few individuals is expected as a result of capture and relocation efforts. We estimate this at 2 percent of the estimated total captures (521) or 11 individuals. The relocated individuals would be provided with a food source that would not only increase the likelihood that they will remain in the new burrow, but also increase the likelihood that they will survive and reproduce during the next breeding cycle. While we do not have data sufficient to make a firm rangewide population estimate, the potential loss of 11 individual giant kangaroo rats would be minor in comparison to the local metapopulation and would represent an even smaller percentage of the regional group of metapopulations and rangewide populations of the species. We conclude that while some individual giant kangaroo rats may be killed or injured, the numbers rangewide will not be reduced because such losses are likely to only have a temporary effect to the local population.

While we anticipate some potential mortality associated with operations and maintenance, we expect it to occur infrequently and to affect a low number of individuals and therefore an insignificant percent of the rangewide population.

Distribution

The local distribution of the species would be altered due to the removal of occupied habitat and suitable habitat for local range expansion. Also, relocated individuals would change the distribution if relocated to an area not currently occupied or increase the density of the area if relocated to an inactive burrow system in an occupied area. However, linkages between the local and rangewide metapopulations are expected to be maintained through the establishment of the Valley Floor Conservation Lands. The species' larger geographic range includes portions of at least five counties on the western side of the San Joaquin Valley. We conclude that despite some changes to the species' local distribution, the proposed action would not reduce the rangewide distribution of the giant kangaroo rat.

Recovery

The removal of occupied and suitable habitat would reduce the overall area of potential population and meta-population expansion in the Ciervo-Panoche Natural Area. It would also reduce protection against stochastic events that require large areas to allow the species to redistribute across the landscape during or after an event. The capture and relocation of giant kangaroo rats, while an important measure to reduce giant kangaroo rat mortality, could alter the genetic structure of the metapopulations in the Ciervo-Panoche Natural area through introduction of individuals to areas of different genetic diversity. Establishment of the Silver Creek Ranch Conservation Lands would benefit the giant kangaroo rat by providing protection and management of an area identified in the Recovery Plan as important for recovery of the species (Service 1998). The conservation and management of Silver Creek Ranch Conservation Lands would protect a large area with a dense population of giant kangaroo rats. Conservation of these lands along with conservation lands established by solar facilities in the Carrizo Plains would provide a series of large, protected habitat areas for the species to inhabit. Although some occupied and suitable habitat would be removed and mortality of a few individuals is expected, implementation of the proposed project would have minimal effect on, and would not impede recovery of the species due to preservation of important occupied habitat in the conservation lands and the capture and relocation measures incorporated into the project to minimize mortality to giant kangaroo rats.

Effects of the Proposed Action on San Joaquin Kit Fox

Development of the solar arrays and associated infrastructure would result in the temporary and permanent disturbance of 2,506 acres. Construction of the panel arrays, project roads, and telecommunication and powerline infrastructure would result in a loss of 1,794 acres of suitable and/or occupied San Joaquin kit fox habitat. An additional 712 acres would be temporarily impacted during construction of roads, installation of the perimeter fence and collector lines, work areas, and the construction pond. The entire proposed project footprint contains suitable habitat for the San Joaquin kit fox.

Individual kit foxes occur on the project site and are breeding, feeding, and sheltering within the project footprint. We have little survey information to identify the current number of individuals using the project area. Based on the 2010 scat-sniffing dog surveys, 22 individual San Joaquin kit foxes used the action area or used areas in proximity to the action area. We anticipate that any individuals currently using the project area could be affected directly or indirectly by project activities.

To minimize the project's effects on the reproduction of San Joaquin kit fox, the Applicant proposes to survey for and avoid natal dens in the project footprint. These actions should reduce many project related impacts to the species occurring within the solar generation facility. Early observations at the California Valley Solar Ranch indicate that San Joaquin kit foxes use the solar array areas in at least a limited capacity for movement (H.T. Harvey 2015). Because literature on the long-term effects of solar arrays on terrestrial wildlife is limited, the potential for this species to re-inhabit the land under panel arrays after installation is possible, but cannot be expected. Therefore, we conclude that San Joaquin kit fox numbers in the area of the arrays would be reduced.

Arid systems are characterized by unpredictable fluctuations in precipitation, which lead to high frequency and high amplitude fluctuations in the abundance of mammalian prey for the San Joaquin kit fox (Goldingay et al. 1997; White and Garrott 1999). Because the reproductive and neonatal survival rates of the San Joaquin kit fox are strongly depressed at low prey densities (White and Ralls 1993; White and Garrott 1997, 1999), periods of prey scarcity owing to drought or excessive rain can contribute to population crashes and marked instability in the abundance and distribution of the San Joaquin kit fox (White and Garrott 1999). Frequent, rapid decreases in San Joaquin kit fox density can increase the extinction risk for small, isolated populations. The relocation of giant kangaroo rats from the project footprint may reduce the potential for San Joaquin kit foxes to persist in and around the solar arrays. Preliminary data from the California Valley Solar Ranch suggests that San Joaquin kit foxes may use the land under and around the panel arrays to some extent, at least in the short term (H.T. Harvey 2015). San Joaquin kit foxes were observed traveling through operational arrays, using the shade of the installed photovoltaic solar panels, and moving through and sitting along access roads; however, there were no observations of natal activity in the California Valley Solar Ranch project area during the San Joaquin kit fox reproductive period (H.T. Harvey 2015). Because of the uncertainty of the long-term effects and the lack of data to support that San Joaquin kit fox would persist in such an altered environment, we conclude the area under and around the panel arrays would likely be unsuitable for San Joaquin kit foxes.

The project area in the Panoche Valley provides open, flat habitat for San Joaquin kit fox movement through the landscape and the Ciervo-Panoche Natural Area. The Panoche Valley is surrounded by steep mountain ranges that present topographic barriers to San Joaquin kit fox movement. Construction of the proposed project would remove optimal habitat for the species and reduce the amount of suitable habitat available for movement through the landscape and the Ciervo-Panoche Natural Area. A habitat corridor designed into the project extends through the center of project area, and should provide connectivity between the southern portion of the Panoche Valley and the northern extent of the project, Little Panoche Valley, and further to the San Joaquin Valley.

Effects of Project Construction

Solar arrays would be installed in an area that is characteristic of optimal San Joaquin kit fox habitat: open, low relief, with a slope less than 6 percent. A change in activity in the area with an increase in human presence, noise, and structure could disturb individual San Joaquin kit foxes and disrupt normal behavioral patterns. This would constitute a loss of suitable habitat for foraging, shelter, and breeding.

Employing underqualified designated monitors could result in adverse effects to San Joaquin kit foxes. If designated monitors do not have adequate training to detect sign of San Joaquin kit foxes, presence of the species in the area may not be recognized. Any San Joaquin kit foxes or their dens not correctly identified would be subject to the effects described below. Service review and approval of the designated biologists would ensure that the monitors are appropriately qualified.

Direct destruction of a den or disturbance of a den from construction activities could result in the loss or abandonment of active San Joaquin kit fox dens. During the 2010 surveys, two active dens and one natal den were observed in the project footprint. Active natal or shelter dens may be abandoned if covered by solar arrays due to human presence, disturbance, or altering of the habitat. Depending on the age and development, San Joaquin kit fox pups present in natal dens may be subject to increased exposure, stress, and predation. If the pups are not mobile, the parent San Joaquin kit foxes may abandon a natal den leaving the pups behind; the abandoned pups may be crushed or entombed by construction activities. Proper identification of dens and den activities, avoiding den destruction, and establishing appropriate buffers would reduce the risk of adversely affecting denning San Joaquin kit foxes (Althouse and Meade 2015). The Applicant's proposal to establish buffers around San Joaquin kit fox dens would reduce or eliminate the potential for adverse effects to San Joaquin kit fox using those dens.

Mortality, injury, and harm of San Joaquin kit foxes by vehicles, heavy equipment, excavation, and grading could occur during construction activities. Mortality or injury of San Joaquin kit foxes could occur due to vehicle strikes from traffic in the action area during construction. The project will substantially increase traffic to the local area. Approximately 40 percent of the personnel and all of the equipment and supplies will enter the project site from the north on Little Panoche Road. Approximately 60 percent of the personnel will enter the project site from the southwest but still increase traffic on Little Panoche Road. This increase in traffic along Little Panoche Road, which bisects the Panoche Valley and the project site, is expected to be 1,750 percent over baseline levels during peak construction (PVS 2014). The potential for vehicle strikes would be greatest during dawn and dusk when the majority of personnel would be arriving and departing the project site and during required night-time activities such as PV panel connection. Although the project description states that all project related vehicles would maintain a 25 mph speed limit on County Roads adjacent to the solar generation site, this measure may not be enforceable. Research published by the National Cooperative Highway Research Program (2003) found that in rural settings adherence to posted speed limits was between 37 and 72 percent. The same research study found that drivers adhered to a posted 25 mph speed zone at a rate of only 42 percent. Studies have indicated that mortality from vehicle strikes remains a threat to similar canine species in areas with strict low speed limits, such as military installations (Snow et al. 2012). There is the potential for increased vehicle strikes on the County roads leading to and through the project area due to the increase in traffic to the area from project-related activities.

Injury or mortality of individual San Joaquin kit foxes could occur as a result of predation by or competition with species such as the red fox, coyote, or domestic dogs that might be attracted to the proposed project area by trash discarded by personnel during construction, or if proposed project activities cause an increase in prey availability for these species. The Applicant will prohibit domestic dogs on site, which should reduce this risk. The Applicant’s plan to regularly remove trash from the project area would eliminate the attractant for other wildlife and reduce the potential for predation on San Joaquin kit foxes during construction.

Accidental spillage or leakage of industrial chemicals, fuels, and lubricants could result in poisoning of San Joaquin kit foxes and contamination of their habitat. Rodent species poisoned by industrial chemicals and ingested by San Joaquin kit foxes may result in secondary poisoning. Properly enforced, the spill prevention plan proposed by the Applicant would minimize, if not eliminate, this risk for the San Joaquin kit fox.

Noise and ground vibrations from the use of heavy equipment and pile driving during construction could result in temporary reduction in hearing sensitivity, which could negatively affect foraging success of San Joaquin kit foxes. This species also relies on hearing to detect predators and other threats (Bowles and Francine 1993).

Noise and ground vibrations from the use of heavy equipment during construction could cause San Joaquin kit foxes to temporarily or permanently leave impact areas, and San Joaquin kit foxes could move to areas where they are more susceptible to injury or mortality from predation, vehicular traffic, or other activities. San Joaquin kit foxes displaced from the project area due to disturbance related to construction may increase competition for food and habitat with San Joaquin kit foxes in other areas.

Use of rodenticides would suppress the prey base and could directly or indirectly effect San Joaquin kit foxes through inter- and intra-species competition for the remaining available prey. Use of rodenticides could also lead to secondary poisoning of San Joaquin kit foxes that scavenge carcasses of poisoned rodents. Limiting the use of rodenticides as described in the Project Description section would minimize the risk to San Joaquin kit foxes.

Spillage or leakage of industrial chemicals, fuels, and lubricants could result in fouling or poisoning of San Joaquin kit fox and contamination of their habitat. The Applicant’s spill prevention and response plan would minimize or eliminate the risk of poisoning or contaminating the habitat of San Joaquin kit fox.

<u>Effects of Operations and Maintenance</u>

The solar arrays could alter San Joaquin kit fox habitat to the extent that it may exclude or reduce the species' use of the 1,794-acre area, which includes the solar array plus an area around the array’s footprint. Resulting alterations could include changes from an open grassland habitat to one with more shading and less long range visibility. San Joaquin kit foxes are known to use, in limited capacity, areas with existing structures, such as orchards, active oil field operations, and the fringes of urban development. San Joaquin kit foxes have also been observed around and under the solar arrays in the California Valley Solar Ranch (H.T. Harvey 2015). Although a habitat corridor exists through the project area, if the panel array areas are not re-inhabited by San Joaquin kit foxes or if the habitat corridor is not used, the San Joaquin kit fox local population would be fragmented and potentially isolated from the rest of the species' range. Fragmenting or isolating populations could lead to increased stress leading to lower reproduction, lower juvenile survival, shorter lifespans, and/or risk of local extinction (Lande 1988; Frankham and Ralls 1998; Saccheri et al. 1998). The perimeter security fencing would be permeable to San Joaquin kit fox and would allow movement through the project site. The habitat corridors and the permeable perimeter fence would reduce the risk of fragmenting and isolating the local population.

The project would result in a change to the current grazing regime from cattle to sheep. Working dogs used by ranchers conducting the grazing and management programs could chase, injure, or kill San Joaquin kit foxes. Alterations to the grazing regime could have an effect on the abundance or distribution of San Joaquin kit foxes. The current intensive cattle grazing within the project area constrains vegetation height, density, and composition, which creates beneficial habitat conditions for the San Joaquin kit fox. The project area within the array footprints would be grazed by sheep or goats during the O&M phase of the project. Any vegetation change resulting from this alteration in the grazing regime could be either beneficial or detrimental to San Joaquin kit fox prey, and fluctuations in prey populations have been shown to affect kit fox densities (White and Ralls 1993, White et al. 1996). However, due to a lack of information regarding the continued long-term use of solar arrays by the San Joaquin kit fox and to be conservative for the species in our analysis, we conclude that the land under the panel arrays would not remain suitable habitat for the species.

The proposed project could also affect movement and dispersal of San Joaquin kit foxes. Although San Joaquin kit foxes are known to move through partially disturbed habitats such as farmlands, oil fields, and areas with low density roads and highways, San Joaquin kit foxes could avoid, to some extent, the areas under and around the arrays due to the density of the panels in the landscape (Haight et al. 2002). The panel arrays would create artificial structure in an otherwise open landscape. The panel arrays could simulate a habitat with more vertical structure than preferred by San Joaquin foxes or create structure that would provide habitat preferred by competitors or predators. As a result, San Joaquin kit foxes may avoid the area under and around the panel arrays. Also, placement of solar arrays and fencing could influence the scent-marking behavior and disrupt territorial boundaries of San Joaquin kit foxes in the proposed project area. If territories shift from the current distribution, interspecific competition and behavior changes could occur.

Vehicles used by operations and maintenance personnel, anticipated to be 50 individuals, could kill or injure San Joaquin kit fox in the project area during their daily commute to the solar generation facility (PVS 2014). Vehicles for maintenance and panel washing could kill or injure San Joaquin kit foxes if the species re-inhabits the panel array areas. Preliminary results at the California Valley Solar Ranch indicate San Joaquin kit fox use of the panel arrays during and shortly after the construction (H.T. Harvey 2015). Vehicles driven through the array could crush dens. Maintenance and panel washing vehicles could also strike individual San Joaquin kit fox resulting in injury or mortality.

San Joaquin kit foxes could be killed or injured by being hit or run over by nighttime worker traffic or security patrols during project construction or operations and maintenance activities. We anticipate the risk of vehicle strike to continue during the operations and maintenance of the facility; this risk would be greatest during nighttime security patrols. The threat of vehicle strike may be greater for San Joaquin kit foxes that are attempting to re-inhabit the panel arrays, because they would be moving through an unfamiliar landscape. To minimize the risk of vehicle strike, all nighttime traffic would be required to maintain a posted 10 mph speed limit on the project site, and would be required to remain on the existing roads except when emergency response requires vehicle access to off-road areas. However, we anticipate that not all workers will observe the posted speed limit, which could somewhat limit the benefit of this measure.

San Joaquin kit fox populations have been linked to giant kangaroo rat populations (Service 1998; Cypher 2003). Capture and relocation of giant kangaroo rats, a primary prey source for the San Joaquin kit fox, may alter the kit fox's distribution in the solar generation facility area, conservation lands, and the recovery core area. San Joaquin kit foxes may vacate the solar array area in search of prey, resort to a less preferred or optimal prey source, and be subject to reduced fitness that could result in reduced reproduction locally.

Effects of Conservation Lands

The project's conservation measures include habitat preservation and management, which would protect suitable and occupied habitat for the San Joaquin kit fox. San Joaquin kit foxes have been observed on all three of the areas proposed by the Applicant to serve as conservation lands. Current land use in the conservation lands is compatible with San Joaquin kit fox persistence and appears to be near optimal conditions for the species. The proposed management actions will protect the conservation lands from incompatible future land uses and maintain an optimal grazing regime for the species. The ultimate effect of conservation of the lands as proposed by the Applicant would be permanent preservation of suitable and occupied habitat from future incompatible land uses. Despite the conservation of existing habitat, the project would still result in a net loss of suitable and occupied habitat for the San Joaquin kit fox and a minor reduction of area available for recovery of the species.

Effects on Recovery

The Recovery Plan for Upland Species of the San Joaquin Valley, California (Recovery Plan) addresses recovery goals for the San Joaquin kit fox (Service 1998). The strategy in the Recovery Plan for the San Joaquin kit fox includes the establishment and maintenance of viable complexes of interconnected kit fox populations on private and public lands throughout its geographic ranges (Service 1998). While the proposed project would impact 2,506 acres of occupied or suitable habitat optimal (0 to 6 percent slope in an open landscape) for the San Joaquin kit fox in the Ciervo-Panoche Natural Area, the conservation measures incorporated into the project would result in protection and management of important San Joaquin kit fox habitat.

The proposed project includes the conservation of approximately 10,000 acres of San Joaquin kit fox habitat (0 to 11 percent slope in an open landscape) and measures to maintain habitat connectivity, thus contributing to the recovery goal of establishing and maintaining viable interconnected kit fox populations. The 1,794 acres of permanent impact represent a small portion of the available habitat for the local population and an even smaller portion of available habitat rangewide. While the proposed protection and management of the conservation lands is not expected to result in increased numbers of San Joaquin kit foxes because current land uses on these lands are already near optimal condition for supporting San Joaquin kit fox, the proposed project will contribute to recovery by providing permanent protection of these lands consistent with the recovery plan. The maintenance of the habitat corridors through the solar generation facility will provide permanent protection of habitat that San Joaquin kit foxes can use to disperse to lands south and north of the project site.

Summary of Effects to San Joaquin Kit Fox

In determining whether a proposed action is likely to jeopardize the continued existence of a species, we consider the effects of the action with respect to the numbers, reproduction, and distribution of the species. The Corps and the project proponent have proposed measures to avoid and minimize impacts to San Joaquin kit fox during project activities.

Based on the conservation measures included in the project description to be implemented by the Corps and the Applicant, we conclude that impacts to the overall population, breeding and reproduction capacity, and recovery of the San Joaquin kit fox due to the Corps' current proposed activities would be minor. Because the Corps and the project proponent would implement the protective measures identified in the Description of the Proposed Action section of this document, we anticipate that few San Joaquin kit fox are likely to be killed or injured during the project.

Reproduction

Due to the large increase in traffic during the projected 18-month construction period, San Joaquin kit foxes would be subject to potential mortality during the breeding season. Reproductive-aged individuals, particularly females, killed during the breeding season would reduce the reproductive success of the local population. We expect the reduction in reproductive success to be a short-term impact. We anticipate the loss of a reproductive individual would be replaced during the next breeding cycle through maturation of juveniles or immigration of new individuals from outside the project area.

To minimize the project's effects on the reproduction of the San Joaquin kit fox during construction, the Applicant proposes to survey for and avoid natal dens in the project footprint. Consequently, we expect the local effect of the proposed project on reproduction of the San Joaquin kit fox to be minimal. Because the effects of the proposed project on the species' reproduction is not expected to be substantial at the local level, we further conclude that the proposed project will not reduce the San Joaquin kit fox's ability to reproduce rangewide.

Numbers

The Applicant has propose measures to avoid injuring or killing individual San Joaquin kit foxes, including pre-construction surveys, avoidance of active dens, and exclusionary measures to prevent direct injury. Some injury or mortality may still occur, especially due to vehicle strikes; however, due to the low density of San Joaquin kit foxes in the project area and the measures proposed to avoid and minimize effects, we expect that few San Joaquin kit foxes would be killed or injured. We do not have an estimate for the rangewide population of the species. The San Joaquin kit fox occupies a geographic range that is large relative to the size of the action area, including portions of most counties surrounding the San Joaquin Valley, and there is a large, stable population in the Carrizo Plain. Implementation of the proposed project is not expected to appreciably reduce the local population of the San Joaquin kit fox. Because the effect on the number of San Joaquin kit foxes at the local level would be minor, we conclude that the proposed action will not appreciably reduce the number of San Joaquin kit foxes rangewide.

Distribution

The local population of the San Joaquin kit fox is expected to shift out of and away from the panel arrays. This would eliminate a portion of habitat in the middle of the Panoche Valley; however, conservation of land to the north and south and the connecting habitat corridor would minimize the effects of the habitat lost to the solar development. The project as proposed would result in some limitations on the movement of San Joaquin kit foxes but is not expected to preclude north and south movements as a habitat corridor would remain through the project. Therefore, although implementation of the proposed project would remove occupied and suitable habitat for the species, we have determined that it will not appreciably reduce the distribution of the species at the local or rangewide level.

Recovery

The project could disrupt normal life history patterns of some individual San Joaquin kit foxes within one of the three core populations for San Joaquin kit fox: the Ciervo-Panoche Natural Area (Service 1998). The proposed project would also permanently remove some occupied, optimal habitat in the Ciervo-Panoche Natural Area. The avoidance, minimization, and conservation measures are expected to reduce these effects to the species in the area and minimize adverse effects to recovery efforts. In particular, the project design incorporates a habitat corridor that allows for more site permeability from north to south and allows for movement between lands conserved as part of the proposed project. The corridor is expected to provide a path of suitable habitat for San Joaquin kit fox occupation and movement through the area which will allow for continued function of the Ciervo-Panoche Natural Area. Based on information from similar solar power projects in the Carrizo Plains, the Service concludes that San Joaquin kit fox can persist, at least in the short term, in and around solar arrays. With the protection of lands to the north and south of the project site and the habitat corridor to through the project footprint, the function of the Ciervo-Panoche Natural Area will be maintained and recovery of the species will not be impeded by the proposed project.

Effects of the Proposed Action on Blunt-nosed Leopard Lizard

Development of the solar arrays and associated infrastructure would result in the temporary and permanent disturbance of 2,506 acres. Construction of the panel arrays, project roads, and telecommunication and powerline infrastructure would result in a permanent loss of 1,794 acres of suitable and/or occupied blunt-nosed leopard lizard habitat. Another 712 acres of suitable and/or occupied blunt-nosed leopard lizard habitat would be temporarily lost. Unless blunt-nosed leopard lizards are able to persist under and around the solar arrays (1,629 acres), the entire 1,794 acres would be lost for movement, dispersal, foraging, and population expansion.

Survey efforts, both at protocol and non-protocol levels, conducted in the solar array portion of the project area have identified blunt-nosed leopard lizard occupation of the site to be concentrated in Las Aguilas and Panoche Creek and along Yturiate Road, and they have been observed in the Valley Floor Conservation Lands (PVS 2014). Areas disturbed by the proposed power line and telecommunication improvements could also provide suitable habitat for blunt-nosed leopard lizards. Protocol surveys have not been completed for the power line and telecommunication improvement portions of the proposed project. The proposed project has been designed to avoid the locations where blunt-nosed leopard lizards have been observed and avoidance measures include establishing a 52.4-acre buffer centered on the single observation of a blunt-nosed leopard lizard in the project footprint. All of these avoided areas are included in the Valley Floor Conservation Lands. The Applicant proposes to conduct a preconstruction survey immediately prior to construction, and conduct monitoring of construction activities in areas potentially occupied by blunt-nosed leopard lizards to avoid effects to the species (PVS 2014). Exclusion fencing installed at the discretion of the designated biologist during construction would prevent those individuals observed from entering the project area. In areas where exclusion fencing is not installed, individual blunt-nosed leopard lizards could enter the project area and would be subject to the effects of project construction described below.

Although survey efforts have identified where blunt-nosed leopard lizards have occurred, we assume that not all individuals may have been observed even at protocol levels due to their cryptic coloration and their fossorial nature (CDFW 2004). Adult blunt-nosed leopard lizards may remain in underground burrows for over 21 months during periods were prey may be low in abundance due to drought conditions (Germano et. al 1994), and California is currently in the fourth consecutive year of drought conditions (Griffin and Anchukaitis 2014). These prolonged drought conditions increase the likelihood that blunt-nosed leopard lizards may be in underground burrows and were therefore not detected during survey efforts. Blunt-nosed leopard lizards also move throughout the landscape and have been recorded moving distances as far as 1,509 feet and may have moved through the landscape and into the project area since the last observation (Tollestrup 1983). The preconstruction surveys may not occur when environmental conditions are suitable for blunt-nosed leopard lizards to be active above ground. We expect some blunt-nosed leopard lizards will remain within the project footprint regardless of the proposed survey effort and would be subject to the effects described below.

Effects of Project Construction

Solar arrays would be installed in areas that are characteristic of optimal blunt-nosed leopard lizard habitat: open, sparse vegetation, low relief, with a slope less than 11 percent. The area underneath and within shading distance of the array structures may be altered due to changes in vegetation structure and environmental conditions to such an extent that blunt-nosed leopard lizard abundance or use of the area is reduced. This would constitute a loss of suitable habitat for foraging, shelter, and breeding.

Employing underqualified designated monitors could result in adverse effects to blunt-nosed leopard lizards. If designated monitors do not have adequate training to detect blunt-nosed leopard lizards, presence of the species in the area may not be recognized. Any blunt-nosed leopard lizards not correctly identified would be subject to the effects described below. Service review and approval of the designated biologists would ensure that the monitors are appropriately qualified.

Blunt-nosed leopard lizards not detected during surveys or those that have moved into the project area since past survey observations would be subject to injury, mortality, or other adverse effects. Blunt-nosed leopard lizards could be killed or injured by vehicle traffic, heavy equipment, excavation, trenching, and grading during construction activities. The roads created as part of the proposed project could provide suitable basking areas and an open, flat area for foraging for blunt-nosed leopard lizards and cause individuals to move into the construction area and the proposed project. Blunt-nosed leopard lizards that move to project roads would be subject to mortality and injury caused by vehicles during construction. Blunt-nosed leopard lizards are more susceptible to vehicular strikes in cool weather, when they are less active because of low body temperature. Blunt-nosed leopard lizards that remain in the project area and in burrows would be subject to mortality as a result by entombment in burrows that collapse during construction activity.

Large-scale renewable solar energy projects can impact blunt-nosed leopard lizard habitat by altering landscape topography, vegetation, and drainage patterns. They also can reduce habitat quality through interception of solar energy that would normally reach the ground surface, thereby affecting ambient air temperatures through habitat shading and altering soil moisture regimes (Smith 1984; Smith et al.1987). The proposed project footprint, 1,629 acres of solar arrays, is a large contiguous block of disturbance in undeveloped habitat with unimpeded solar energy reaching the ground. We conclude that the area under the panel arrays would likely be unsuitable for blunt-nosed leopard lizards for the life of the project due to the decrease in solar radiation at the ground and expected change in vegetative structure and density that could reduce the ability of blunt-nosed leopard lizards to move through the area.

Ground disturbance caused by construction activities would disturb suitable and potentially occupied blunt-nosed leopard lizard habitat. Installation of solar panels mounted on metal frames anchored with a low impact pile driver within areas of burrow refugia could result in mortality or injury through direct contact or as a result of burrows being crushed by vehicles or equipment or subject to vibrational collapse. The Applicant has proposed conducting surveys for the species and avoiding areas around observations, which we conclude would reduce but not eliminate this risk and we expect that some injury or mortality of blunt-nosed leopard lizards may still occur.

The proposed stream crossings would occur across Las Aguilas, which has concentrations of blunted-nosed leopard lizard sightings. Because of the relatively high concentrations of blunt-nosed leopard lizards in these areas, construction of stream crossings have the highest likelihood of causing injury to mortality of individuals. All ground disturbing activities would cause loss of suitable habitat, while direct injury or mortality could be caused by vehicle traffic, heavy equipment of machinery, construction worker foot traffic, and leaks or spills from vehicles or equipment. Noise or vibration from construction activities could cause blunt-nosed leopard lizards to disperse from the area, increasing their risk of predation or competition.

Installation of buried power and communication cables in suitable habitat could directly affect blunt-nosed leopard lizards by creating impassable barriers between burrows and foraging areas. Additionally, blunt-nosed leopard lizards could fall into deep, steep-walled trenches and not be able to escape, where they would be vulnerable to predation, starvation, or entombment. Installing escape ramps in temporary trenches and pits, as proposed by the Applicant, will reduce the risk of injury or mortality to blunt-nosed leopard lizards.

Blunt-nosed leopard lizards may be displaced from work sites and adjacent occupied habitat by human activity and noise associated with construction activities. Displaced individuals could be subject to increased predation and increased inter- and intra-specific competition resulting in decreased fitness and potentially reducing the carrying capacity of surrounding habitat.

Blunt-nosed leopard lizards could be killed or injured due to predation by species such as red fox, coyote, or domestic dogs that are attracted to the area by trash discarded by personnel during construction. The Applicant’s plan to regularly remove trash from the project area would eliminate the attractant for other wildlife and reduce the potential for predation on blunt-nosed leopard lizards during construction.

Spillage or leakage of industrial chemicals, fuels, and lubricants could result in fouling or poisoning of blunt-nosed leopard lizards and contamination of their habitat. The Applicant’s spill prevention and response plan would minimize or eliminate the risk of poisoning or contaminating the habitat of blunt-nosed leopard lizards.

<u>Effects of Operations and Maintenance</u>

Maintenance or repair of buried power and communication cables in suitable habitat could directly affect blunt-nosed leopard lizards by creating impassable barriers between burrows and foraging areas. Additionally, blunt-nosed leopard lizards could fall into deep, steep-walled trenches and not be able to escape, where they would be vulnerable to predation, starvation, or entombment. Installing escape ramps in temporary trenches and pits, as proposed by the Applicant, would reduce the risk of injury or mortality to blunt-nosed leopard lizards.

Vehicles for maintenance, day time security patrols, and panel washing could injure or kill blunt-nosed leopard lizards that may re-inhabit the panel arrays or use the project roads for foraging and basking.

Structures associated with the proposed project, such as the panel arrays and fencing, could provide perches for avian predators that could increase predation rates of blunt-nosed leopard lizards in the project area. Blunt-nosed leopard lizards may avoid areas adjacent to project structures, such as the panel arrays and perimeter fence. Terrestrial species have been known to avoid areas with increased vertical structures that may serve as perches for predators (Schuster et al. 2015).

Effects of Conservation Lands

The conservation measures, including habitat preservation and management, would protect suitable habitat for blunt-nosed leopard lizards. The Valley Floor Conservation Lands are currently occupied habitat. Blunt-nosed leopard lizards have been observed on the Silver Creek Ranch Conservation Lands but the extent of the species use of the area is unknown. Current land use in the conservation lands is compatible with blunt-nosed leopard lizard persistence. The proposed management actions and enhancements will benefit the blunt-nosed leopard lizard by providing protection from incompatible future land uses and maintaining an optimal grazing regime for the species. Despite the conservation of existing habitat, the project would still result in a net loss of suitable and occupied habitat for the blunt-nosed leopard lizard. The ultimate effect of conservation of the lands as proposed areas as proposed by the Applicant would be permanent preservation of suitable habitat.

Effects on Recovery

Although the majority of blunt-nosed leopard lizards have been observed in Las Aguilas and Panoche Creeks (both of which transverse the action area and have been included in the Valley Floor Conservation Lands), the entire project site supports suitable habitat for the species. If the habitat under and around the panel arrays changes and becomes unsuitable for blunt-nosed leopard lizards, the species would permanently lose approximately 1,794 acres of suitable habitat. The paths for dispersal would also be limited to Las Aguilas and Panoche Creeks and the other Valley Floor Conservation Lands. The population of the Valley Floor Conservation Lands could be at risk of inbreeding depression and local extinction if the area was to become isolated from other populations. The Valley Floor Conservation Lands provide a corridor which is contiguous with and therefore provides a connection between the other conserved lands to the north and south. This design component of the conservation lands minimizes the risk of population isolation by allowing for movement, dispersal, and genetic flow. While implementation of the proposed project would result in some reduction of suitable habitat in the Panoche Valley, that reduction would be offset through the permanent protection and management of the currently known occupied habitat in the Valley Floor Conservation Lands and approximately 10,000 acres of suitable habitat on the Valadeao and Silver Creek Ranch Conservation Lands, consistent with the recovery goals for this species. We conclude that although effects to individual blunt-nosed leopard lizards would occur and suitable habitat would be lost, the proposed project would not impede the recovery of the species.

The Panoche Valley population of blunt-nosed leopard lizards has unique genetics that indicate relative isolation from other remaining populations of the species (Grimes et al. 2014). The unique genetic composition of the species in the area is important to maintain for recovery of the species. Reduction, fragmentation, or isolation of the local population could remove the individuals of the Panoche Valley population from reproducing and exchanging genes that would increase the chances of survival from disease or other environmental factors from an increase in genetic diversity. However, the preservation and management of the conservations lands is expected to effectively reduce or eliminate the risk of fragmentation and isolation of the local population of the blunt-nosed leopard lizards.

The potential effects of climate change on blunt-nosed leopard lizards are difficult to assess. We have attempted to make inferences through comparisons to the conditions expected to occur to the rangewide population and in particular the subpopulations in the San Joaquin Valley (B. Sinervo, pers. comm.). The Panoche Valley currently has lower average temperatures than the San Joaquin Valley. The average projected increase in temperature due to climate change is expected to maintain suitable temperatures within the Panoche Valley for blunt-nosed leopard lizards whereas the majority of the San Joaquin Valley may become too warm. This minor shift in temperature of the Panoche Valley would make it a refuge from climate change in the next century. Removal of suitable habitat in the area of a refuge from climate change could adversely affect recovery efforts by reducing the overall amount of habitat available for the species. However, the permanent impacts from implementation of the project would represent only a portion of the suitable habitat in the area for the species. The preservation and management of the conservation lands would provide suitable habitat in the Panoche Valley area for the species to inhabit and are expected to minimize the risk of impacts from climate change by providing habitat for blunt-nosed leopard lizards, in perpetuity.

Summary of Effects to Blunt-nosed Leopard Lizards

In determining whether a proposed action is likely to jeopardize the continued existence of a species, we consider the effects of the action with respect to the numbers, reproduction, and distribution of the species and the impacts on recovery. The Corps and the project proponent have proposed measures to avoid and minimize impacts to blunt-nosed leopard lizards during project activities.

Reproduction

The highest densities of blunt-nosed leopard lizards in the action area are located near Panoche and Las Aguilas Creeks, where effects to the habitat would be minimal due to the establishment of the Valley Floor Conservation Lands that include both creeks and adjacent lands. The Valley Floor Conservation Lands will provide foraging, movement, and dispersal habitat that would allow for intraspecies interaction and genetic flow in the local and regional populations. While we expect some blunt-nosed leopard lizards to be killed or injured during project activities (e.g., grading, installation of solar panels), the Applicant has proposed measures to minimize these effects, such as pre-activity surveys, avoidance of occupied areas, and covering open trenches. Assuming the loss of individuals translates into lower reproductive capacity, we expect that if any blunt-nosed leopard lizard are killed or injured, their contribution to the season's breeding effort would be lost; however, because we expect the Applicant's avoidance and minimization measures will reduce such losses, we further conclude that the effect on reproduction in the action area will be small and temporary. This small effect at the local level means that the proposed action would not reduce the reproduction of the species on a rangewide scale.

Numbers

As noted above, we expect that individual blunt-nosed leopard lizards would be killed or injured by the proposed activities; however, we have further determined that implementation of the proposed avoidance, minimization, and conservation measures will reduce the potential for such losses to occur. This means that the number of blunt-nosed leopard lizards may be slightly reduced at the project level, but rangewide, the effect would be negligible. We conclude that the proposed action would not reduce the number of blunt-nosed leopard lizards on a rangewide scale.

Distribution

The proposed project would remove suitable and occupied habitat for the species, and the local population is expected to shift out of and away from the panel arrays. The majority of the occupied areas with the highest densities of blunt-nosed leopard lizard would be avoided by the proposed project design. The project as proposed would result in some limitations on movement of blunt-nosed leopard lizards due to removal of habitat on the Panoche Valley floor, but the species will continue to occupy the habitat of the Valley Floor Conservation Lands, which include Panoche and Las Aguilas Creeks, to move and disperse throughout the area. Because most of the local distribution will remain intact, especially where densities of the blunt-nosed leopard lizard are highest, we conclude that the proposed project will not reduce the species' distribution on a rangewide scale.

Recovery

The proposed project would permanently remove suitable and potentially occupied habitat for the blunt-nosed leopard lizard in the Ciervo-Panoche Natural Area. The avoidance, minimization, and conservation measures are expected to reduce effects to the species in the area and minimize adverse effects to recovery efforts. The conservation lands are expected to provide suitable habitat for blunt-nosed leopard lizard occupation and movement through the area and allow for continued function of the Ciervo-Panoche Natural Area as important habitat for the blunt-nosed leopard lizard. We conclude that the proposed action would not impede the species' recovery.

Effects of the Proposed Action on California Tiger Salamanders

Development of the solar arrays and associated infrastructure, including project road, and telecommunication and powerline infrastructure, will result in the temporary and permanent disturbance of 2,506 acres. The project area contains at least one known breeding pond for California tiger salamanders. Approximately 1,500 acres of the project area are within dispersal distance of known California tiger salamander breeding ponds and contain numerous small mammal burrows that could provide suitable refugia. All known occupied ponds on the project site are included in the Valley Floor Conservation Lands and will not be directly affected by the proposed project construction. We are not aware of any scientific literature on the effects of solar arrays on California tiger salamanders. The potential for this species to re-inhabit the land under panel arrays after installation exists, but is unlikely as the project is not compatible with standing water where breeding could occur. Some California tiger salamanders may be present in the project area during dispersal events to or from breeding ponds.

The Applicant proposes to excavate burrows to capture and relocate California tiger salamanders in portions of the solar generation site that are in proximity (a minimum of 3,281 feet) to known breeding ponds as detailed in the California Tiger Salamander Pre-construction Avoidance and Minimization Plan. While capture and relocation of California tiger salamanders is expected to reduce the number of California salamanders that could be killed or injured by project construction activities, capture and relocation could result in the injury or death of individual California tiger salamanders. The Applicant proposes to reduce the risk of injury or death by using Service-approved biologists, by limiting the duration of handling, and requiring the proper transport of these species. Although survivorship for translocated California tiger salamanders has not been estimated, survivorship of translocated wildlife, in general, is reduced due to intraspecific competition, lack of familiarity with the location of potential breeding, feeding, and sheltering habitats, and increased risk of predation. However, California tiger salamanders tend to be relatively sedentary when aestivating in upland habitat. By relocating captured salamanders to suitable upland refugia, we expect the survivorship of these individuals to be relatively high.

Observations of diseased and parasite-infected amphibians are now frequently reported. Releasing amphibians following a period of captivity, during which time they can be exposed to infections, may cause an increased risk of mortality in wild populations. Amphibian pathogens and parasites can also be carried between habitats on the hands, footwear, or equipment of fieldworkers, which can spread them to localities containing species which have had little or no prior contact with such pathogens or parasites. Chytrid fungus is a water-borne fungus that can be spread through direct contact between aquatic animals and by a spore that can move short distances through the water. The fungus only attacks the parts of an animal’s skin that have keratin (thickened skin), such as the mouthparts of tadpoles and the tougher parts of adults’ skin, such as the toes. It can decimate amphibian populations, causing fungal dermatitis, which usually results in death in 1 to 2 weeks. Infected animals may spread the fungal spores to other ponds and streams before they die. Once a pond has become infected with chytrid fungus, the fungus stays in the water for an undetermined amount of time. Relocation of individuals captured from the project area could contribute to the spread of chytrid fungus. In addition, infected equipment or footwear could introduce chytrid fungus into areas where it did not previously occur. Using proper precautions, such as the Applicant’s commitment to using the Declining Amphibian Populations Task Force protocol to avoid spreading infection from location to location, constitute the best practices available to reduce or eliminate risk to the species.

Effects of Project Construction

Solar arrays would be installed in areas occupied by a large population of rodents and small mammals that provide suitable burrows for California tiger salamanders. The area underneath and within shading distance of the array structures may be altered due to changes in vegetation structure and environmental conditions to such an extent that rodent and small mammal abundance or use is reduced. This would constitute a loss of suitable refugia habitat for California tiger salamanders.

Employing underqualified monitors could result in adverse effects to California tiger salamanders. If designated monitors do not have adequate training to detect California tiger salamanders, presence of the species in the area may not be recognized. Any California tiger salamanders not correctly identified would be subject to the effects described below. Service review and approval of the designated biologists would ensure that the monitors are appropriately qualified.

California tiger salamanders that occur in or within dispersal distance of the project area could be adversely affected by project activities. Injury or mortality could occur when individuals are crushed by earth-moving equipment, debris, and worker foot traffic. Work activities, including resultant noise and vibration, could cause California tiger salamanders to leave or avoid suitable habitat. This disturbance and displacement may increase the potential for predation, desiccation, competition for food and shelter, or strike by vehicles on roadways. Individuals remaining in burrows may be killed or injured by the large machinery used to dig trenches; by project grading activities; or they may become trapped and die if the entrance to their upland sheltering habitat is crushed or covered.

During periods of rainfall (typically greater than 0.5 inch of rain in a 24-hour period), we expect a higher likelihood of California tiger salamanders dispersing above ground towards or away from breeding ponds in the project vicinity. Any amphibians moving through the project site would be at risk of injury or death caused by vehicles, equipment, or workers. Exclusion fencing, installed at the discretion of the designated biologist around areas of project construction and ground disturbance, would reduce the risk of adverse effects to California tiger salamanders. However, areas where exclusion fencing is not installed, would allow California tiger salamanders to move through the project site. These individuals would be subject to adverse effects from project construction.

Trash left during or after project activities could attract predators to work sites, which could, in turn, prey on California tiger salamanders. For example, raccoons (*Procyon lotor*) and feral cats (*Felis catus*) are attracted to trash and also prey opportunistically on California tiger salamanders. This potential impact would be reduced or avoided by careful control of waste products at all work sites, as proposed by the Applicant.

Uninformed workers could disturb, injure, or kill California tiger salamanders. The potential for this to occur would be reduced by educating workers on the presence and protected status of this species as proposed by the Applicant and the additional measures that will be implemented to protect California tiger salamanders during project activities by the designated biologist. The use of flagging and fencing around environmentally sensitive areas, as proposed by the Applicant, would also reduce these potential impacts by preventing workers from encroaching into adjacent habitat.

Spillage or leakage of industrial chemicals, fuels, and lubricants could result in fouling or poisoning of California tiger salamanders and contamination of their habitat. The Applicant's spill prevention and response plan would minimize or eliminate the risk of poisoning or contaminating the habitat of California tiger salamanders.

Effects of Operations and Maintenance

Vehicles for maintenance and panel washing could destroy or damage California tiger salamander habitat if the species re-inhabits the panel arrays. Vehicles driven through areas with burrows could crush burrows and disrupt movement paths. Vehicles could also crush individual California tiger salamanders or entomb individuals in burrows as a result of soil compaction.

California tiger salamanders could be killed or injured by being hit or run over by nighttime worker traffic or security patrols during operations and maintenance activities. This risk would be greatest during or after rainfall when individuals may be moving through the project area towards or away from breeding ponds. All nighttime traffic will be required to maintain a posted 10 mph speed limit on the project site, and will be required to remain on the existing roads except when emergency response requires vehicle access to off-road areas which will reduce the risk of vehicle strikes on California tiger salamanders. However, we anticipate that not all workers will observe the posted speed limit, which could somewhat limit the benefit of this measure.

Maintenance or repair of buried power and communication cables in suitable habitat could directly affect California tiger salamanders through direct mortality from ground disturbance, destroying occupied burrows, and creating impassable barriers between burrows and foraging areas. Additionally, California tiger salamanders could fall into deep, steep-walled trenches and not be able to escape, where they would be vulnerable to predation, starvation, or entombment. Installing escape ramps in temporary trenches and pits, as proposed by the Applicant, would reduce the risk of injury or mortality to California tiger salamanders.

Effects of Conservation Lands

The conservation measures including habitat preservation and management would protect suitable habitat for California tiger salamanders. The Valley Floor Conservation Lands and Valadeao Ranch Conservation Lands are currently occupied habitat. The Applicant proposes to create three additional breeding ponds on the Valadeao Conservation Lands. Current land use in the conservation lands is compatible with California tiger salamander persistence, and the proposed management actions and enhancements are expected to provide a benefit to the species. Management for the species, particularly breeding ponds, will benefit the species at a local, regional, and rangewide scale. While the project would result in a net loss of suitable habitat for the species, with the creation of additional breeding ponds, we expect the local population to increase or remain stable.

Effects on Recovery

We have not developed a recovery plan for the California tiger salamander to which we can refer to assess its recovery status. In the absence of a recovery plan, we default to standard conservation practices for this and most other amphibian species. Recovery goals would focus on the preservation of much of the remaining habitat that supports the species. In general terms, where suitable habitat exists, it should be conserved and where possible, additional habitat should be created or restored. Because of the preservation of existing habitat, creation of breeding habitat, and upland habitat enhancement activities included in Habitat Management Plan, project implementation should result in few, if any, long-term effects to the species or to its recovery.

Relocation of the individuals not tested for non-native genes could spread non-native alleles to other locations occupied by previously unaffected native populations. This would reduce the overall California tiger salamander survivorship through hybrid breeding. Although genetic analysis has not been performed for the local population of California tiger salamanders, the isolated nature of the Panoche Valley suggests that individuals have not been exposed to nonnative genes and hybridization. The loss of native genetics would adversely affect recovery of the California tiger salamander, but we expect the potential for such effects to be low because we expect the few individuals will be lost and prevented from reproduction. The creation of additional breeding ponds is expected to increase the local population and preserve the current genetic structure.

In addition to avoiding known breeding ponds and incorporating them into the conservation lands, the Applicant will create additional breeding ponds. Also, individual California tiger salamanders located in upland refugia will be captured and relocated. We believe that only a few, if any, individuals will be lost due to project activities. The effects to recovery of local, regional and rangewide populations of California tiger salamanders are expected to be negligible.

Summary of Effects to California Tiger Salamanders

In determining whether a proposed action is likely to jeopardize the continued existence of a species, we consider the effects of the action with respect to the numbers, reproduction, and distribution of the species and the impacts on recovery. The Corps and the Applicant have proposed measures to avoid and minimize impacts to California tiger salamanders during project activities, identified in the Description of the Proposed Action section of this document, such that we anticipate that few, if any, California tiger salamanders are likely to be killed or injured during the project construction or operation and maintenance.

In summary, the proposed action could adversely affect California tiger salamanders due to the loss of dispersal and aestivation habitat; however, the Corps and the project proponent have proposed avoidance and minimization measures to reduce these impacts, including capture and relocating individuals from the project area and creation of additional breeding ponds. Based on these measures, we anticipate that the impacts to California tiger salamanders will be low during project implementation.

Reproduction

We have determined that implementation of the proposed project would not reduce the ability of the California tiger salamander to continue to successfully breed within the action area. This conclusion is based on the Applicant's proposal to avoid direct impacts to the breeding ponds located in the project area and the proposed creation of breeding ponds in adjacent conservation lands. Some individual California tiger salamanders may be killed or injured during dispersal or while aestivating in burrows, and the loss of reproductive individuals may translate into lower reproductive capacity for the local population; however, we expect such numbers to be low due to measures the Applicant has proposed to protect individual California tiger salamanders, such as pre-activity surveys, capture/relocation efforts, and closing of open trenches. Therefore, we conclude that the likely minimal loss of individual California tiger salamander and the measures proposed to protect breeding by the species and adjacent upland habitat mean that the proposed action will not reduce the reproduction of the California tiger salamander rangewide.

Numbers

A few individual California tiger salamanders are expected to be lost during capture and relocation efforts; however, we have determined that implementation of the proposed project would not reduce the local or rangewide population of the California tiger salamander. We anticipate that a small number of individuals may occur between the proposed 1.2 mile dispersal survey distance and the 1.3 mile known dispersal distance used by the Service. These individuals would be subject to injury or mortality due to construction activities. The avoidance, minimization, and conservation measures would reduce the potential adverse effects to the California tiger salamander and minimize the number lost during project activities. Because the number of individuals that would be killed or injured is likely to be low at the project site, we conclude that any loss of individual California tiger salamanders would be negligible at the rangewide scale.

Distribution

Although implementation of the proposed project would remove suitable and likely occupied upland habitat for the species, we have determined that it will not appreciably affect the distribution of the species at the local, regional or rangewide levels. The California tiger salamander occupies a relatively large geographic ranges outside the action area. The Central California DPS of the California tiger salamander occupies portions of the San Joaquin Valley and coastal Counties in central California. The local population is expected to shift out of and away from the solar panel arrays and the creation of three additional breeding ponds will result in additional breeding habitat and likely a minor shift in the local distribution of the species. We expect these shifts in distribution to be minor at the local level, and we conclude that any change in distribution at the local level would not reduce the distribution of the species rangewide.

Recovery

The proposed project would permanently remove suitable dispersal and likely occupied upland habitat for the species. The avoidance, minimization, and conservation measures proposed by the Applicant, including capture and relocation and avoidance of known breeding ponds are expected to effectively reduce effects to the species in the area and should, in turn, minimize any effects on the species' recovery. In addition, the conservation lands provide suitable habitat for California tiger salamanders and the creation of breeding ponds will help recovery efforts by preserving known breeding habitat and creating new opportunities for reproduction. The creation of new habitat for the California tiger salamander is consistent with typical recovery goals for a species declining, in part, due to habitat loss. We conclude that the proposed action will not impede the recovery of the California tiger salamander.

Summary of Effects of the Conservation Lands

The entire Action Area is within the Ciervo-Panoche Natural Area (Service 1998). The Service listed the Ciervo-Panoche Natural Area as Priority Level 1 in the Recovery Plan (Service 1998). The Priority Level 1 designation means that action must be taken within the Ciervo-Panoche Natural Area to prevent extinction or to prevent a species from declining irreversibly in the foreseeable future. The Service outlined the steps to achieve this goal through protection of natural lands from development through acquisition of fee title or easements from willing sellers and ensuring that traditional rangeland uses continue while monitoring and protecting vulnerable plant and insect populations. The development of the solar power facility in the Ciervo-Panoche Natural Area does not further this goal. However, the inclusion in the proposed action of permanent protection and management of the conservation lands for the benefit of federally listed species in the area is consistent with the Priority Level 1 designation for the Ciervo-Panoche Natural Area. The conservation lands are currently managed for free range cattle grazing. This land use has provided near optimal habitat conditions for giant kangaroo rats, San Joaquin kit foxes, blunt-nosed leopard lizards, and California tiger salamanders. The enhancement proposed for the conservation lands is expected to maintain or minimally increase the numbers of giant kangaroo rats, San Joaquin kit foxes, and blunt-nosed leopard lizards, and result in an increase in the number of California tiger salamanders through the creation of new breading habitat. The permanent protection from future development of these habitat lands and specific management of the lands for these species will further recovery efforts.

The conservation lands provide a mix in habitat quality for the species included in this consultation. The Valley Floor Conservation Lands area (2,514 acres) is occupied and used by giant kangaroo rats, San Joaquin kit foxes, blunt-nosed leopard lizards, and California tiger salamanders. This land is interspersed with the proposed project footprint and will be protected from development. The Valley Floor Conservation Lands also provide project footprint permeability and a corridor for movement from the conservation lands to the south and north. This corridor is designed to allow individuals of the species and their ecological associates to move and disperse throughout the Ciervo-Panoche Natural Area and maintain the function of the core area.

The Valadeao Ranch Conservation Lands (10,772 acres) are sparsely occupied by giant kangaroo rats and blunt-nosed leopard lizards. San Joaquin kit foxes were found to use the area of the Valadeao Ranch Conservation Lands known as Little Panoche Valley (PVS 2014). Approximately 2,945 acres of Valadeao Ranch Conservation Lands are between 0 and 11 percent slope which is considered optimal habitat for those three species. The 2,945 acres is an overestimate of the actual habitat available for the species because this calculation is based entirely on slope and did not account for small or isolated areas of slope surrounded by steep slopes.

The Silver Creek Ranch Conservation Lands (10,890 acres) are occupied by giant kangaroo rats, San Joaquin kit foxes, and blunt-nosed leopard lizards. Approximately 5,765 acres of Silver Creek Ranch Conservation Lands are between 0 and 11 percent slope which is considered optimal habitat for those three species. The 5,765 acres is an over estimate of the actual habitat available for the species because this calculation is based entirely on slope and did not account for small or isolated areas of slope surrounded by steep slopes. The Silver Creek Ranch is specifically identified in the Recovery Plan for Upland Species of the San Joaquin Valley (Service 1998) as an area with high habitat value for the special status species. The recovery plan, in reference to giant kangaroo rats, also has a goal to "protect all existing natural land on the Silver Creek Ranch …" (Service 1998). In reference to the blunt-nosed leopard lizard, the Recovery Plan aims to "protect additional habitat for them in key portions of their range; areas of highest priority to target for protection are … Natural lands in the Panoche Valley area of Silver Creek Ranch, San Benito County" (Service 1998). By preserving the Silver Creek Conservation Lands, the proposed action would preserve a "highest priority" area identified in the recovery Plan for these listed species that is currently unprotected.

The value of the conservation lands could be reduced if subsurface mineral rights are exercised. Based on a minerals estate map, approximately 34 percent of the conservation lands have Federal subsurface mineral rights. The remaining 66 percent is a mix of the surface owner (who would be the project proponent) and other private individuals. If the mineral rights are exercised, the associated impacts to the surface and occupied or suitable habitat would be affected. This potential is an unknown and based on the typical BLM practice of a 10 percent surface disturbance, this would reduce the potential surface impacts from mineral extraction to 5 percent of the total area. If those mineral extraction projects were to proceed, they would be subject to consultation with the Service for effects to listed species.

Despite the potential for mineral rights being exercised, we conclude that the conservation lands and their permanent protection and management will provide a benefit to the recovery of listed species.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. We do not consider future Federal actions that are unrelated to the proposed action in this section because they require separate consultation pursuant to section 7 of the Act. We are unaware of any non-Federal actions that are reasonably certain to occur in the action area that would adversely affect the giant kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard, and California tiger salamander. The area has been and continues to be used primarily for free-range ranching activities, which are part of the environmental baseline. The area is located in a relatively remote part of California with limited water availability rendering future development unlikely.

CONCLUSIONS

The regulatory definition of “to jeopardize the continued existence of the species” focuses on assessing the effects of the proposed action on the reproduction, numbers, and distribution of the species, and their effects on the survival and recovery of the species. For that reason, we have focused our analysis of the effects of the proposed action on the reproduction, numbers, and distribution of the giant kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard, and California tiger salamander to assess the overall effect of the proposed action on the species. We also consider the effect of the action on the recovery of the species.

Giant Kangaroo Rat

Reproduction

In addition to avoiding areas known to have concentrations of giant kangaroo rats, surveys would be conducted prior to the initiation of construction activities, all giant kangaroo rats found within construction areas would be captured and relocated outside of areas of ground disturbance, and exclusion fencing would erected to prevent re-occupancy of the areas during construction. If capture and relocation activities occur during mating season, those individual giant kangaroo rats captured and relocated to burrows with inclusion fencing (to prevent immediate dispersal) would be removed from reproduction for the year. If any lactating females are captured during relocation efforts, the female would be returned to the burrow until the young have matured to be on their own. Burrows with young present would not be excavated. Capture and relocation efforts are generally effective but can result in temporary effects to reproduction of the local population from the disruption of normal behavioral patterns that may result in lower reproduction rates. We do not expect implementation of the proposed project to affect overall reproduction of the giant kangaroo rat in the action area because the individuals that may be captured and relocated only represent a portion of the individuals in the local population and a smaller portion of the regional and rangewide populations. We expect any disruption of reproduction to be recovered during the next breeding cycle. At the species level, the minor, temporary effect to the local reproduction of the giant kangaroo rat likely to result from the proposed action would not appreciably affect rangewide reproduction.

Numbers

Any reduction in the population of giant kangaroo rats as a result of the proposed action is expected to be minimal, and any individuals lost would likely be replaced during the next normal breeding cycle so that such losses would be temporary. The capture and relocation efforts, and other minimization and avoidance measures, are expected to effectively reduce the potential loss of individuals that would otherwise be killed or injured by construction activities and vehicles. Mortality of a few individuals is expected as a result of capture and relocation efforts. We estimate this at 2 percent of the estimated total captures (521) or 11 individuals. The relocated individuals would be provided with a food source that would not only increase the likelihood that they will remain in the new burrow, but also increase the likelihood that they will survive and reproduce during the next breeding cycle. The potential loss of individual giant kangaroo rats would be minor to the local metapopulation, regional metapopulations, and to the rangewide status of the species. We conclude that while some individual giant kangaroo rats may be killed or injured, the numbers rangewide will not be appreciably reduced; the anticipated losses are minimal and likely to only have a temporary effect.

Distribution

The local distribution of the species would be altered due to the removal of occupied habitat and suitable habitat for local range expansion. Also, relocated individuals would change the distribution if relocated to an area not currently occupied or increase the density of the area if relocated to an inactive burrow system in an occupied area. However, while distribution of the local population would be altered, local distribution would not be significantly reduced, and linkages between the local and rangewide metapopulations are expected to be maintained through the establishment of the Valley Floor Conservation Lands. We conclude that despite local changes to the species' occurrences, the proposed action would not appreciably reduce the rangewide distribution of the giant kangaroo rat.

Recovery

The removal of occupied and suitable habitat would reduce the overall area of potential population and meta-population expansion in the Ciervo-Panoche Natural Area. It could also reduce protection against stochastic events that require large areas to allow the species to redistribute across the landscape during or after an event. The capture and relocation of giant kangaroo rats could alter the genetic structure of the metapopulations in the Ciervo-Panoche Natural area through introduction of individuals to areas of different genetic diversity. To offset these impacts, the proposed project includes conservation of the Silver Creek Conservation Lands to provide permanent protection and management of a large area identified in the Recovery Plan as important for recovery of the species (Service 1998) and establishment of the Valley Floor Conservation Land to permanently protect linkages between the local and rangewide metapopulations of giant kangaroo rat. Although some occupied and suitable habitat would be removed and mortality of a few individuals is expected, we conclude that implementation of the proposed project is expected to have a minimal effect on recovery of the species due to preservation of occupied habitat in the conservation lands and minimizing mortality of individuals through the capture and relocation efforts.

<u>Conclusion for Giant Kangaroo Rat</u>

After reviewing the current status of the giant kangaroo rat, the environmental baseline for the action area, the effects of the proposed Panoche Valley Solar Farm and the cumulative effects, it is the Service's biological opinion that the Panoche Valley Solar Farm, as proposed, is not likely to jeopardize the continued existence of the giant kangaroo rat. Because we do not anticipate an appreciable decline in giant kangaroo rats within the action area, the proposed action will not appreciably reduce the likelihood of the species' survival and recovery in the wild. The effects on reproduction and numbers of individuals are expected to be minimal and offset during subsequent breeding cycles, the metapopulation distribution would shift but the rangewide distribution would only be slightly altered, and the effects on recovery are expected to be minimal due to the preservation and management of important habitat specifically for the species consistent with recovery efforts.

San Joaquin kit fox

Reproduction

To minimize the project's effects on the reproduction of San Joaquin kit fox, the Applicant proposes to survey for and avoid natal dens in the project footprint. These actions should effectively reduce any project related impacts to the species; consequently, we expect the local effect of the proposed project on reproduction of the San Joaquin kit fox to be minimal. Because the effects of the proposed project on the species' reproduction are expected to be minimal at the local level, we conclude that the proposed project will not appreciably reduce the San Joaquin kit fox's ability to reproduce rangewide.

Numbers

The Applicant proposes numerous measures to avoid injuring or killing individual San Joaquin kit foxes, including pre-construction surveys, avoidance of active dens, and exclusionary measures to prevent direct injury. Some injury or mortality may still occur, especially due to vehicle strikes; however, due to the low number of San Joaquin kit foxes in the project area and the measures proposed to avoid and minimize effects, we expect that few San Joaquin kit foxes would be killed or injured. Therefore, we have determined that implementation of the proposed project is not expected to appreciably reduce local population of the San Joaquin kit fox. Because the effect on the number of San Joaquin kit foxes at the local level would be minor, we conclude that the proposed action will not appreciably reduce the number of San Joaquin kit foxes rangewide.

Distribution

The local population of the San Joaquin kit fox is expected to shift out of and away from the panel arrays. This would eliminate a portion of habitat in the middle of the Panoche Valley; however, conservation of land to the north and south and the connecting habitat corridor would minimize the effects of the loss that habitat. The project as proposed would result in some limitations on movement of San Joaquin kit fox but is not expected to impede north and south movements as the habitat corridor would remain through the project. Therefore, although implementation of the proposed project would remove some occupied and suitable habitat for the species, we conclude that it will not appreciably reduce the distribution of the species at the local or rangewide level.

Recovery

The proposed project would permanently remove some occupied, optimal habitat in the Ciervo-Panoche Natural Area. The project could disrupt normal life history patterns of some individuals in one of the three core populations for San Joaquin kit fox (Service 1998). The avoidance, minimization, and conservation measures incorporated into the proposed project are expected to reduce effects to the species in the area and minimize any adverse effects to recovery efforts. The conservation measures would result in protection and management of important San Joaquin kit fox habitat. The project design incorporates a habitat corridor that allows for more site permeability from north to south and allows for movement between conserved lands. The corridor will provide a path of suitable habitat for San Joaquin kit fox occupation and movement through the area and allow for continued functionality of the Ciervo-Panoche Natural Area. Based in part on information from similar solar power projects in the Carrizo Plains, the Service concludes that San Joaquin kit foxes can persist, in some capacity, in and around solar arrays. With the protection of lands to the north and south of the project site and the habitat corridor to through the project footprint, the function of the Ciervo-Panoche Natural Area will be maintained as an important recovery area for San Joaquin kit fox and the proposed project will not impede recovery of the species rangewide.

Conclusion for San Joaquin Kit Fox

After reviewing the current status of the San Joaquin kit fox, the environmental baseline for the action area, the effects of the proposed Panoche Valley Solar Farm and the cumulative effects, it is the Service's biological opinion that the Panoche Valley Solar Farm, as proposed, is not likely to jeopardize the continued existence of the San Joaquin kit fox. Because we do not anticipate an appreciable decline in San Joaquin kit foxes within the action area, we also do not believe that the proposed action will appreciably reduce the likelihood of the species' survival and recovery in the wild. The action area represents a small percentage of the known population so that the minor effects we expect due to the proposed action are not likely to appreciably reduce the numbers, reproduction, or distribution of the species or impede its rangewide recovery.

Blunt-nosed leopard lizard

Reproduction

The highest densities of blunt-nosed leopard lizards in the action area are located near Panoche and Las Aguilas Creeks, where effects to the habitat would be minimal because the areas are avoided and will be preserved as undisturbed, contiguous habitat. While we expect some blunt-nosed leopard lizards to be killed or injured during project activities (e.g., grading, installation of solar panels), the Applicant has proposed measures to minimize these effects, such a pre-activity surveys, avoidance of occupied areas, and covering open trenches. Assuming the loss of some individuals translates into lower reproductive capacity, we expect that if any blunt-nosed leopard lizard are killed or injured, their contribution to the season's breeding effort would be lost; however, because we expect the Applicant's avoidance and minimization measures will minimize such losses, we further conclude that the effect on reproduction in the action area will be small. The small effect on reproduction at the local level would not appreciably reduce the reproduction of the species rangewide.

Numbers

As noted above, we expect that individual blunt-nosed leopard lizards would be killed or injured by the proposed activities; however, implementation of the proposed avoidance, minimization, and conservation measures will minimize any such losses. While the number of blunt-nosed leopard lizards may be slightly reduced at the local level, rangewide the effect would be negligible. We conclude that the proposed action would not appreciably reduce the numbers of blunt-nosed leopard lizards rangewide.

Distribution

The proposed project would remove some suitable and potentially occupied habitat for the species, and the local population is expected to shift out of and away from the panel arrays; however, the majority of the occupied areas with the highest densities of blunt-nosed leopard lizard would be avoided by the proposed project design. The project as proposed would result in some limitations on movement of blunt-nosed leopard lizards due to removal of habitat within the project footprint on the Panoche Valley floor, but the species will continue to occupy and disperse through the habitat of the Valley Floor Conservation Lands. Because most of the local distribution will remain intact, especially where densities of the blunt-nosed leopard lizard are highest, we conclude that the proposed project will not appreciably reduce the species' distribution rangewide.

Recovery

The proposed project would permanently remove some suitable and potentially occupied habitat for the blunt-nosed leopard lizard in the Ciervo-Panoche Natural Area. The avoidance, minimization, and conservation measures incorporated into the proposed project are expected to reduce effects to the species in the action area and minimize any adverse effects to recovery efforts. The conservation lands will provide suitable habitat for blunt-nosed leopard lizard occupation and movement through the area and allow for continued functionality of the Ciervo-Panoche Natural Area as important habitat for the blunt-nosed leopard lizard. We conclude that the proposed action would not impede the rangewide recovery of the blunt-nosed leopard lizard.

Conclusion for the Blunt-nosed Leopard Lizard

After reviewing the current status of the blunt-nosed leopard lizard, the environmental baseline for the action area, the effects of the proposed Panoche Valley Solar Farm and the cumulative effects, it is the Service's biological opinion that the Panoche Valley Solar Farm, as proposed, is not likely to jeopardize the continued existence of the blunt-nosed leopard lizard. Because the effects on reproduction, numbers and distribution of individuals at the local level are expected to be minimal, the rangewide reproduction, numbers and distribution will not be appreciably altered, and the effects to recovery are expected to be minimal due to preservation and management of lands specifically for conservation of the species. The effects to blunt-nosed leopard lizards at the local level will be minor and the project will not appreciably diminish the likelihood of the blunt-nosed leopard lizard's survival and recovery rangewide.

California tiger salamander

Reproduction

We have determined that implementation of the proposed project would not reduce the ability of the California tiger salamander to continue to successfully breed within the action area. This conclusion is based on the Applicant's proposal to avoid direct impacts to the existing breeding ponds located in the project area and the proposed creation of three new breeding ponds in adjacent conservation lands. Some individual California tiger salamanders may be killed or injured during dispersal or while aestivating in burrows, and the loss of reproductive individuals may translate into lower reproductive capacity for the local population; however, we expect such numbers to be low due to measures the Applicant has proposed to protect individual California tiger salamanders, such as pre-activity surveys, capture/relocation efforts, and closing of open trenches. The proposed project will likely result in minimal loss of individual California tiger salamanders and will benefit reproduction of this species through the inclusion of measures to enhance and protect breeding by the species. Therefore, we conclude that the proposed project will not appreciably reduce the reproduction of the California tiger salamander rangewide.

Numbers

A few individual California tiger salamanders are expected to be lost during capture and relocation efforts. However, the numerous avoidance, minimization, and conservation measures incorporated into the project will minimize the number lost as a result of capture and relocation efforts and other project activities. The creation of three breeding ponds on the conservation lands would likely increase the number of individuals in the action area. The minor loss of individuals expected to occur under the proposed project would not appreciably reduce the local or rangewide population of the California tiger salamander.

Distribution

Although implementation of the proposed project would remove some suitable and likely occupied upland habitat for the species, this habitat loss will not appreciably affect the distribution of the species at the local level. The creation of three breeding ponds will result in a net increase in breeding habitat for the species at the local level. The local population is expected to shift out of and away from the solar panel arrays and the creation of additional breeding ponds would likely create a minor shift in the local distribution of the species. We expect these shifts in distribution to be minor at the project level, and we conclude that any change in distribution at the local level would not appreciably reduce the distribution of the species rangewide.

Recovery

The proposed project would permanently remove some suitable and likely occupied upland habitat for the species. The avoidance, minimization, and conservation measures built into the project are expected to reduce effects to the species in the area and minimize any adverse effects to recovery efforts. The conservation lands are expected to provide suitable habitat for California tiger salamanders and the creation of breeding ponds will assist with recovery efforts.

The creation of new habitat for the California tiger salamander is consistent with recovery goals and objectives for a species declining, in part, due to habitat loss. We conclude that the proposed action will not impede the California tiger salamander's recovery.

Conclusion for the California Tiger Salamander

After reviewing the current status of the California tiger salamander, the environmental baseline for the action area, the effects of the proposed Panoche Valley Solar Farm and the cumulative effects, it is the Service's biological opinion that the Panoche Valley Solar Farm, as proposed, is not likely to jeopardize the continued existence of the California tiger salamander. We have concluded that the effects of the project on reproduction, number and distribution of the species would be minimal and not appreciable rangewide. The proposed project will not impede recovery of the species but will assist recovery through the preservation and management of suitable habitat for the species and the creation of new breeding habitat.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened wildlife species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the Agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Corps or made binding conditions of any grant or permit issued to the Applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to monitor and regulate the activity covered by these Incidental Take Statements and the Corps and the Applicant have a continuing duty to comply with the Reasonable and Prudent Measures and implementing Terms and Conditions set forth below. The Corps has stated that it lacks authority to regulate any of the Applicant's activities beyond the construction, operations, and maintenance phases of the proposed project. Therefore the take exempted under section 7(o) of the Act through these Incidental Take Statements is limited to take resulting from construction, operations, and maintenance of the proposed solar facility. No take is exempted for the decommissioning or repowering of the project. The protective coverage of section 7(o)(2) may lapse if: (1) the Corps fails to require the Applicant to adhere to the Terms and Conditions of the Incidental Take Statement through enforceable terms that are added their permit, (2) the Corps fails to retain oversight to ensure compliance with the Terms and Conditions of the Incidental Take Statement, or (3) the Corps or the Applicant fails to adhere to the Terms and Conditions of the Incidental Take Statement. To monitor the impact of incidental take, the Corps or Applicant must report the progress of the action and its impact on the species to the Service as specified in the Incidental Take Statement [50 CFR 402.14(i)(3)].

In June 2015, the Service finalized new regulations implementing the incidental take provisions of section 7(a)(2) of the Act. The new regulations allow for Incidental Take Statements to rely on the use of "surrogates" for estimating the amount of take that is reasonably certain to occur as a result of the proposed action in certain circumstances. To use a surrogate to estimate take, the following criteria must be met: (1) the Incidental Take Statement must describe the causal link between the surrogate and the take of the listed species; (2) the Incidental Take Statement must explain why it is not practical to express the amount or extent of anticipated take or to monitor take-related impacts in terms of individuals of the listed species; and (3) the Incidental Take Statement must set a clear standard for determining when the level of anticipated take of the listed species has been exceeded.

The new regulations also clarify the standard regarding when the Service formulates an Incidental Take Statement [50 CFR 402.14(g)(7)], from "…if such take may occur" to "…if such take is reasonably certain to occur." This is not a new standard, but merely a clarification and codification of the applicable standard that the Service has been using and is consistent with case law. The standard does not require a guarantee that take will result; only that the Service establishes a rational basis for a finding of take. The Service continues to rely on the best available scientific and commercial data, as well as professional judgment, in reaching these determinations and resolving uncertainties or information gaps.

We believe construction of the proposed project is relatively discrete from operations and maintenance of the facility. Therefore, we have treated these as two distinct phases when developing our Incidental Take Statement. We provide an estimate of our anticipated level of incidental take for 1) construction and 2) operations and maintenance.

Incidental Take Statement for Construction

<u>Giant kangaroo rat</u>

We anticipate that some giant kangaroo rats could be taken in the form of harm caused by habitat loss. Incidental take of giant kangaroo rats can be difficult to detect for the following reasons: the species' relatively small body size, the fact that they spend much of their time in underground burrows, they are nocturnal, and they can be quickly consumed by scavengers. These factors make an accurate population size estimate difficult and it is likely that most individual mortality would go undetected. In addition, mortality as a result of a loss or reduction in habitat suitability due to modification from the project may be masked by typical ecological fluctuations in population size. For this reason, the Service is quantifying incidental take as the number of acres of suitable habitat that would be temporarily or permanently impacted by the proposed project and the individuals that likely occupy that habitat. On that basis, the following level of take is anticipated: approximately 1,794 acres of suitable giant kangaroo rat habitat, currently or recently occupied or that could become occupied within the life of the project, would be permanently impacted by the construction of the action. An additional 712 acres of suitable giant kangaroo rat habitat would be temporarily disturbed by construction activities and would be revegetated following construction. The Service estimates that all giant kangaroo rats inhabiting this approximately 2,506 acres would be subject to take in the form of harm as a result of this action. If the area of disturbance exceeds 2,506 acres, the Corps must reinitiate consultation. Project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions.

While the benefits of relocation (i.e., minimizing mortality) outweigh the risk of capture, we provide a limit for take by capture, which when reached, would trigger reinitiation of consultation because high rates of capture may indicate that some important information about the species in the action area was not apparent (e.g., it is much more abundant than thought) during the original consultation. Conversely, because capture and relocation can be highly variable, depending upon the species and the timing of the activity, we do not anticipate a number so low that reinitiation would be triggered before the effects of the activity are greater than analyzed in the Effects Analysis. We estimate that up to 521 individual giant kangaroo rats may be captured and relocated within the action area. We expect a small number of individuals to be killed as a result of their capture and relocation. Mortality from other sources, such as the indirect effects of translocation (e.g., unable to find food in a new location) or displacement from the action area, would be difficult to observe. A similar capture and relocation plan for the California Valley Solar Ranch experienced a mortality rate from capturing giant kangaroo rats of approximately 2 percent (J. Sloan, pers. comm.). So we estimate a similar mortality rate at 2 percent of total captures or 11 individuals. Therefore, we anticipate that up to 521 individual giant kangaroo rats would be taken by capture, and that up to 11 of those captured may die as a result of their handling. If more than 521 giant kangaroo rats are captured, or more than 11 die as a result of their handling, the Corps must reinitiate consultation. Project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions.

Incidental take of giant kangaroo rats due to vehicle strikes during project construction would be difficult to detect and quantify because of their small body size, use of underground burrows or dense cover when injured, or they may be quickly scavenged; therefore, finding a dead or injured specimen may be unlikely. The exact number of individuals killed or injured by vehicles is likely to be greater than observed; however, because we cannot predict with reasonable certainty how many giant kangaroo rats may be killed or injured by vehicles, we are unable to anticipate how much take would occur as a result of that activity. We are using the Reasonable and Prudent Measures/Terms and Conditions of this Incidental Take Statement to establish a level at which take due to vehicle strikes would warrant reinitiation of consultation (see Reasonable and Prudent Measure #3).

Incidental take of giant kangaroo rats for decommissioning or repowering activities is not exempted in this consultation. The Corps has determined that it lacks the authority and jurisdiction over decommissioning or repowering of the project, including take likely to result from decommissioning or repowering activities.

San Joaquin kit fox

We anticipate that some San Joaquin kit foxes could be taken as a result of the proposed action due to harm resulting from habitat loss. Approximately 1,794 acres of occupied San Joaquin kit fox habitat would be permanently impacted by the construction of the Proposed Action. The Proposed Action would result in the loss of foraging, breeding, sheltering, and dispersal habitat. An additional 712 acres of occupied San Joaquin kit fox habitat would be temporarily impacted by construction activities, but would be restored to pre-project conditions following construction. Based on the results of surveys in the action area, we estimate up to 22 individual San Joaquin kit foxes inhabit the action area. We estimate that up to 16 San Joaquin kit foxes currently inhabit the solar generation facility area and all would be subject to take in the form of harm as a result of construction of the proposed solar arrays and associated infrastructure. We expect few San Joaquin kit foxes would be killed resulting from project activities; the most likely cause of lethal take would be by vehicle strike. Typical mortality rates from vehicle strike are approximately 10 percent (Bjurlin et al. 2005, PVS 2014). Based on these data we can expect that up to 3 of the 22 San Joaquin kit foxes in the project area may be subject to take caused by vehicle strike. We expect that few, if any, additional foxes would be killed by other project activities.

Finding a dead or injured San Joaquin kit foxes may be unlikely across the total area of the project site. Due to their small size San Joaquin kit foxes may be quickly scavenged. Based on their denning behavior, they may seek cover or shelter if injured. Detecting dead foxes may be difficult due to their cryptic coloration and small size. Consequently the actual number of San Joaquin kit foxes killed or injured by the proposed project would be difficult to ascertain. However, foxes killed by vehicle strike may be more easily detected due to the limited vegetation around roadways. Similar to other forms of take, detection of injury or mortality caused by vehicle strike would challenging, because mortality may not be immediate and injured individuals may move to locations where they would not be detected; furthermore, dead foxes are likely to be scavenged quickly. The actual number of individuals killed by vehicles is likely to be greater than what is observed.

We must provide a level at which formal consultation would have to be reinitiated. For the San Joaquin kit fox, when we determine an appropriate take level that would trigger reinitiation, we are considering what could be detected, anticipating that the actual take would be higher than what could be detected and we set the number that triggers reinitiation below that level. We are reasonably certain that if three San Joaquin kit foxes or one pregnant or lactating female San Joaquin kit fox are found dead or injured, more have been taken that were not detected and that impacts of the take we anticipate overall (22 individuals) may have been exceeded. Loss of more than three individuals or one pregnant or lactating female would become a substantial enough impact that it would warrant further analysis. Consequently, at the point three (3) San Joaquin kit foxes or one (1) pregnant or lactating female San Joaquin kit fox have been found dead or injured as a result of project activities, the Corps must contact our office immediately to reinitiate formal consultation. Project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions.

Incidental take of San Joaquin kit foxes for decommissioning or repowering activities is not exempted in this consultation. The Corps has determined that it lacks the authority and jurisdiction decommissioning or repowering of the project, including take likely to result from decommissioning or repowering activities.

Blunt-nosed leopard lizard

We anticipate that some blunt-nosed leopard lizards could be taken as a result of the proposed action. Incidental take of blunt-nosed leopard lizards can be difficult to detect for the following reasons: the species' relatively small body size, the fact that they spend time in underground burrows, they are cryptically colored, and they can be quickly consumed by scavengers. These factors make an accurate population size estimate difficult and it is likely that most individual mortality would go undetected. In addition, mortality as a result of a loss or reduction in habitat suitability due to modification from the project may be masked by typical ecological fluctuations in population size. We expect the incidental take to be in the form of harm due to habitat loss. Approximately 1,794 acres of suitable blunt-nosed leopard lizard habitat would be permanently impacted by the construction of the Proposed Action. The Proposed Action would result in the loss of foraging, breeding, sheltering, and dispersal habitat. An additional 712 acres of suitable blunt-nosed leopard lizard habitat would be temporarily impacted by construction activities but would be restored to pre-project conditions following construction.

We cannot quantify the precise number of blunt-nosed leopard lizards that may be taken as a result of the proposed actions. First, we do not have adequate density estimates for the project area, nor are any suitable equivalents available in the literature. Also, blunt-nosed leopard lizards move across the landscape over time; for example, animals may have entered or departed the project footprint area since the time of pre-construction surveys and before completion of any exclusion fencing. Other individuals may not be detected due to their cryptic coloration, small size, and fossorial nature. The protective measures proposed by the Corps and the Applicant are likely to prevent mortality or injury of most individuals; however, some individuals are likely to remain in the project area and subject to the effects described above. In addition, finding a dead or injured blunt-nosed leopard lizard is unlikely due to their small size and scavengers.

Consequently, while we are reasonably certain that some take will occur, we are unable to anticipate the actual number of blunt-nosed leopard lizards that would be taken by the proposed project; however, we provide a level at which formal consultation would have to be reinitiated. Therefore, we anticipate that all blunt-nosed leopard lizards within the 2,506 acres of permanent and temporary disturbance would be taken by the proposed action. If the area of disturbance exceeds 2,506 acres, the Corps must reinitiate consultation. Project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions.

Incidental take of blunt-nosed leopard lizards due to vehicle strikes during construction would be difficult to detect and quantify because of their small body size, use of underground burrows or dense cover when injured, they may be quickly scavenged, and the number on roads my fluctuate along with natural population changes; therefore, finding a dead or injured specimen may be unlikely. The exact number of individuals killed or injured by vehicles is likely to be greater than observed. Because we cannot predict with reasonable certainty how many blunt-nosed leopard lizards may be killed or injured by vehicles, we are unable to anticipate how much take would occur as a result of that activity. We are using the Reasonable and Prudent Measures/Terms and Conditions of this Incidental Take Statement to establish a level at which take due to vehicle strikes would warrant reinitiation of consultation (see Reasonable and Prudent Measure #3).

Incidental take of blunt-nosed leopard lizards for decommissioning or repowering activities is not exempted in this consultation. The Corps has determined that it lacks the authority and jurisdiction over decommissioning or repowering of the project, including take likely to result decommissioning or repowering activities.

<u>California tiger salamander</u>

The Service anticipates all California tiger salamanders in construction areas would be subject to take as a result of project activities. Take would occur in the form of capture during relocation activities and in the form of injury or death as a result of construction activities if they are accidentally injured or killed during capture and relocation or are unable to be collected for relocation and remain in active construction areas. The probability of these risks may be increased if substantial rainfall (greater than 0.5 inch of rain in a 24-hour period) occurs, and California tiger salamanders are dispersing through the area during work activities.

Incidental take of California tiger salamanders would be difficult to detect because of their small body size and use of underground burrows; finding a dead or injured specimen may be unlikely. California tiger salamanders injured or killed during translocation efforts are likely to be observed; however, mortality from other sources, including the indirect effects of translocation (e.g., unable to find food in a new location) or displacement from the action area, would be difficult to observe. Consequently, the observed number of California tiger salamanders taken may be lower than the actual number taken.

All individual California tiger salamanders remaining in dispersal area between the 1.2 mile and 1.3 mile distance from breeding ponds would be subject to harm. These individuals would not be included in the proposed capture and relocation activities and could be killed or injured as a result of construction activities.

While we expect California tiger salamanders to be observed in the action area during the project construction period, we anticipate that few, if any, would be found dead or injured. We expect the majority of observable take to be during capture and relocation activities. In our best judgment, based upon the information available, if five (5) adult California tiger salamanders are found dead or injured during capture and relocation activities, the Corps must reinitiate consultation. We expect few instances of take would be observed during other project activities.

In our best judgment, based upon the information available, if three (3) adult California tiger salamanders are found dead or injured during the 18 months of construction activities, the Corps must reinitiate consultation. We believe that if three (3) individuals are found killed or injured, then a larger number have been taken but not observed; this would represent a greater impact to the local population than we currently anticipate. Project activities that are likely to cause additional take should cease during reinitiation because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions.

In addition to the incidental take we anticipate from construction of the project, we also conclude that incidental take of California tiger salamanders due to vehicle strikes during construction would occur. Similar to other forms of take, such injury or mortality would be difficult to detect and quantify because mortality may not be immediate and injured individuals may move to locations where they would not be detected, and dead salamanders are likely to be scavenged quickly or desiccate and be unrecognizable; therefore, finding a dead or injured specimen may be unlikely. The exact number of individuals killed by vehicles is likely to be greater than what is observed. Unlike the take due to harm described above, we cannot predict with reasonable certainty how many California tiger salamanders may be killed or injured by vehicles, so we are unable to anticipate how much take would occur as a result of that activity. Therefore, we are using the Reasonable and Prudent Measures/Terms and Conditions of this Incidental Take Statement to establish a level at which take due to vehicle strikes would warrant reinitiation of consultation (see Reasonable and Prudent Measure #3).

Incidental take of California tiger salamanders decommissioning or repowering activities is not exempted in this consultation. The Corps has determined that it lacks the authority and jurisdiction over decommissioning or repowering of the project, including take likely to result from decommissioning or repowering activities.

Incidental Take Statement for Operations and Maintenance

Giant kangaroo rat

We anticipate that effects to giant kangaroo rats during the operational period, including maintenance activities, to be similar to those discussed for construction but will occur at a reduced level. We are unable to predict at what extent giant kangaroo rats may use the solar generation facility after the construction phase. However, we do not anticipate that giant kangaroo rats will reinhabit the solar generation facility site to pre-project levels. Incidental take of giant kangaroo rats due to maintenance activities or vehicle strikes during operations and maintenance would be difficult to detect and quantify because of their small body size, use of underground burrows or dense cover when injured, and they may be quickly scavenged; therefore, finding a dead or injured specimen may be unlikely. The exact number of individuals killed or injured by vehicles is likely to be greater than observed; however, because we cannot predict with reasonable certainty how many giant kangaroo rats may be killed or injured by vehicles, we are unable to anticipate how much take would occur as a result of that activity.

We must provide a level at which formal consultation would have to be reinitiated. For the giant kangaroo rat, when we determine an appropriate take level that would trigger reinitiation, we are considering what could be detected, anticipating that the actual take would be higher than what could be detected and we set the number that triggers reinitiation below that level. We expect that few if any individuals will be killed or injured as a result of operations and maintenance activities annually and cumulatively over the 30-year operational phase of the project. Therefore, if two (2) giant kangaroo rats are found dead or injured within a 12-month period, we expect more have been taken that were not detected and that impacts of the take we anticipate overall may have been exceeded. Detection of more than two dead or injured individuals in a 12-month period would indicate that impacts to giant kangaroo rats are greater than we anticipated and warrants further analysis. Consequently, at the point two (2) giant kangaroo rats have been found dead or injured within a 12-month period or thirty (30) giant kangaroo rats total over the 30-year operations phase of the project as a result of operations and maintenance activities, the Corps must contact our office immediately to reinitiate formal consultation.

We are unable to determine the extent that giant kangaroo rats will reinhabit the areas under and around the panel arrays. However, we do not anticipate giant kangaroo rats to reinhabit the areas at preconstruction densities and ground disturbing activities are expected to be minimal. Because some ground disturbing activities are anticipated during maintenance activities, if 2 (two) precincts over a 12-month period or thirty (30) precincts over the 30-year operational period are disturbed or destroyed, the Corps must contact our office immediately to reinitiate formal consultation. We believe that if these numbers are exceeded that the species has reinhabitated the area more than anticipated or that impacts from operation and maintenance activities are beyond our analysis.

If reinitiation is required due to the anticipated level of take being exceeded as described above, project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions.

<u>San Joaquin kit fox</u>

We are unable to predict at what extent San Joaquin kit fox may use the solar generation facility after the construction phase. However, we do not anticipate that San Joaquin kit fox will reinhabit the solar generation facility site to pre-project levels. We anticipate that some San Joaquin kit foxes that may disperse through or inhabit habitat within or near the panel arrays could be taken as a result of the proposed operations and maintenance activities due to harm including noise, human presence, or lighting that significantly impairs normal behavioral patterns. We expect a subset of those San Joaquin kit foxes would be taken in the form of harm in the form of injury or mortality resulting from project activities. The most likely cause of lethal take would be by vehicle strike.

We are unable to determine the exact extent of the take of San Joaquin kit fox during operation and maintenance because it is unknown if and to what extent San Joaquin kit fox may reinhabit the panel arrays. We expect that few if any individuals will be killed or injured as a result of operations and maintenance activities over the 30 year operational phase of the project. Also, finding a dead or injured San Joaquin kit foxes may be unlikely across the total area of the project site. Due to their small size San Joaquin kit foxes may be quickly scavenged. Based on their denning behavior, they may seek cover or shelter if injured. Detecting dead foxes may be difficult due to their cryptic coloration and small size. Consequently the actual number of San Joaquin kit foxes killed or injured by the proposed project would be difficult to ascertain. However, foxes killed by vehicle strike may be more easily detected due to the limited vegetation around roadways. Similar to other forms of take, detection of injury or mortality caused by vehicle strike would challenging, because mortality may not be immediate and injured individuals may move to locations where they would not be detected; furthermore, dead foxes are likely to be scavenged quickly. The actual number of individuals killed by vehicles is likely to be greater than what is observed.

We must provide a level at which formal consultation would have to be reinitiated. For the San Joaquin kit fox, when we determine an appropriate take level that would trigger reinitiation, we are considering what could be detected, anticipating that the actual take would be higher than what could be detected and we set the number that triggers reinitiation below that level. We believe that with implementation of the proposed protective measures, few San Joaquin kit foxes will be killed or injured during operation and maintenance of the facility. We are reasonably certain that if San Joaquin kit foxes are found dead or injured, more have been taken that were not detected and that impacts of the take we anticipate overall may have been exceeded. We believe that injury or death of more two (2) individuals within a 12-month period or six (6) cumulatively over the 30-year operational phase would become a substantial enough impact that it would exceed the anticipated effects of the project and would therefore warrant further analysis. Consequently, at the point two (2) San Joaquin kit foxes within a 12-month period or six (6) cumulatively over the 30-year operational phase have been found dead or injured as a result of operations and maintenance activities, the Corps must contact our office immediately to reinitiate formal consultation. Project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions.

Blunt-nosed leopard lizard

We anticipate that effects to blunt-nosed leopard lizards during the operational period, including maintenance activities, to be similar to those discussed for construction but will occur at a reduced level. We are unable to predict at what extent blunt-nosed leopard lizards may use the solar generation facility after the construction phase. However, we anticipate that some blunt-nosed leopard lizards could be taken as a result of the proposed operations and maintenance activities, including vehicle strikes. Incidental take of blunt-nosed leopard lizards can be difficult to detect for the following reasons: the species' relatively small body size, the fact that they spend time in underground burrows, they are cryptically colored, and they can be quickly consumed by scavengers. These factors make an accurate population size estimate difficult and it is likely that most individual mortality would go undetected.

Consequently, while we are reasonably certain that some take will occur, we are unable to anticipate the actual number of blunt-nosed leopard lizards that would be taken by the proposed project; however, we provide a level at which formal consultation would have to be reinitiated. We expect that few individuals will be killed or injured as a result of operations and maintenance activities over the 30-year operational phase of the project. We do not expect blunt-nosed leopard lizards to occur in high densities in the solar generation facilities after construction. Therefore, if two (2) blunt-nosed leopard lizards within a 12-month period or ten (10) total blunt-nosed leopard lizards cumulatively over the 30-year operational period are found dead or injured, we expect more would likely have been taken that were not detected. Loss of more than two (2) individuals in a 12-month period or ten (10) total blunt-nosed leopard lizards cumulatively over the 30-year operational period would represent a substantial enough impact that it would warrant further analysis. Consequently, at the point two (2) blunt-nosed leopard lizards within a 12-month period or ten (10) over the 30-year operational period have been found dead or injured as a result of operations and maintenance activities, the Corps must contact our office immediately to reinitiate formal consultation. Project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions.

California tiger salamander

We anticipate that effects to California tiger salamanders during the operational period, including maintenance activities, to be similar to those discussed for construction but will occur at a reduced level. We are unable to predict at what extent California tiger salamanders may use the solar generation facility after the construction phase. However, we anticipate that some California tiger salamanders could be taken as a result of the proposed operations and maintenance activities. Incidental take of California tiger salamanders would be difficult to detect because of their small body size and use of underground burrows; finding a dead or injured specimen may be unlikely. Consequently, the observed number of California tiger salamanders taken may be lower than the actual number taken.

Incidental take of California tiger salamanders due to vehicle strikes during operations and maintenance is reasonably certain to occur. The risk to individuals of operations and maintenance activities would increase during periods of rainfall, especially at night. Injury or mortality would be difficult to detect and quantify because mortality may not be immediate and injured individuals may move to locations where they would not be detected, and dead salamanders are likely to be scavenged quickly or desiccate and be unrecognizable; therefore, finding a dead or injured specimen may be unlikely. We expect that few if any individuals will be killed or injured as a result of operations and maintenance activities over the 30 year operational phase of the project. The exact number of individuals killed by operations and maintenance activities is likely to be greater than what is observed. We cannot predict with reasonable certainty how many California tiger salamanders may be killed or injured, so we are unable to anticipate how much take would occur as a result of that activity; however, we provide a level at which formal consultation must be reinitiated. If two (2) California tiger salamanders within a 12-month period or ten (10) total California tiger salamanders cumulatively over the 30-year operational period are found dead or injured, we expect that more have been taken that were not detected and our anticipated impacts of the take may have been exceeded and would warrant further analysis. Consequently, at the point two (2) California tiger salamanders within a 12-month period or ten (10) total California tiger salamanders cumulatively over the 30-year operational period have been found dead or injured as a result of operations and maintenance activities, the Corps must contact our office immediately to reinitiate formal consultation. Project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions.

REASONABLE AND PRUDENT MEASURES

The following Reasonable and Prudent Measures are necessary and appropriate to minimize the impacts of the incidental take of the giant kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard, and California tiger salamander:

1. To minimize the effects of habitat loss and direct injury/mortality of the giant kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard, and California tiger salamander, the Corps must ensure the Applicant adheres to all conservation measures in the biological assessment, and the additional measures as noted in this biological opinion and under the additional Term and Condition 1 noted below.

2. The Corps and the Applicant must ensure that take due to not detecting animals that are present or mishandling of animals to be captured and relocated out of harm's way will be minimized by employing biologists approved by the Service before they conduct activities associated with this biological opinion. In particular, the biologists must be qualified to survey for, conduct burrow excavations, or capture and move giant kangaroo rats and California tiger salamanders in the action area.

3. The Corps and the Applicant must ensure that effects to the giant kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard, and California tiger salamander are minimized during construction of the project by implementation of additional protective measures identified below, and ensuring that take due to vehicle strikes during construction activities is commensurate with our analysis.

4. The Corps and the Applicant must ensure that effects to the giant kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard, and California tiger salamander are minimized during operations and maintenance of the facility by implementation of additional protective measures identified below and ensuring that take during operations and maintenance activities is commensurate with our analysis.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the Corps must comply with or ensure through monitoring and enforcement actions that its Applicant complies with the following Terms and Conditions, which implement the Reasonable and Prudent Measures described above and outline reporting and monitoring requirements. These Terms and Conditions are non-discretionary.

1. The following Terms and Conditions implement Reasonable and Prudent Measure 1:

   a. The Corps must include all measures, plans, conditions, and reporting requirements in the biological assessment and this biological opinion as binding terms and conditions of any and all permits it issues for the Project and must monitor and enforce their implementation. The Applicant must fully implement and adhere to all proposed conservation measures, plans, and easements, and all other conditions and reporting requirements in the biological assessment and this biological opinion, as conditioned in any permit issued by the Corps.

   b. The Corps and the Applicant must minimize the potential for the taking of federally-listed species resulting from Project related activities by implementation of the conservation measures as described in the biological assessment and appendices. The Corps or the Applicant must submit final conservation and minimization plans, including the Conservation Lands Management Plan, Invasive Plant Management Plan, Habitat Restoration and Revegetation Plan, and Spill Prevention Plan, for approval by the Service at least 30 days prior to the start of construction activities.

   c. The Corps or the Applicant must be the point of contact in the field for the Project and must maintain a copy of this biological opinion on-site whenever construction is taking place. The names and telephone numbers of appropriate contacts must be provided to the Service at least 30 days prior to groundbreaking. Prior to ground disturbance, the on-site project supervisor must submit a letter to the Service verifying that he/she possesses a copy of this biological opinion and that they have read and understand the Terms and Conditions.

2. The following Terms and Conditions implement Reasonable and Prudent Measure 2:

   a. The Corps or the Applicant must request our written approval of any biologists either entity wishes to employ to conduct any avoidance, minimization, and conservation measures including surveying; monitoring; conducting training sessions; and capturing, handling, and relocating giant kangaroo rats or California tiger salamanders. The request must be in writing and be received by the Service's Ventura Fish and Wildlife Office at least 30 days prior to the commencement of any of these activities.

   b. The Corps or the Applicant must include all information for authorization necessary for the Service to make a determination on the qualifications of an individual. At a minimum the request must include: (1) relevant education; (2) relevant training on species identification, survey techniques, handling individuals of different age classes, and handling of different life stages by a permitted biologist or recognized species expert authorized for such activities by the Service; (3) a summary of field experience conducting requested activities (to include project/research information); (4) a summary of biological opinions under which they were authorized to work with the listed species and at what level (such as construction monitoring versus handling), this should also include the names and qualifications of persons under which the work was supervised as well as the amount of work experience on the actual project; (5) a list of Federal Recovery Permits [10(a)1(A)] held or under which are authorized to work with the species (to include permit number, authorized activities, and name of permit holder); and (6) any relevant professional references with contact information.

3. The following Terms and Conditions implement Reasonable and Prudent Measure 3:

a. The Corps or the Applicant must provide to the Service documentation that all workers present on the project site have completed the appropriate worker education programs as stated in the Description of the Proposed Action section. The Corps must ensure that the Applicant complies with this condition.

b. The Corps or the Applicant must ensure that relocation sites and the rationale for the location for giant kangaroo rats are identified and approved by Service at least 30 days prior to project initiation. To determine activity, potential relocation sites that will utilize existing inactive precincts must be monitored by remote cameras and with bait for 10 days immediately prior to the potential release of an individual to be relocated . If after 10 days of no activity or new sign of activity, the precinct may be determined inactive.

c. The Applicant must ensure no nursing female or dependent juvenile giant kangaroo rats are disturbed during burrow excavation. Any burrows containing a lactating female must not be excavated and a 250-foot buffer from all construction activities must be maintained until lactation has ceased and presumably any offspring are independent. The precinct may be monitored by a remote camera to observe activity. Because the occupied precinct would be enclosed with fencing and would potentially inhibit or preclude foraging, a sufficient amount of seed to sustain a nursing female must be placed at the precinct opening. If the designated biologist can determine with certainty which precinct the lactating female is occupying, adjacent precincts may be excavated only if impacts to the occupied precinct is avoided.

d. To reduce the amount of time a lactating/nursing female may be in a trap, all traps set from January 1 through August 31 for the capture and relocation of giant kangaroo rats must be set no more than 1 hour prior to sunset and closed no more than 1 hour after sunrise. All traps set during this period when females may be lactating/nursing must also be checked for occupancy every 2 hours between sunset and sunrise.

e. Consistent with established parameters set in protocols for other San Joaquin Valley kangaroo rats, during the threat of inclement weather, such as the National Weather Service prediction of a 40 percent or greater chance of rain, all traps for giant kangaroo rats will be closed. Should the air temperature exceed 105 degrees Fahrenheit all traps will be closed. If the air temperature is predicted to drop below 50 degrees Fahrenheit, synthetic batting or other appropriate insulating material must be placed in the open trap.

f. Destruction of San Joaquin kit fox dens must be avoided unless they are in an area of direct and permanent destruction, or pose a risk of direct harm to the species. If dens are in an area of temporary disturbance or not directly impacted by project activities, a one-way door must be installed to prevent San Joaquin kit foxes from utilizing the den during construction activities.

g. Any San Joaquin kit fox natal den identified in the project area must be avoided by a buffer determined after discussions with the Service. This agreed upon buffer will remain until the juveniles are independent and the den is no longer used by any individuals. If project activities are to occur in proximity to the buffer, a Service approved biologist must monitor project activities in the area and be given the authority to cease any activity at that causes disturbance to the individuals using the den.

h. All working ranch dogs must be within eyesight and under strict voice commands of the handler at all times.

i. Little Panoche Road and all County-maintained roads within 1 mile of the proposed project boundaries used for project related traffic, including personal vehicles, must be surveyed every morning within 1 hour of sunrise for animals that have been struck by vehicles. Any wildlife observed on the road, alive or dead, must be recorded along with the location, date, time, photos, and any other information important to this consultation.

j. If five (5) giant kangaroo rats, three (3) San Joaquin kit foxes, one (1) pregnant or lactating female San Joaquin kit fox, two (2) blunt-nosed leopard lizards, or five (5) California tiger salamanders are found injured or dead, and if such injury or mortality is attributable to a strike by a project-related vehicle during construction, the Corps must contact our office immediately to reinitiate consultation. Project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions.

4. The following Term and Condition implements Reasonable and Prudent Measure 4:

The Corps must monitor or ensure that their Applicant monitors the project site at a minimum of every 2 weeks during the operational period for compliance with this biological opinion and survey for take of giant kangaroo rats, San Joaquin kit fox, blunt-nosed leopard lizards, and California tiger salamanders. Monitoring must include surveying all roadways, adjacent land, and any areas of recent ground disturbance for dead individuals.

REPORTING REQUIREMENTS

Pursuant to 50 CFR 402.14(i)(3), the Corps must report the progress of the action and its impact on the species to the Service as specified in this Incidental Take Statement. In addition to the reporting described in the Description of the Proposed Action section of this document, the Corps must ensure submittal of additional reporting, as follows:

> During construction, the Corps must submit a summary report to the Service for review by the 7th day of every month during project construction activities. The report must cover the previous month's work and include: the project progress; amount of habitat disturbed; conservation measures implemented; sensitive species observed, captured, or relocated; a table tracking the monthly and cumulative amount of take; and any other information important to the analysis of this biological opinion. This report should also contain a concise comprehensive section summarizing all report information from the date of project initiation.
>
> During operations and maintenance, the Corps must submit a summary report to the Service for review by the 7th day of every January and July. The report must cover the all work since the previous report and include: activities performed, amount of habitat disturbed, conservation measures implemented, sensitive species observed, a table tracking the cumulative amount of take, and any other information important to the analysis of this biological opinion. This report should also contain a concise comprehensive section summarizing all report information from the date of the initiation of operations and maintenance cumulative through the current reporting period.
>
> The Corps must report injury or mortality to any giant kangaroo rat, San Joaquin kit fox, blunt-nosed leopard lizard, or California tiger salamander to the Service within 2 days of observation.

The Service recognizes that the Applicant may author the reports described above. However, the Applicant should submit their reports to the Corps, who must then review these reports to determine compliance with their permitting conditions prior to submitting them to the Service. The Corps has a continuing duty to monitor and regulate the activity covered by the Incidental Take Statements through the enforceable binding conditions included in any grants or permits they issue to the Applicant.

DISPOSITION OF DEAD OR INJURED SPECIMENS

As part of this Incidental Take Statement and pursuant to 50 CFR 402.14(i)(1)(v), upon locating a dead or injured California tiger salamander, initial notification within 2 working days of its finding must be made by telephone and in writing to the Ventura Fish and Wildlife Office (805-644-1766). The report must include the date, time, location of the carcass, a photograph, cause of death or injury, if known, and any other pertinent information.

The Corps or the Applicant must ensure the safe handling of any injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible state. The Corps or the Applicant must ensure the safe transportation injured animals to a qualified veterinarian. Should any treated California tiger salamander survive, the Corps or the Applicant must contact the Service regarding the final disposition of the animal(s). We recommend that dead California tiger salamanders identified in the action area be tested for amphibian disease and/or undergo genetic analysis for the purpose of investigating hybridization; however, this recommendation is discretionary and to be determined by the Corps upon contacting the Ventura Fish and Wildlife Office at the discovery of a dead California tiger salamander. If the Corps chooses not to submit dead California tiger salamanders for testing, they must be placed with the California Academy of Sciences; Contact: Jens Vindum, Collections Manager, California Academy of Sciences Herpetology Department, Golden Gate Park, San Francisco, California, 94118, (415) 750-7037.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. The Corps should coordinate with the Service to implement recovery actions described in the Recovery Plan for Upland Species for the San Joaquin Valley, California.

2. We recommend that the Service-approved biologists relocate any native animal species within work areas to suitable habitat outside of the project area if such activities are in compliance with State laws.

The Service requests notification of the implementation of any conservation recommendations so we may be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the request for formal consultation. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the Corps’ action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the Corps’ action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, the exemption issued pursuant to section 7(o)(2) will have lapsed and any further take would be a violation of section 4(d) or 9. Consequently, we recommend that any operations causing such take cease pending reinitiation.

If you have any questions about this biological opinion, please contact Christopher Diel of my staff at 805-644-1766, extension 305, or by e-mail at christopher_diel@fws.gov.

Sincerely,

Stephen P. Henry
Field Supervisor

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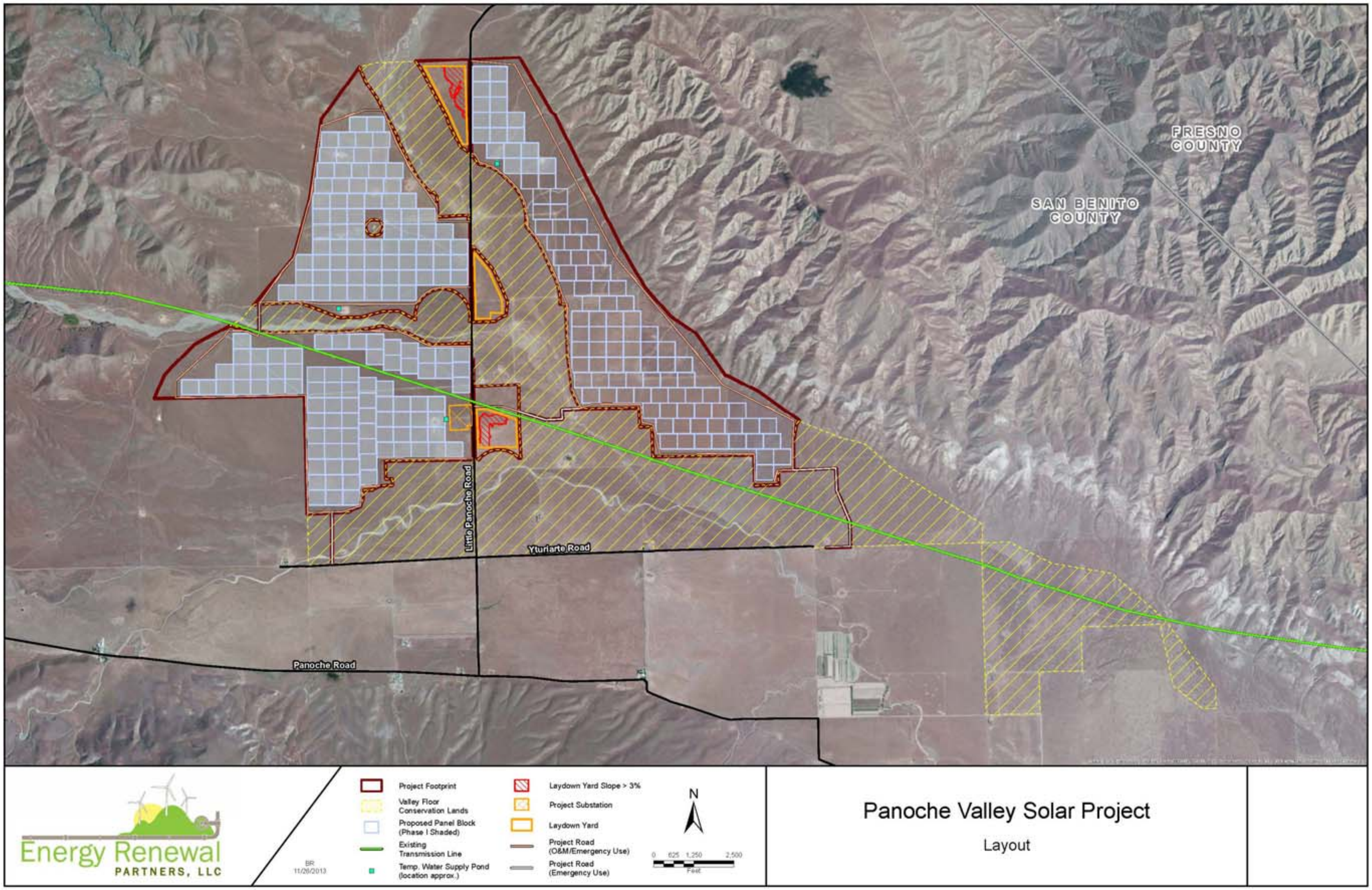
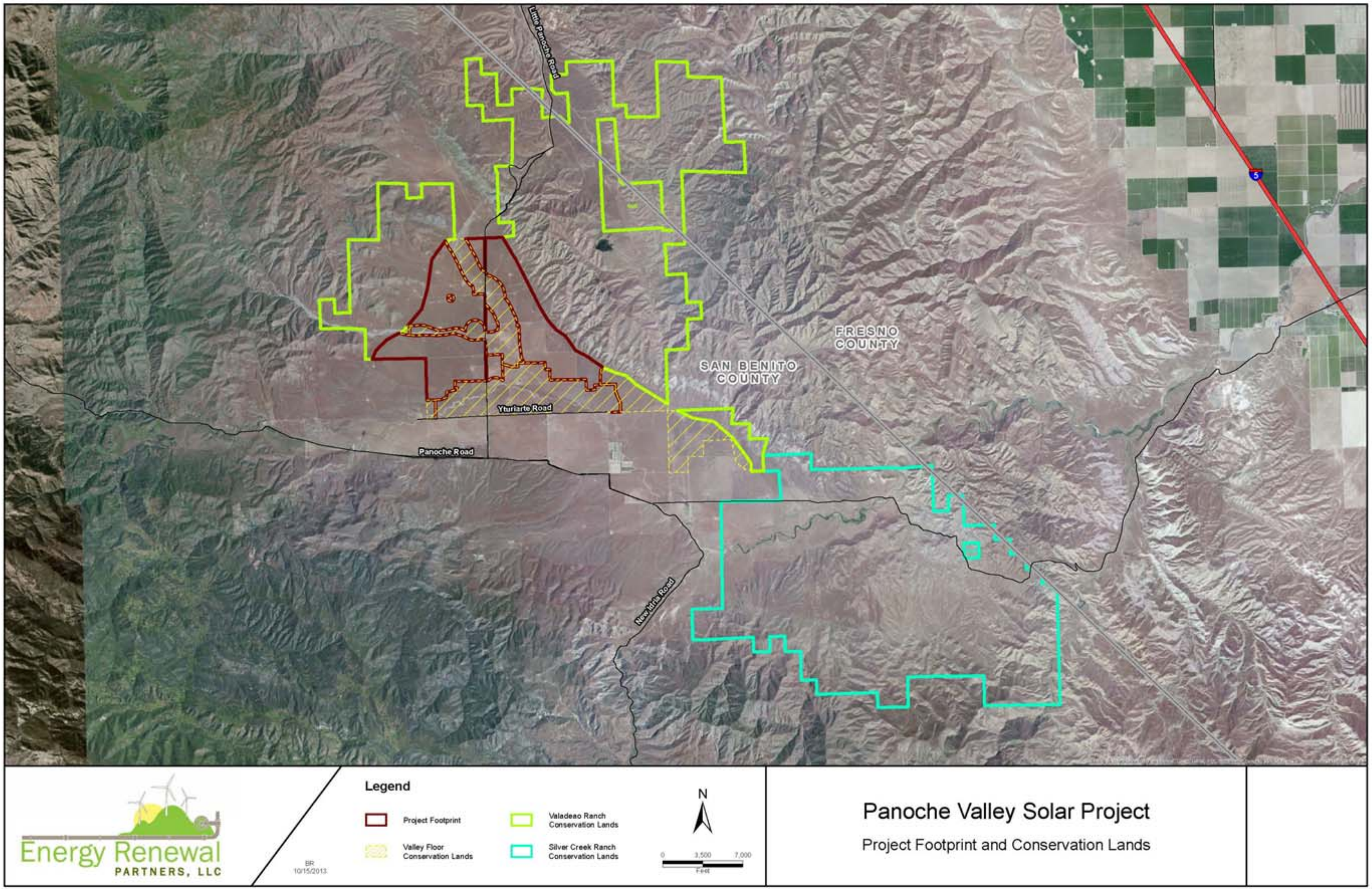
Appendix A. Proposed project footprint.



Appendix B. Proposed project conservation lands.



Appendix C. Proposed stream crossings.