Draft
Environmental Impact Statement

Panoche Valley Solar Facility
San Benito County, CA

September 2015

Volume II

NEPA Lead Federal Agency:

US Army Corps of Engineers

NEPA Cooperating Agency:

US Fish & Wildlife Service

VOLUME II
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BIOLOGICAL ASSESSMENT

FOR THE PANOCHE VALLEY SOLAR FACILITY

April 2014

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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).

Energy Renewal PARTNERS, LLC

BR
2/20/2014

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

Project Location

Figure

1

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

Energy Renewal PARTNERS, LLC

BR
11/26/2013

Panoche Valley Solar Project

Layout

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 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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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.

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. 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.

Operations and Maintenance Building:

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.

Security Fencing:

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.

Species Exclusion Fencing:

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

Legend

Project Footprint

Existing 230 kV Transmission Line

Existing Distribution Line

Underground Route

Overhead Route

N

0 75 150 300 Feet

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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.

<u>Security:</u>

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.

<u>Maintenance:</u>

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.

<u>Lighting:</u>

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).

Giant Kangaroo Rat

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.

San Joaquin Kit Fox

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.

Enhancement

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.

Management

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.

Energy Renewal PARTNERS, LLC

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

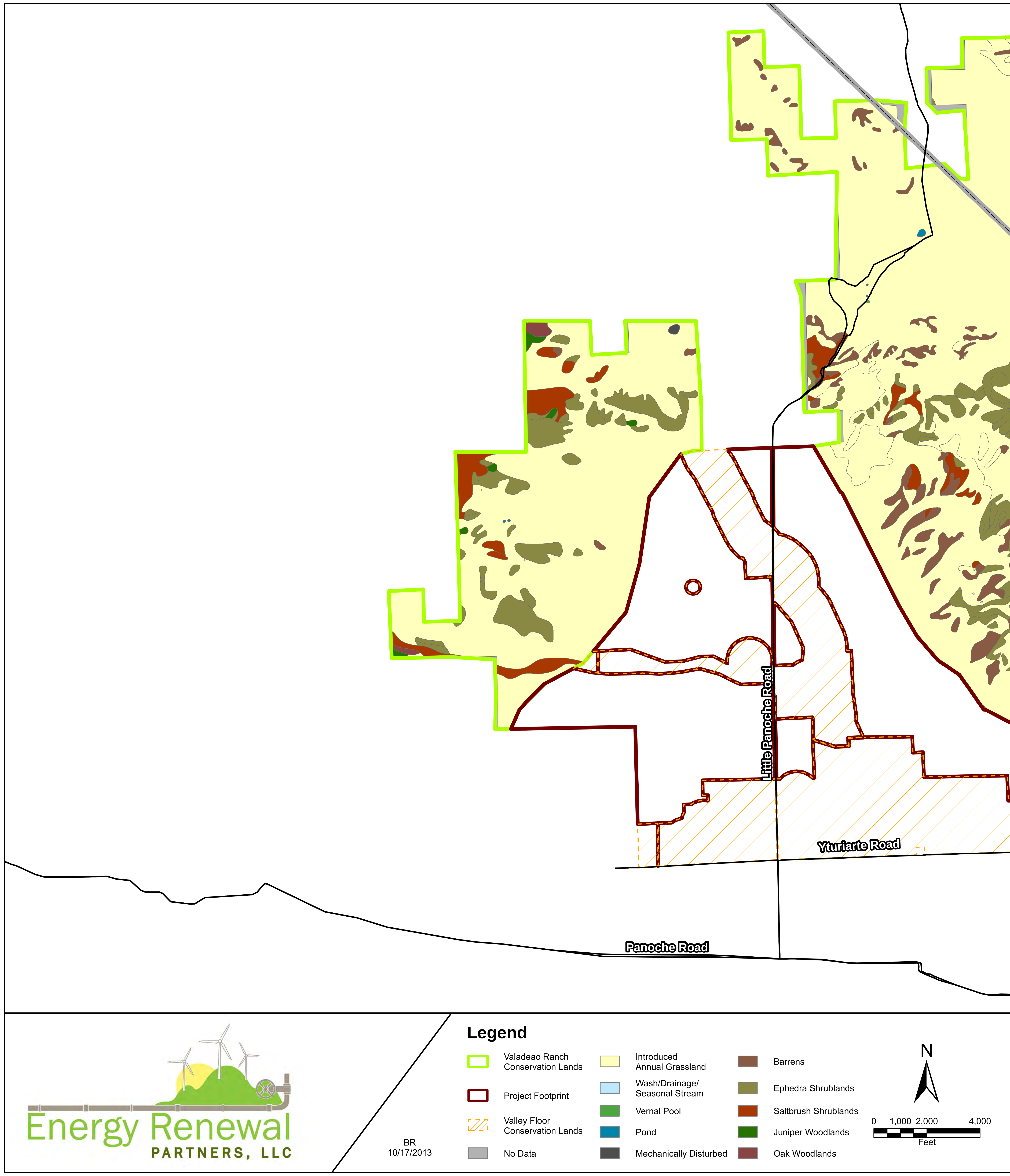
Project Conservation Lands include three areas totaling 24,185 acres that would be preserved in perpetuity for the benefit of the listed species discussed in this document as well as many other species of wildlife. A portion of these lands are contiguous with the VFCL that would be preserved, while some 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*).



Panoche Valley Solar Project

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.

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

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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

Legal Status

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).

Species Ecology

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.

Legend

- Project Footprint
- Giant Kangaroo Rat Location
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands

N

0 3,500 7,000 Feet

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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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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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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.

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.

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2013 Giant Kangaroo Rat Observations - Valley Floor Conservation Lands

Figure 14

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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

Panoche Valley Solar Project

2013 Giant Kangaroo Rat Survey Results - Silver Creek Ranch Conservation Lands

Figure 15

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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

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*

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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

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**.

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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

Panoche Valley Solar Project

San Joaquin Kit Fox Camera Trap Locations

Figure 18

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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

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

Legal Status

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 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.

<u>Local Distribution</u>

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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Legend

- Silver Creek Ranch Conservation Lands
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands
- BNLL Observation During Focused Surveys
- Incidental BNLL Observation
- BNLL Focused Survey Route

N

0 1,500 3,000
Feet

Panoche Valley Solar Project

Blunt-nosed Leopard Lizard Observations on Silver Creek Ranch Conservation Lands

Figure 22

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Legend

- Project Footprint
- Valley Floor Conservation Lands
- 100-year Floodplain
- 2013 Adult BNLL Observation (In Protocol)
- 2013 Adult BNLL Observation (Incidental)
- 2013 Hatchling/Sub-Adult Observation (In Protocol)
- 2013 Hatchling/Sub-Adult Observation (Incidental)

N

0 625 1,250 2,500
Feet

Panoche Valley Solar Project

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.

Local Distribution

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

Energy Renewal PARTNERS, LLC

BR
10/18/2013

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

Energy Renewal PARTNERS, LLC

BR
10/15/2013

Legend

Project Footprint

Vernal Pool Fairy Shrimp Observations

Valley Floor Conservation Lands

N

0 625 1,250 2,500
Feet

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.

<u>Local Distribution</u>

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.

Legend

- Project Footprint
- Valley Floor Conservation Lands
- Valley Floor Suitable Habitat (approx 2,517 acres)
- Valadeao Ranch Conservation Lands
- Valadeao Ranch Suitable Habitat (approx 6,611 acres)
- Silver Creek Ranch Conservation Lands
- Silver Creek Ranch Suitable Habitat (approx 7,151 acres)

N

0 3,500 7,000
Feet

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11/4/2013

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

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.

<u>Indirect Impacts</u>

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.

<u>Mitigation</u>

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.

<u>Conclusion</u>

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.

Slope Percentages and Approximate Acreage per Conservation Land

Slope %	VR	VFCL	SCR
0 - 5	1,108	2,416	3,058
5.1 - 11	1,919	101	2,394
11.1 - 21	2,117	7	1,982
21.1 - 35	2,541	1	1,586
35.1 - 172	3,086	0	1,871

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10/21/2013

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

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.

Indirect Impacts

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

Legend
Project Footprint
County Line
City Limit
Mitigation Lands
BLM Land
Ciervo-Panoche Natural Area

N

0 2 4
Miles

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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).

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.

<u>Indirect Impacts</u>

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.

<u>Mitigation</u>

The following mitigation measures will be implemented in order to avoid and minimize adverse impacts to BNLL to the maximum extent practicable:


Little Panoche Road
out
FRESNO COUNTY
SAN BENITO COUNTY
Yturiarte Road
Panoche Road
New Idria Road
out
5
Energy Renewal PARTNERS, LLC
BR
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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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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

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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.

<u>Indirect Impacts</u>

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.

<u>Mitigation</u>

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.

<u>Determination</u>

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

<u>Direct Impacts</u>

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.

<u>Determination</u>

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.

- <u>CTS Surveys</u>. 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.

- <u>CTS Exclusion Fencing</u>. 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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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

Legend

County Line	Project Footprint	Valadeao Ranch Conservation Lands
City Limit	Valley Floor Conservation Lands	Silver Creek Ranch Conservation Lands

N

0 2 4
Miles

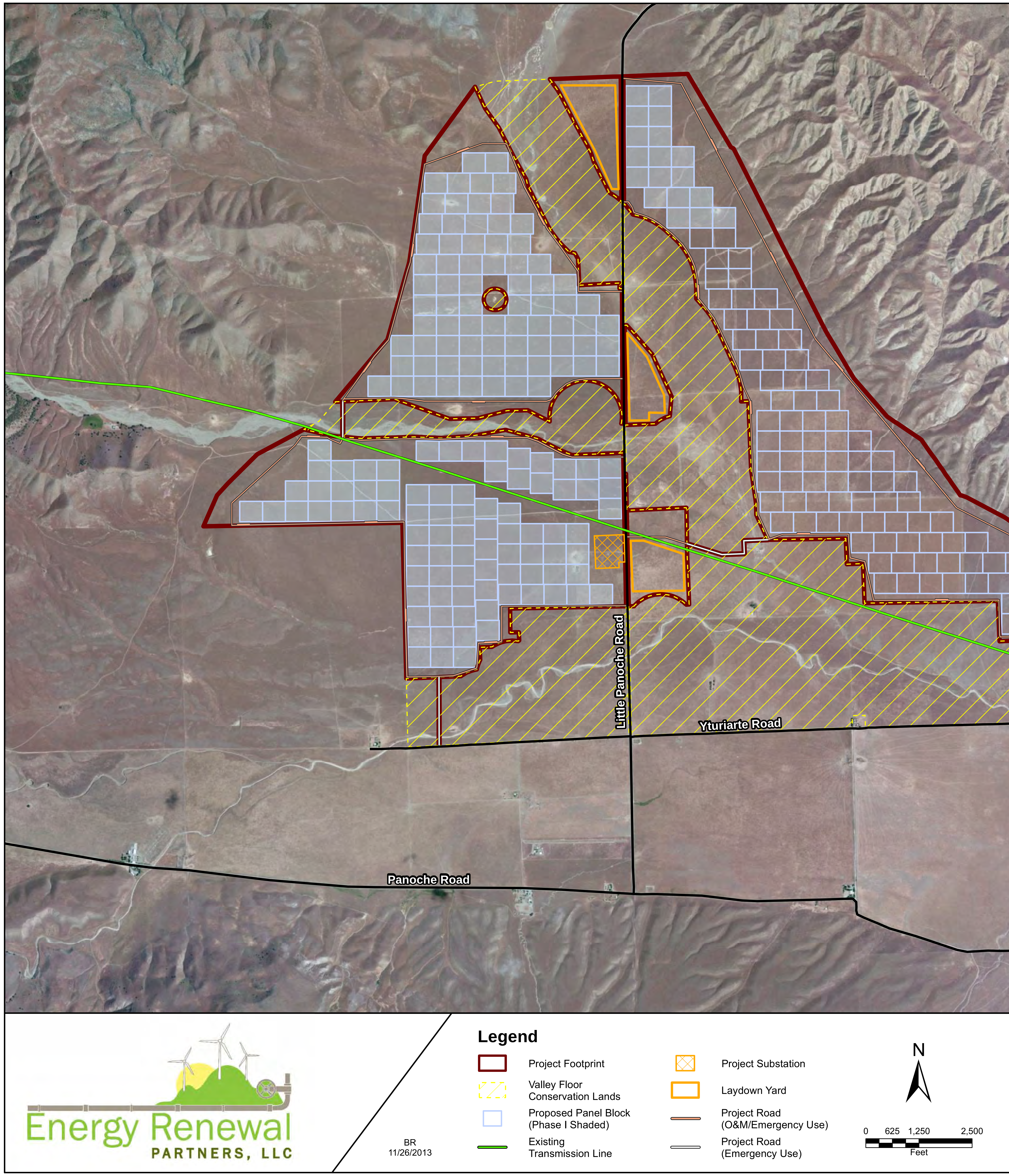
BR
10/15/2013

Energy Renewal
PARTNERS, LLC

Panoche Valley Solar Project

Site Location

Figure
1



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

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

GKR Survey Data and Project Area

Figure
4

Energy Renewal PARTNERS, LLC

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

GKR Survey Data and Valley Floor Conservation Lands

Figure 5

Legend

Silver Creek Ranch Conservation Lands	No Data
Valadeao Ranch Conservation Lands	No Activity
Valley Floor Conservation Lands	GKR Evidence, Active
	GKR Evidence, Inactive

N

0 1,500 3,000 Feet

Energy Renewal PARTNERS, LLC

BR
10/16/2013

Panoche Valley Solar Project

GKR Survey Data and
Silver Creek Ranch

Figure
6

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

Energy Renewal PARTNERS, LLC

BR
10/16/2013

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).

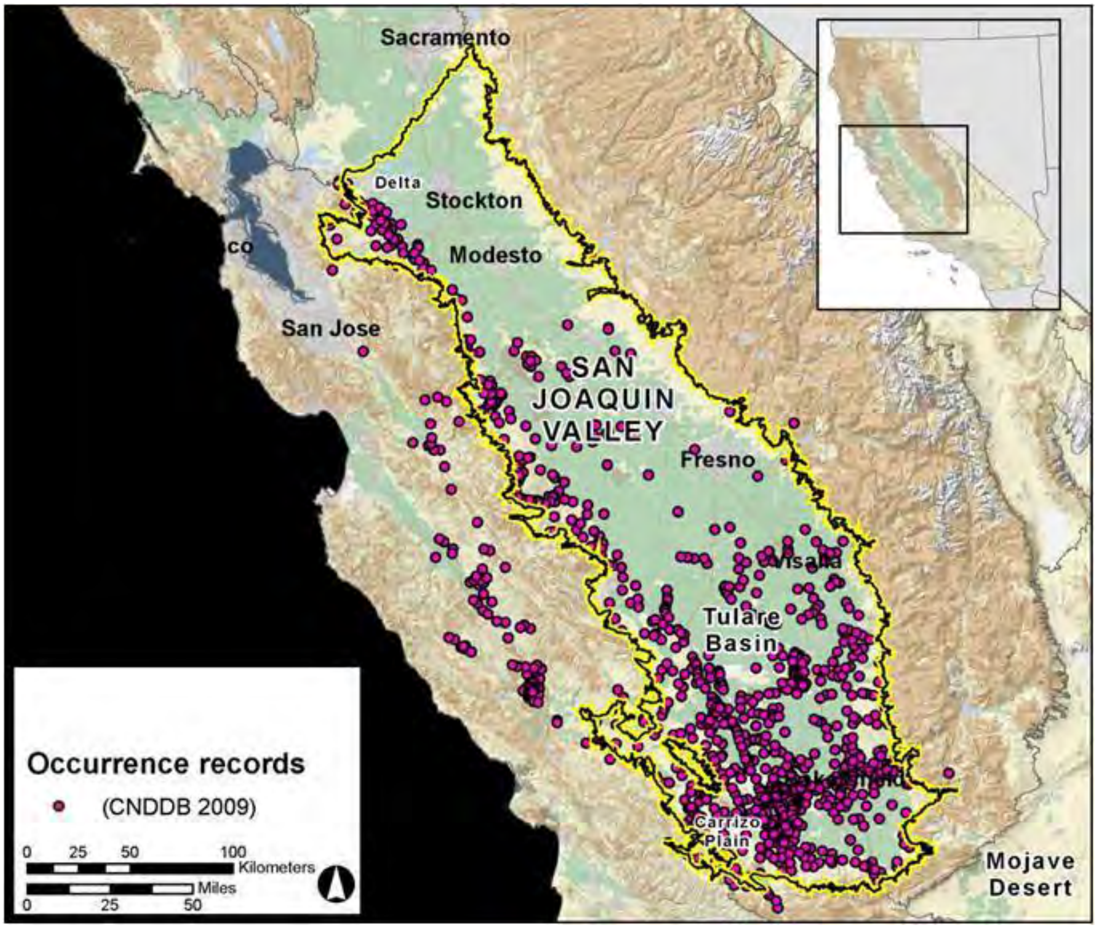


Figure 1. Current Range of the SJKF (Cypher et. al., 2009)

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.

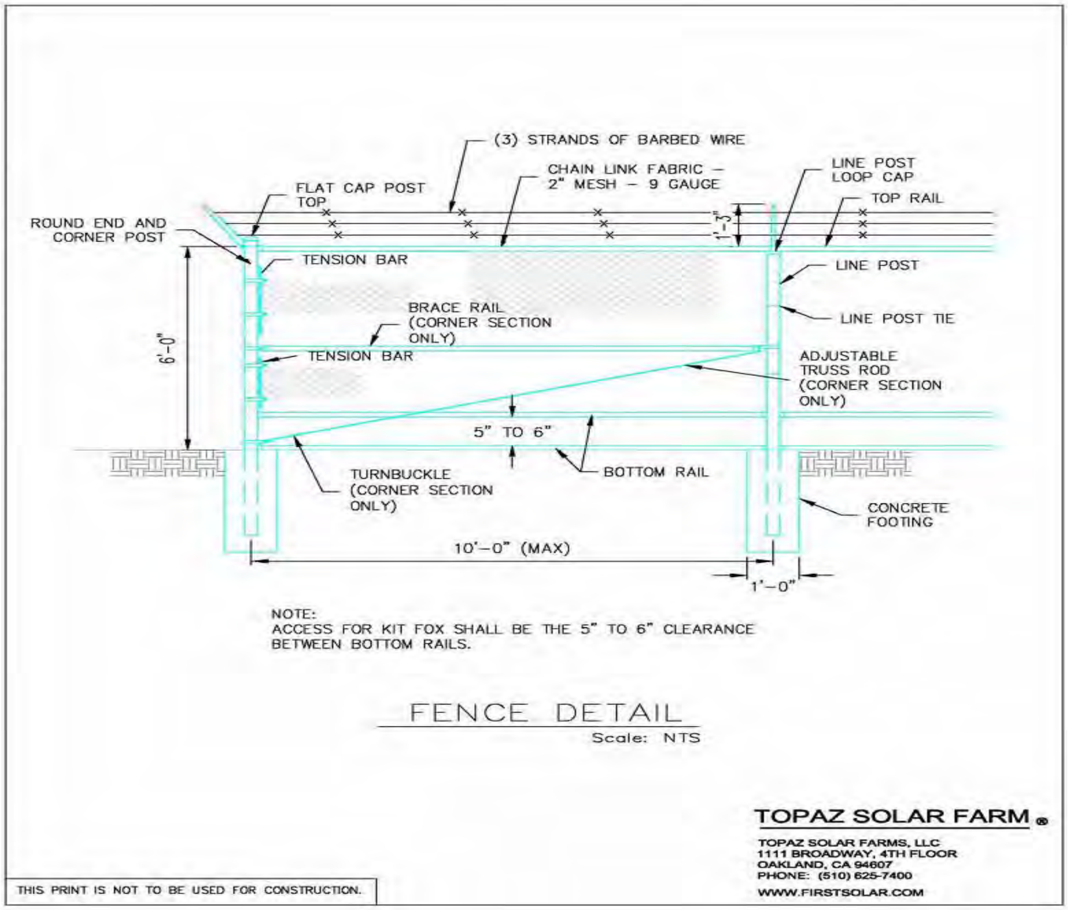


Figure 3. Example SJKF permeable perimeter fence design (Topaz Solar Farm).

- 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).

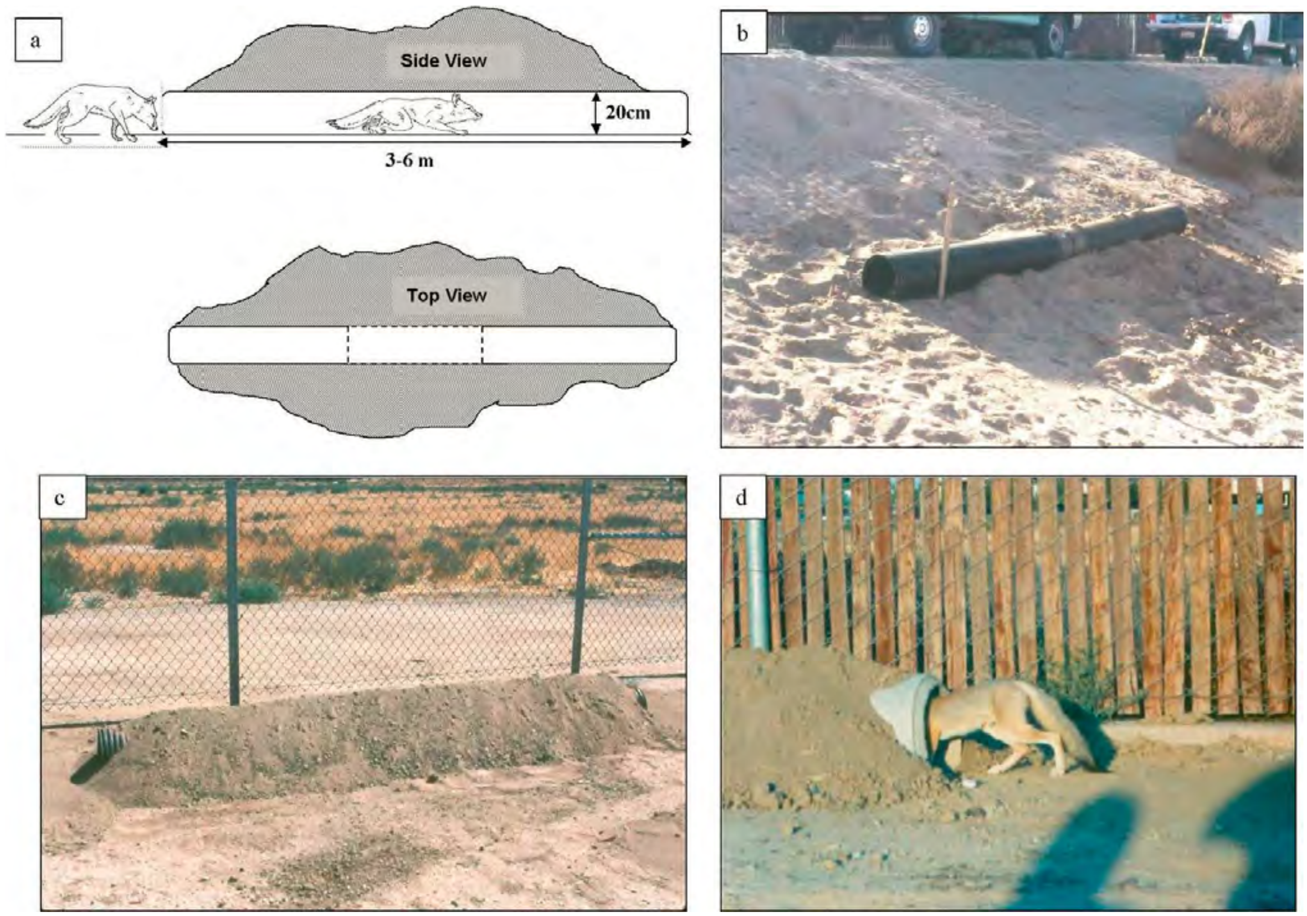


Figure 4. Artificial SJKF escape dens (Althouse and Meade 2011).

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 (12th) 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					

Proposed 52.4 acre home range buffer rationale

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

Prepared for:

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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:

Vegetation/Habitat

- 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

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1 INTRODUCTION

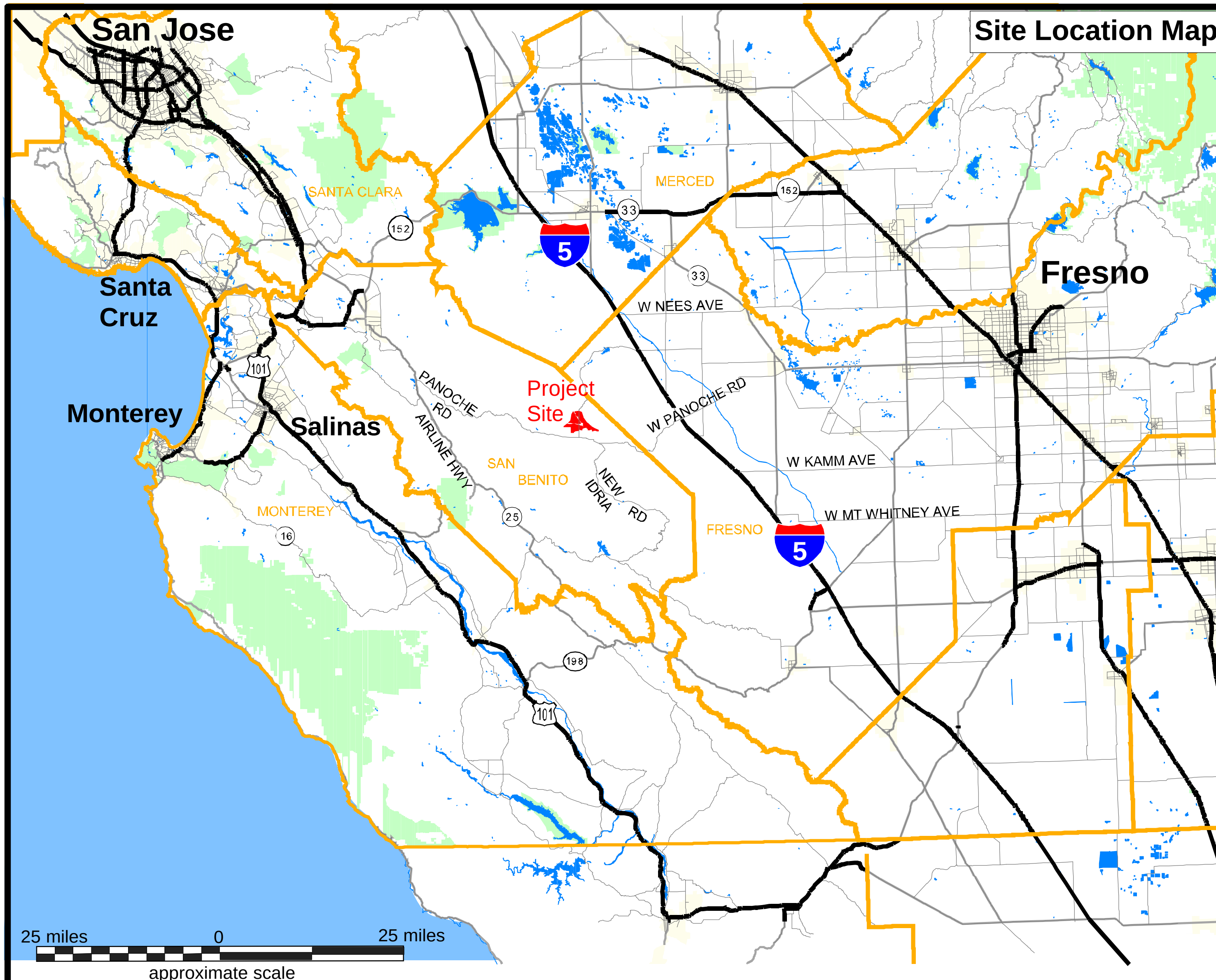
1.1 PROJECT BACKGROUND

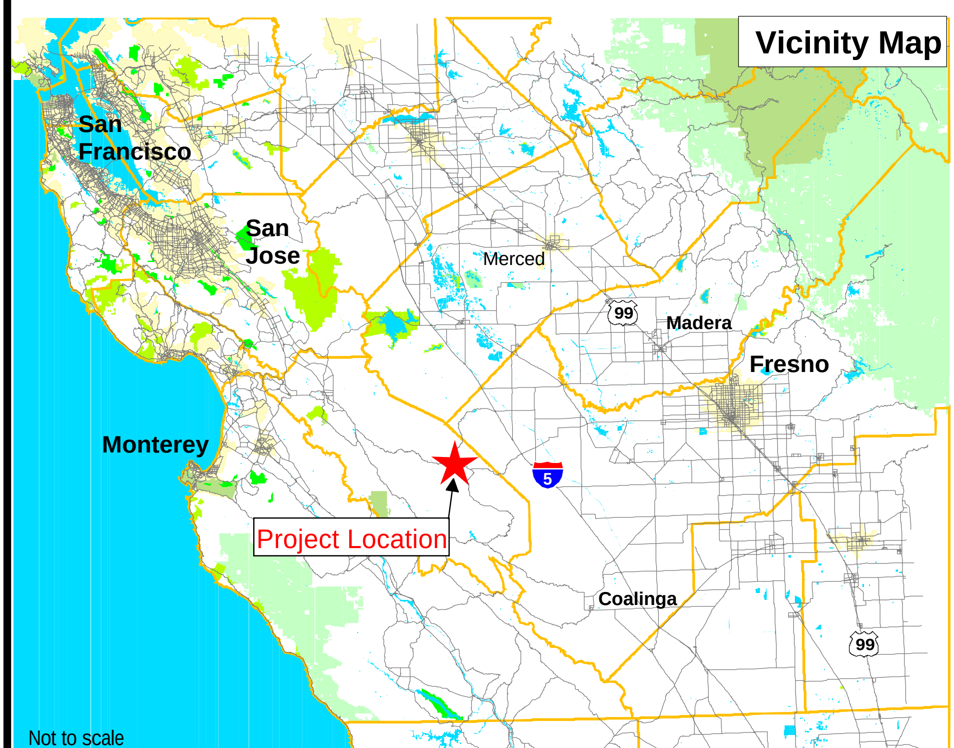
The Applicant, Panoche Valley Solar LLC (formerly Solargen Energy, Inc.) intends to construct a utility-scale, photovoltaic (PV) solar energy production facility on the approximately 2,813-acre Project site, reduced from the original acreage of 4,885 acres (stated in the Final Environmental Impact Report), 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.

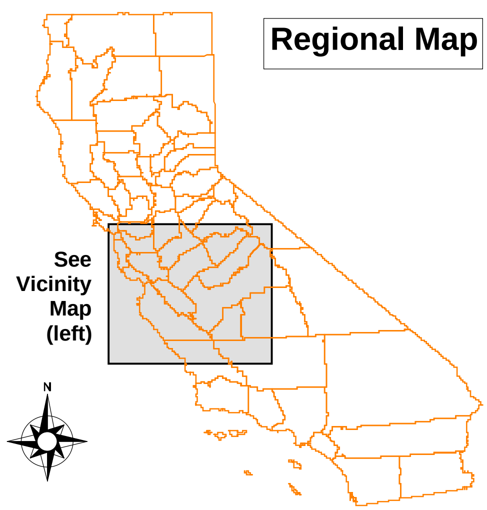
The Proposed Project evolved during San Benito County's 13 month environmental review process under the California Environmental Quality Act (CEQA). The Proposed Project was initially to produce 1,000 megawatts (MW) of PV solar energy from a facility incorporating approximately 10,000 acres of the Panoche 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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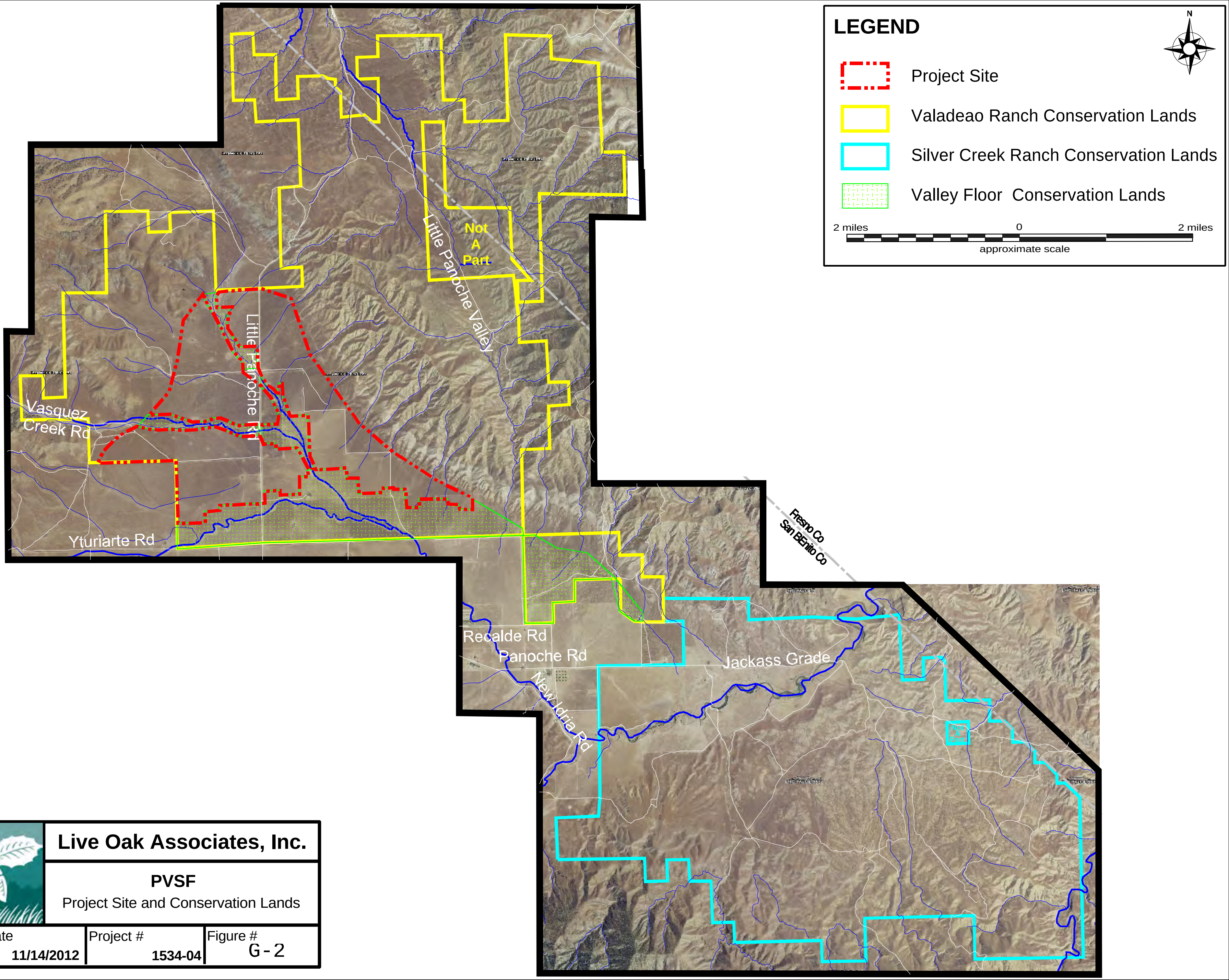
PVSF Vicinity Map		
Date 11/14/2012	Project # 1534-04	Figure # G-1



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Project Site and Conservation Lands

Date	Project #	Figure #
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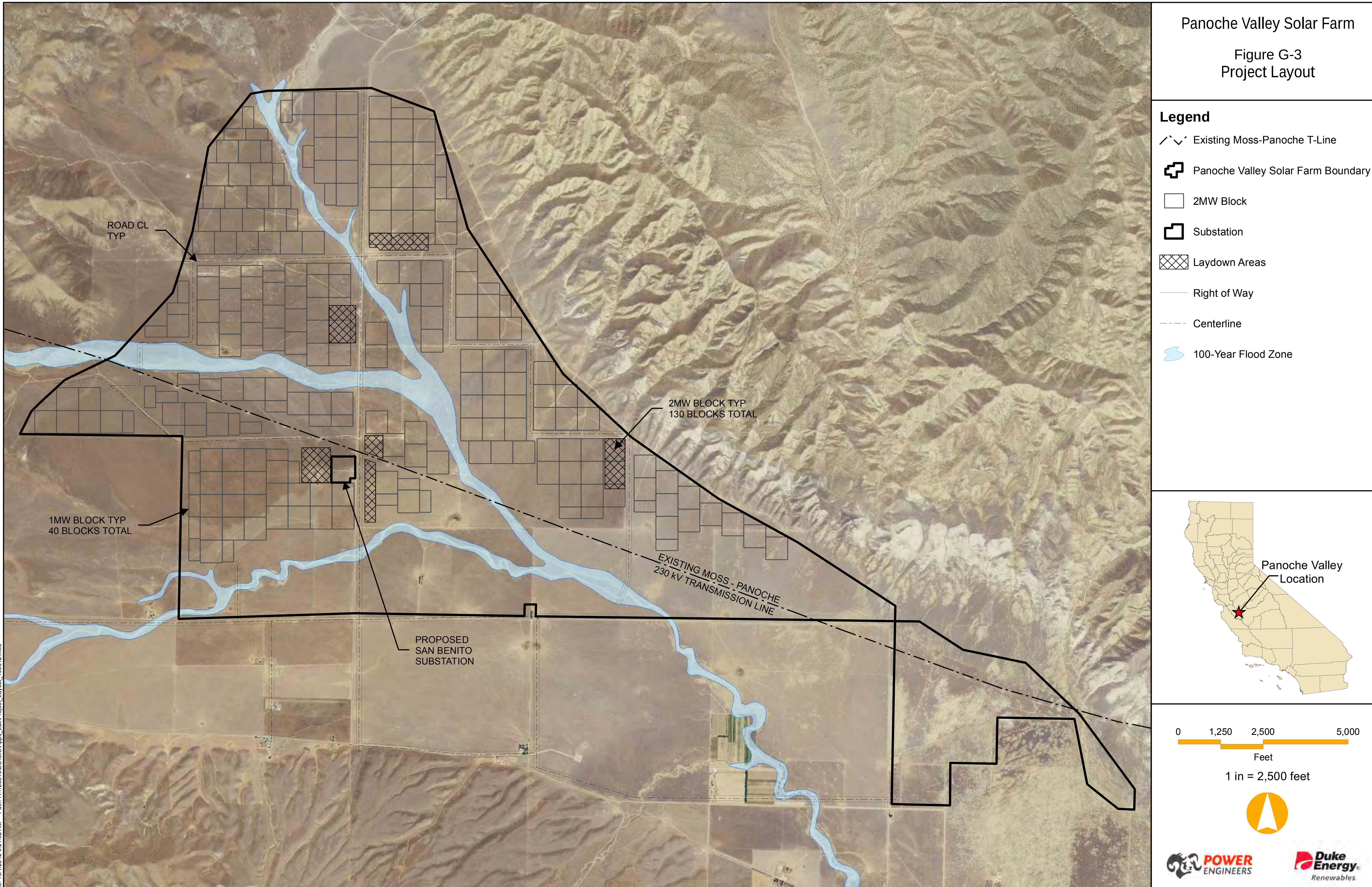


Panoche Valley Solar Farm

Figure G-3
Project Layout

1.2 OFF-SITE MITIGATION LANDS

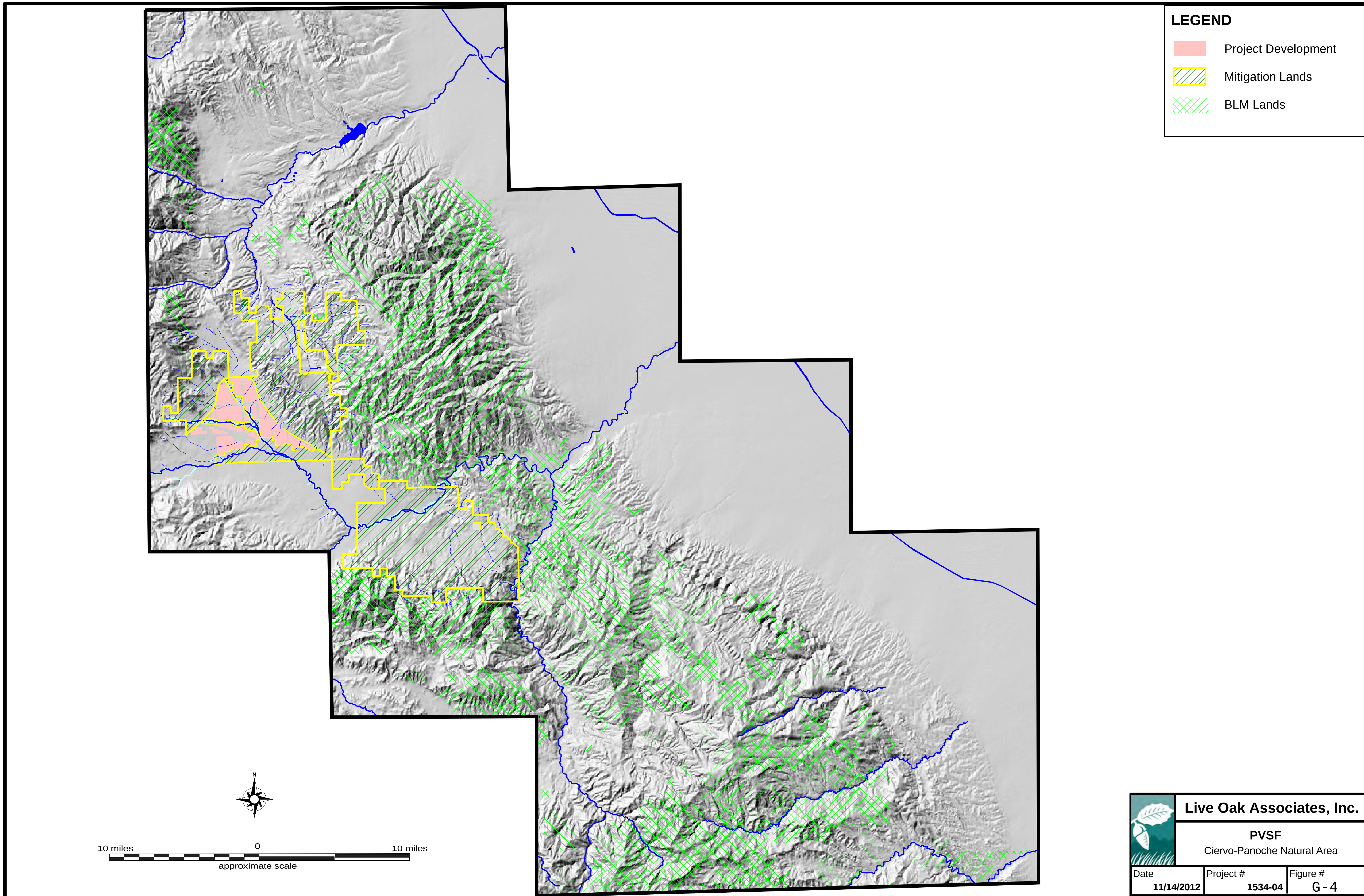
In addition to the designation of the Valley Floor Conservation Lands, the Proposed Project has also retained two large ranches for conservation purposes. These ranches, the Valadeao Ranch Conservation Lands (10,331 acres) and the Silver Creek Ranch Conservation Lands (10,889 acres), are contiguous with 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
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Ciervo-Panoche Natural Area
Date
11/14/2012
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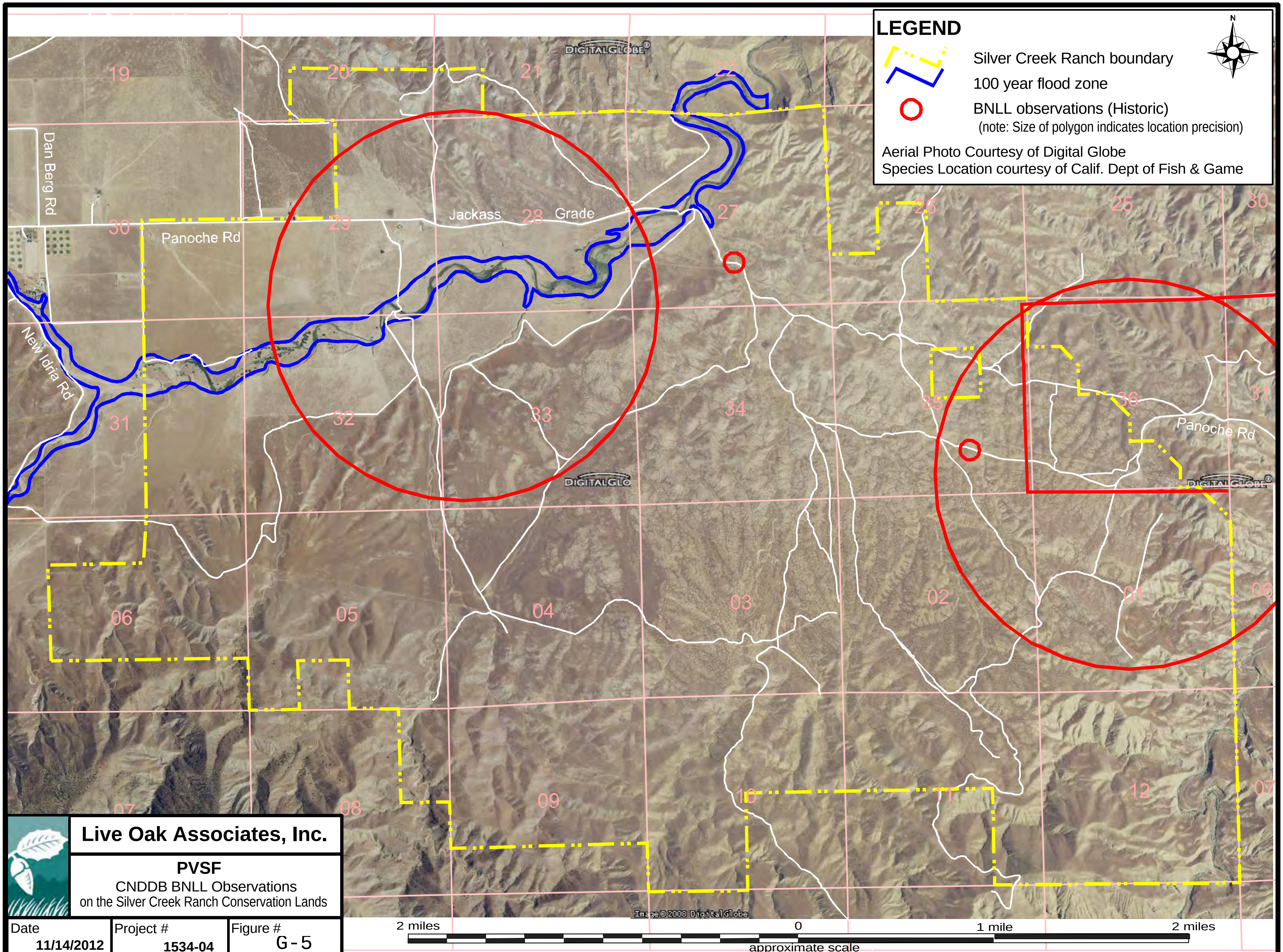
G-4

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

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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.

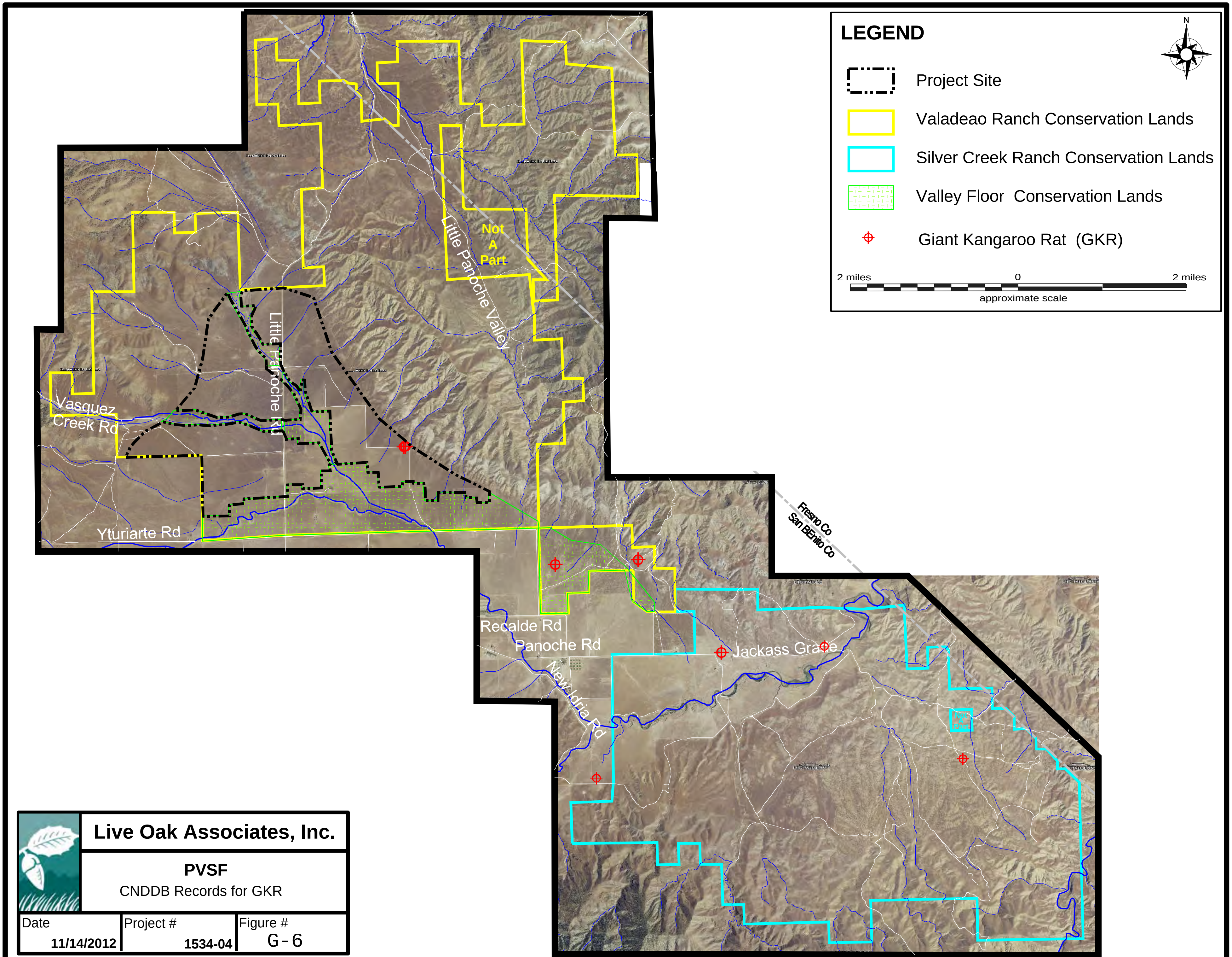
Williams and Germano (1992) examined the state of endangered kangaroo rats in the San Joaquin Valley in order to guide recovery planning. One of the sites Williams and Germano surveyed for potential habitat in western Fresno and eastern San Benito counties included the Tumey-Panoche region (which is 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

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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.

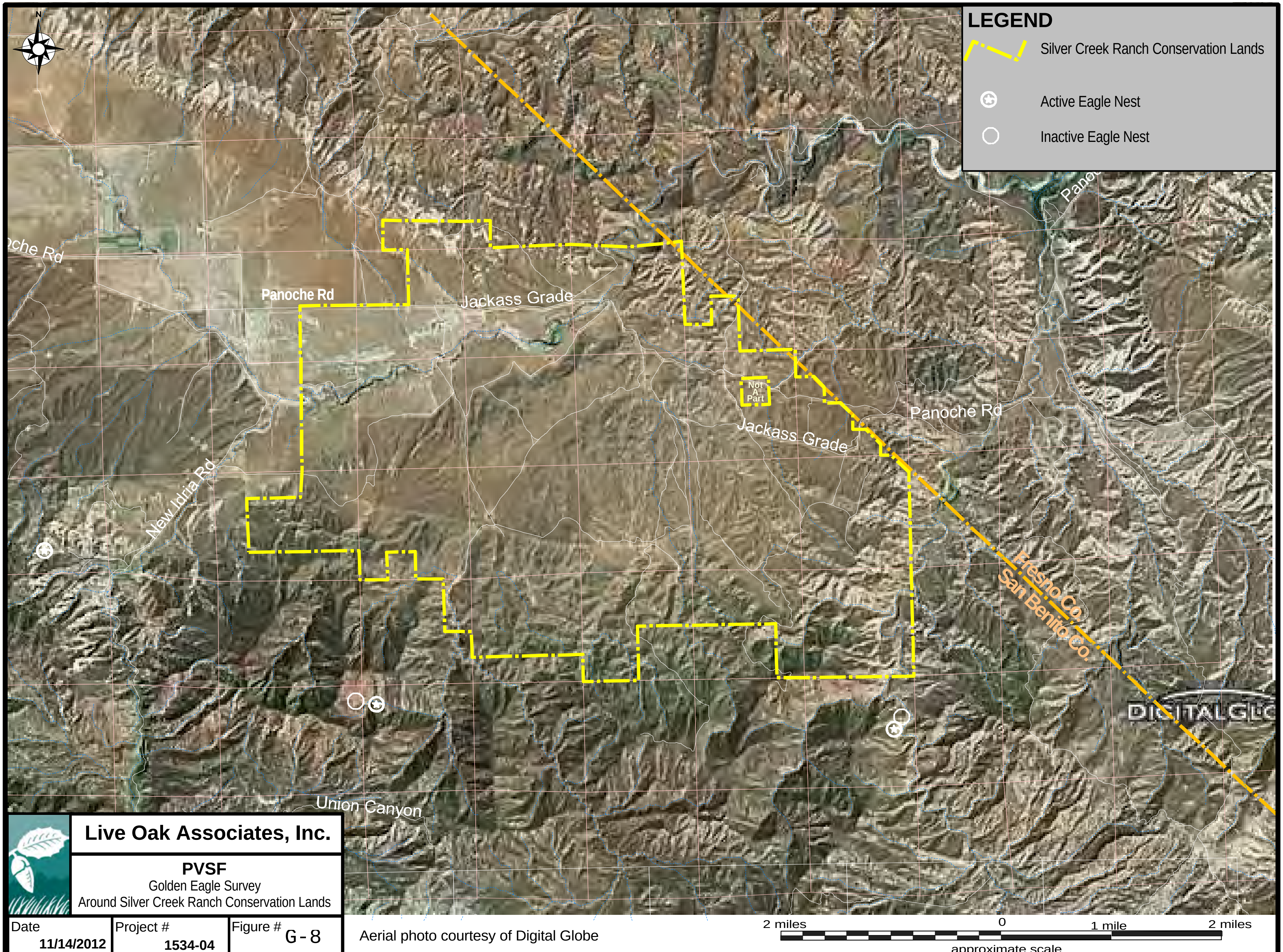
2 CONFIRMATION OF PRESENT CONDITIONS OF SPECIAL STATUS SPECIES ON THE SILVER CREEK RANCH IN 2010

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

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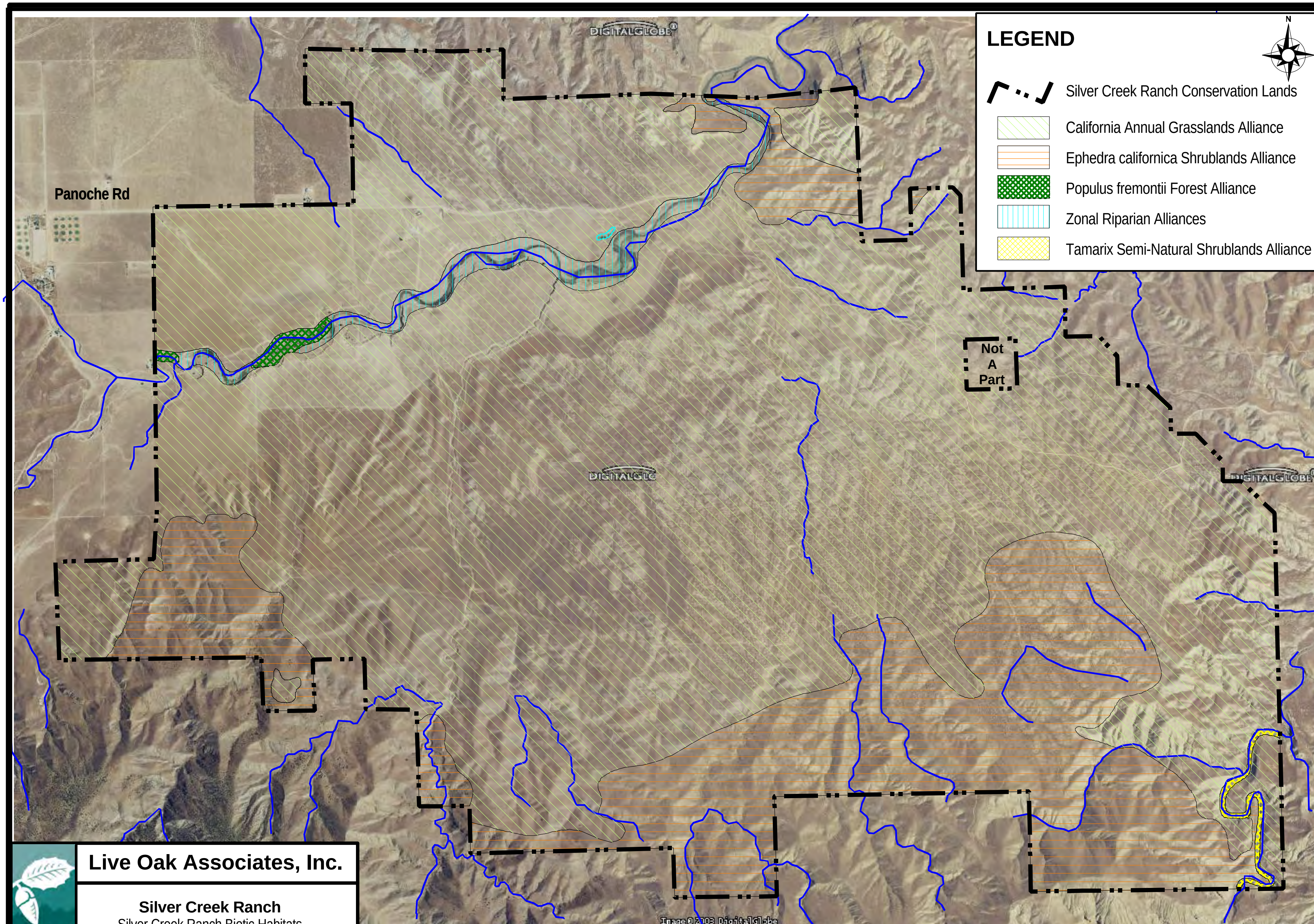
Habitat Mapping of the Silver Creek Ranch Conservation Lands

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.



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approximate scale

Aerial photo courtesy of Digital Globe

Live Oak Associates, Inc.

Silver Creek Ranch

Silver Creek Ranch Biotic Habitats

Date	Project #	Figure #
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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

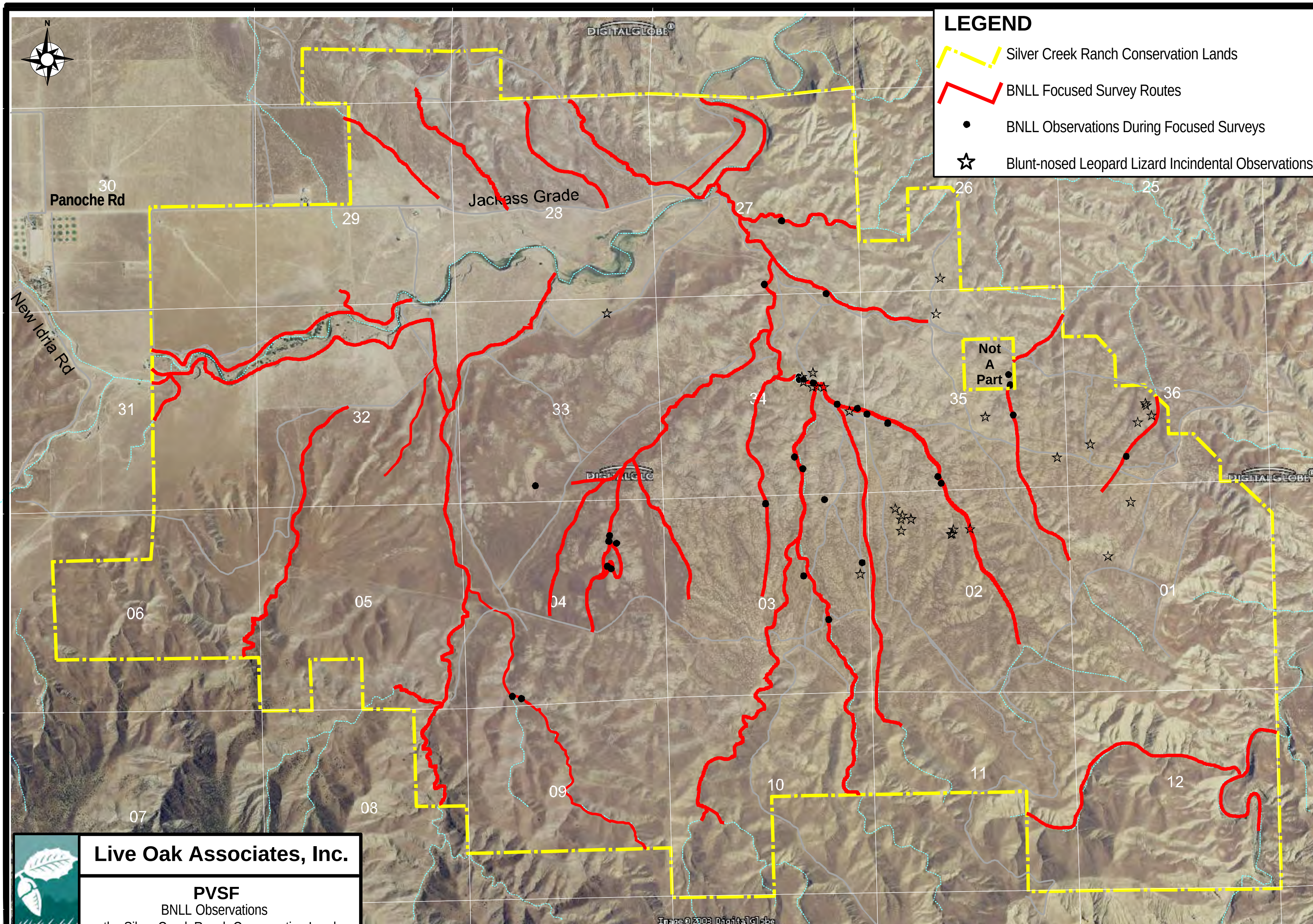
Survey Name	Survey Description	Dates	Lands Surveyed	Special Status Animal Species Detected
Hydrology and CTS Reconnaissance Survey	Identify locations to construct new CTS ponds.	June 28, 2012	Valadeao Ranch and Silver Creek Ranch Conservation Lands (CL)	GKR, SJKF
Blunt-nosed Leopard Lizard Focused Survey (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.



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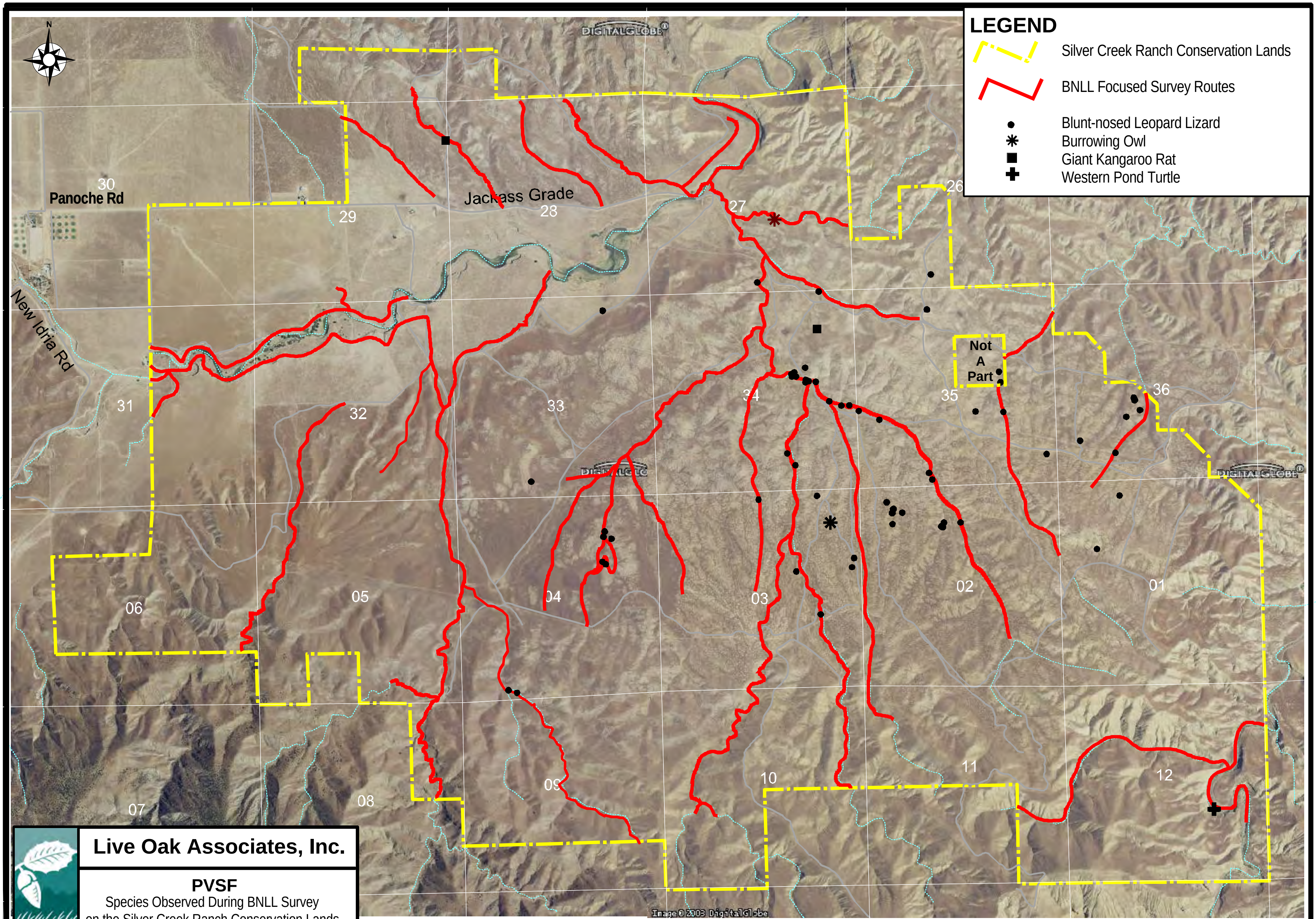
BNLL Observations
on the Silver Creek Ranch Conservation Lands

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.

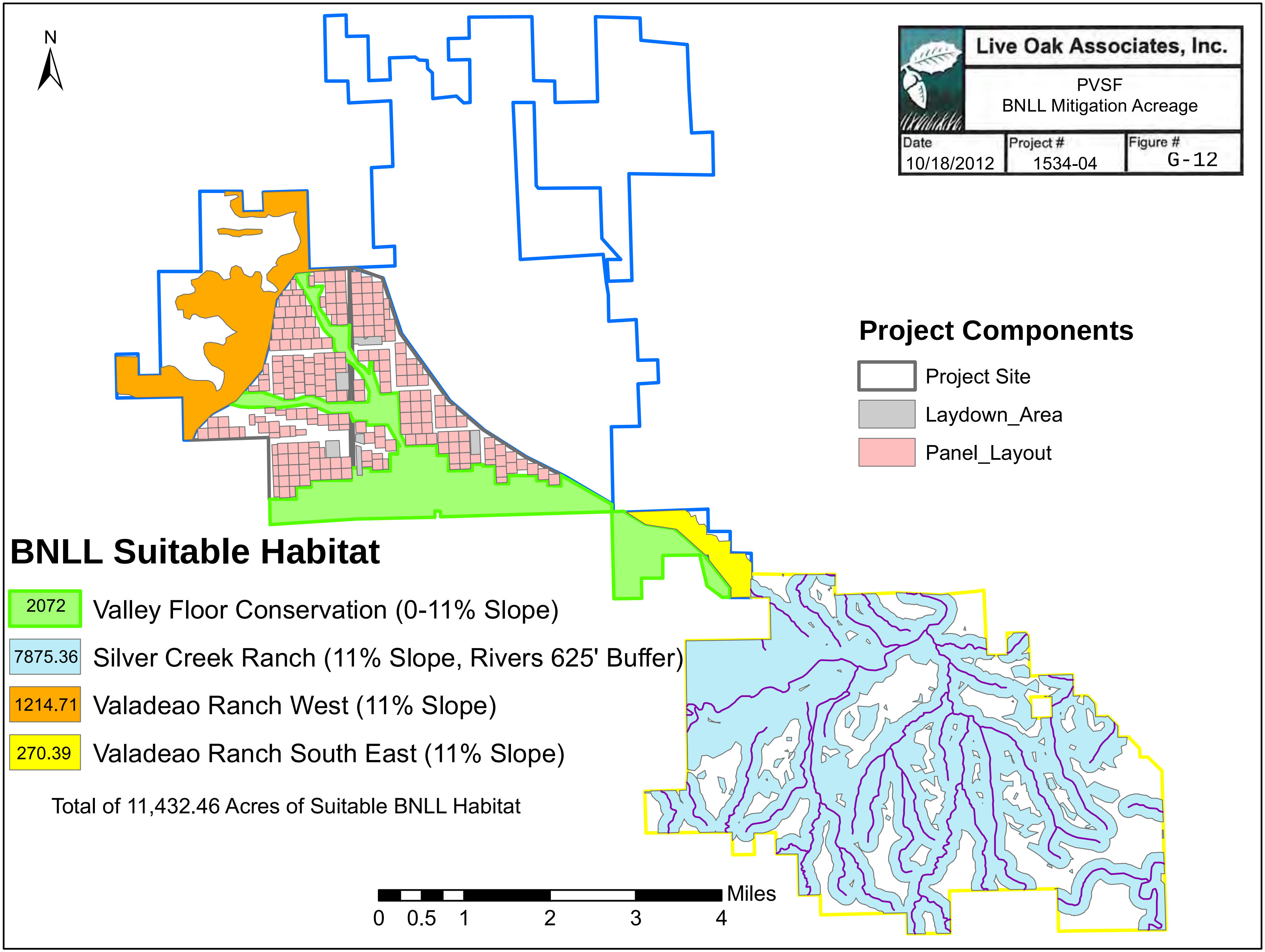
3.1.3 Determination of Blunt-nosed Leopard Lizard Estimates and Methodology

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
Miles
0 0.5 1 2 3 4

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

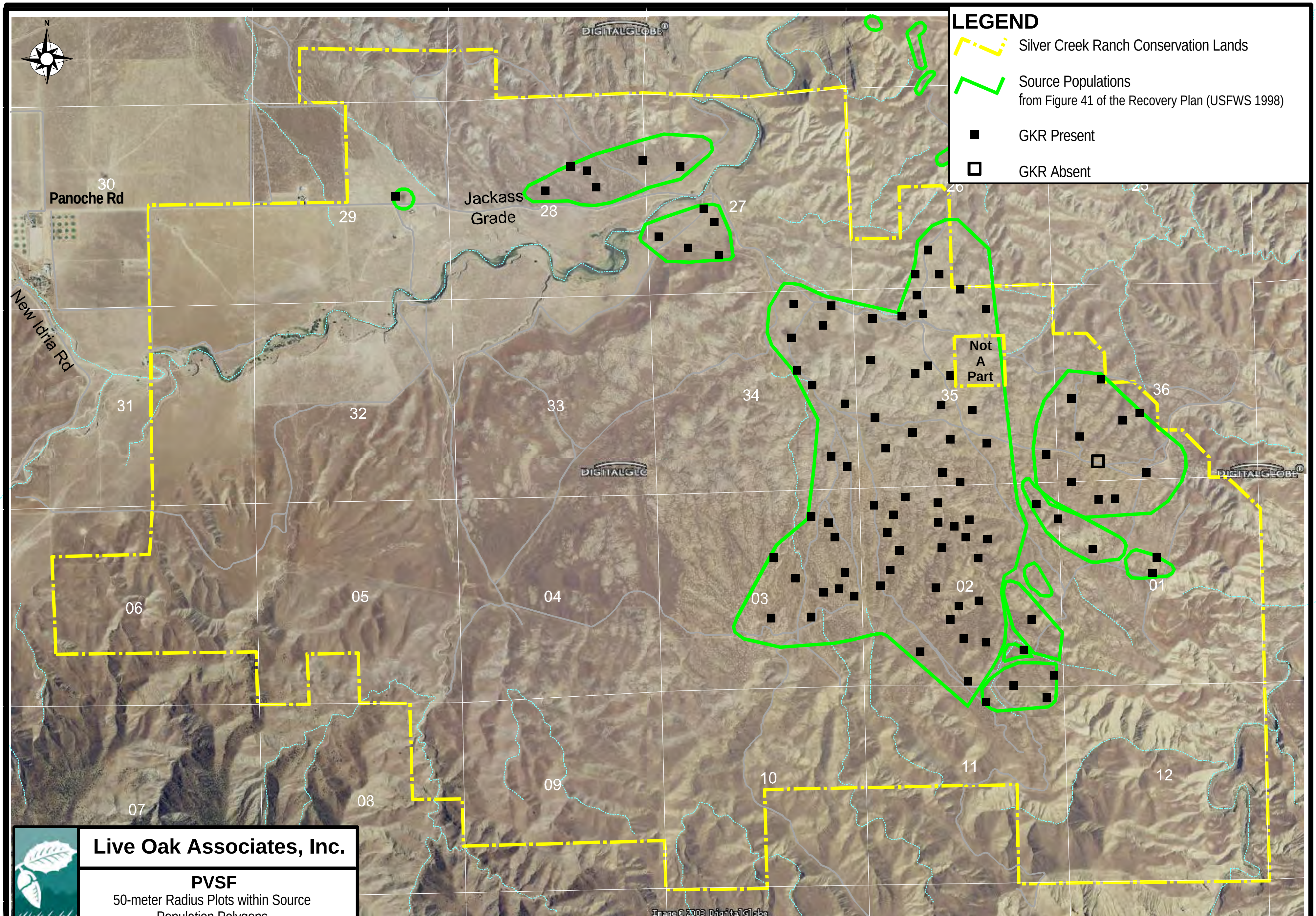
3.2 GIANT KANGAROO RAT FOCUSED SURVEYS

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.



Live Oak Associates, Inc.

PVSF

50-meter Radius Plots within Source Population Polygons

Date	Project #	Figure #
11/14/2012	1534-04	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).

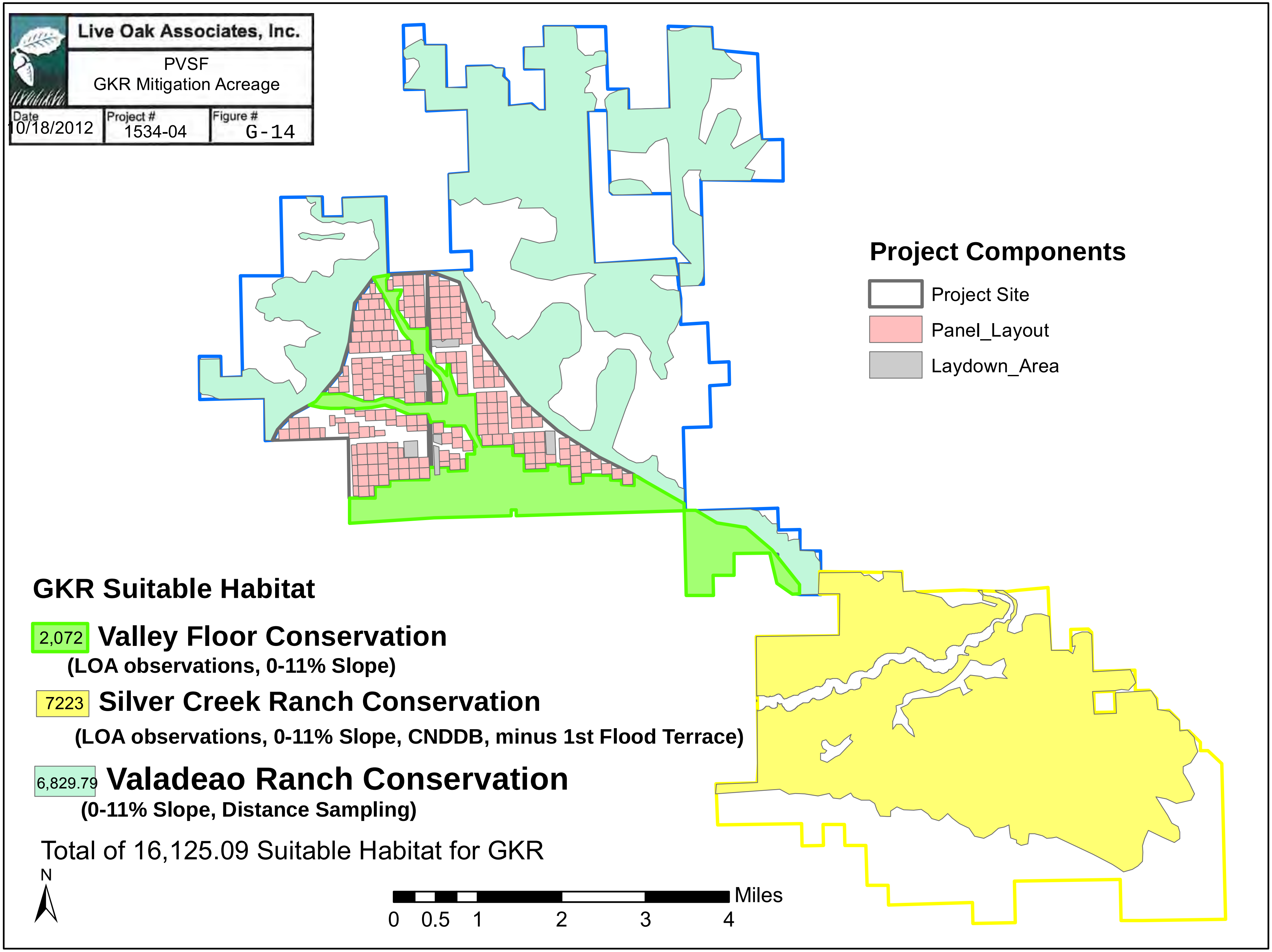

Live Oak Associates, Inc.
PVSF
GKR Mitigation Acreage
Date
10/18/2012
Project #
1534-04
Figure #
G-14
Project Components
Project Site
Panel_Layout
Laydown_Area
GKR Suitable Habitat
2,072
Valley Floor Conservation
(LOA observations, 0-11% Slope)
7223
Silver Creek Ranch Conservation
(LOA observations, 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
Miles
0 0.5 1 2 3 4

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.

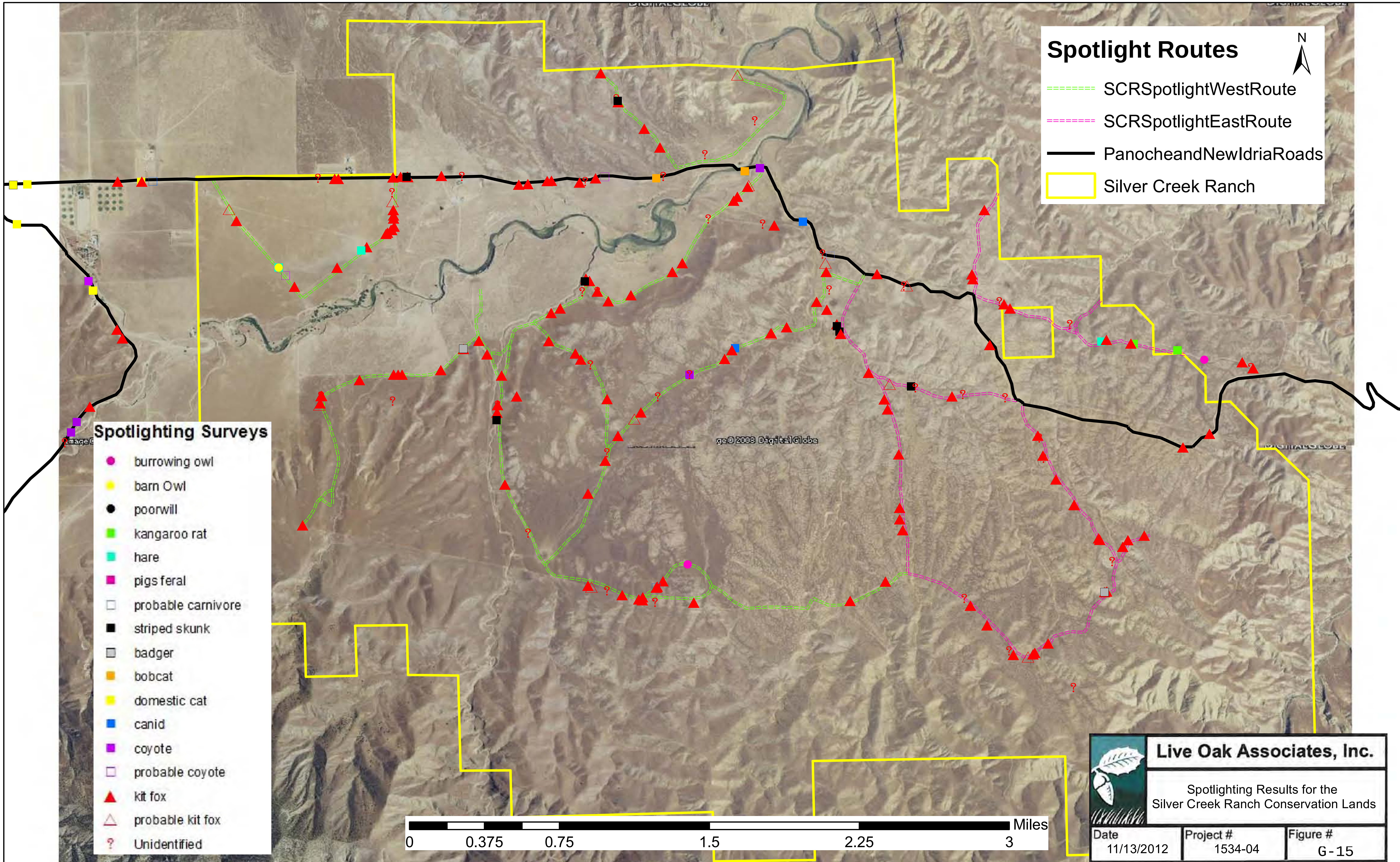
Spotlighting surveys were conducted on 20.5 nights (the half a night was due to vehicle trouble, and thus, an additional full night was spotlighted to compensate for this) surveying approximately 20 miles of public and ranch roads per night. Spotlighting was conducted on 10 nights on the eastern half of the ranch and 10.5 nights on the western half of the ranch.

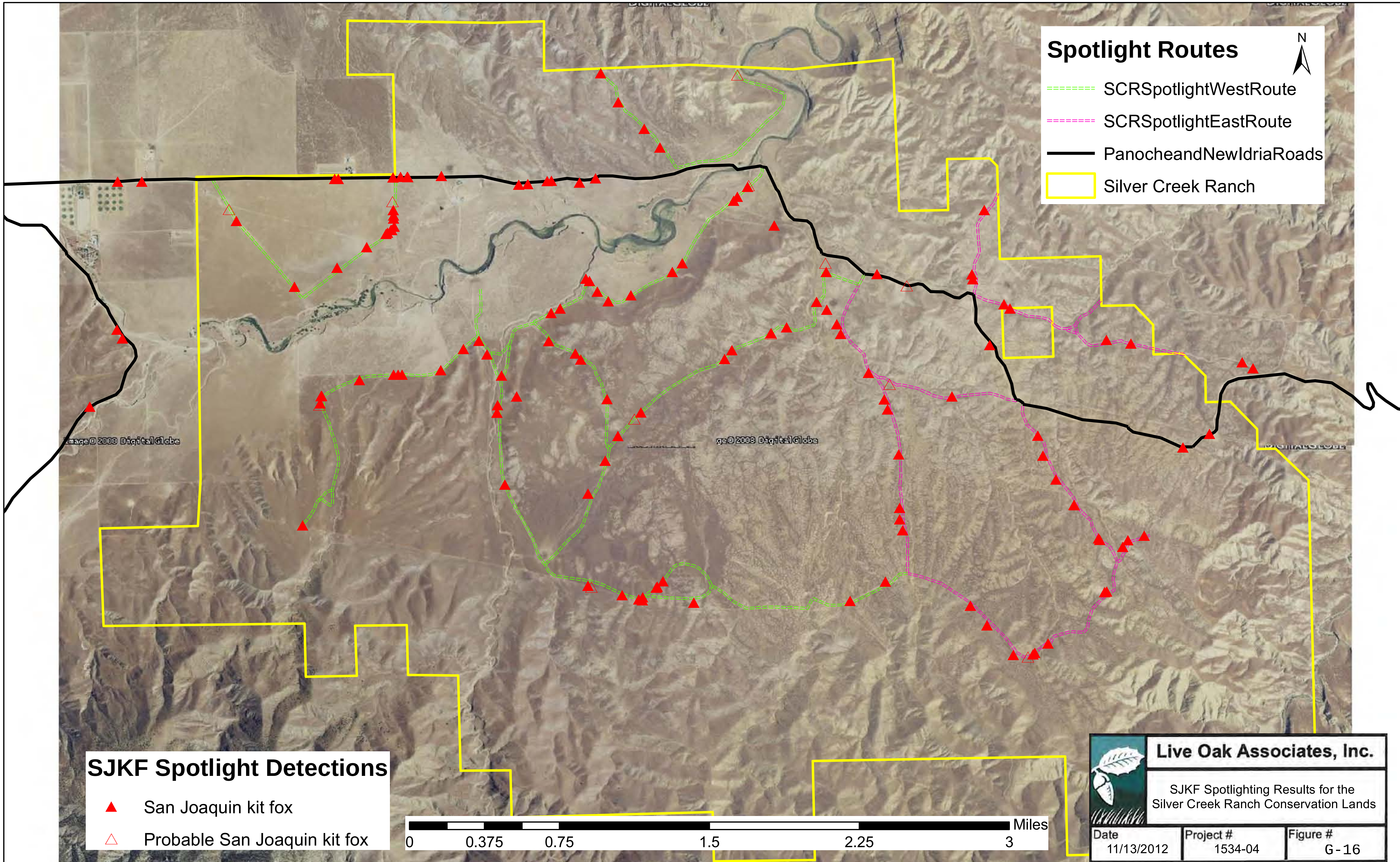
Camera Trap Station Surveys

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.

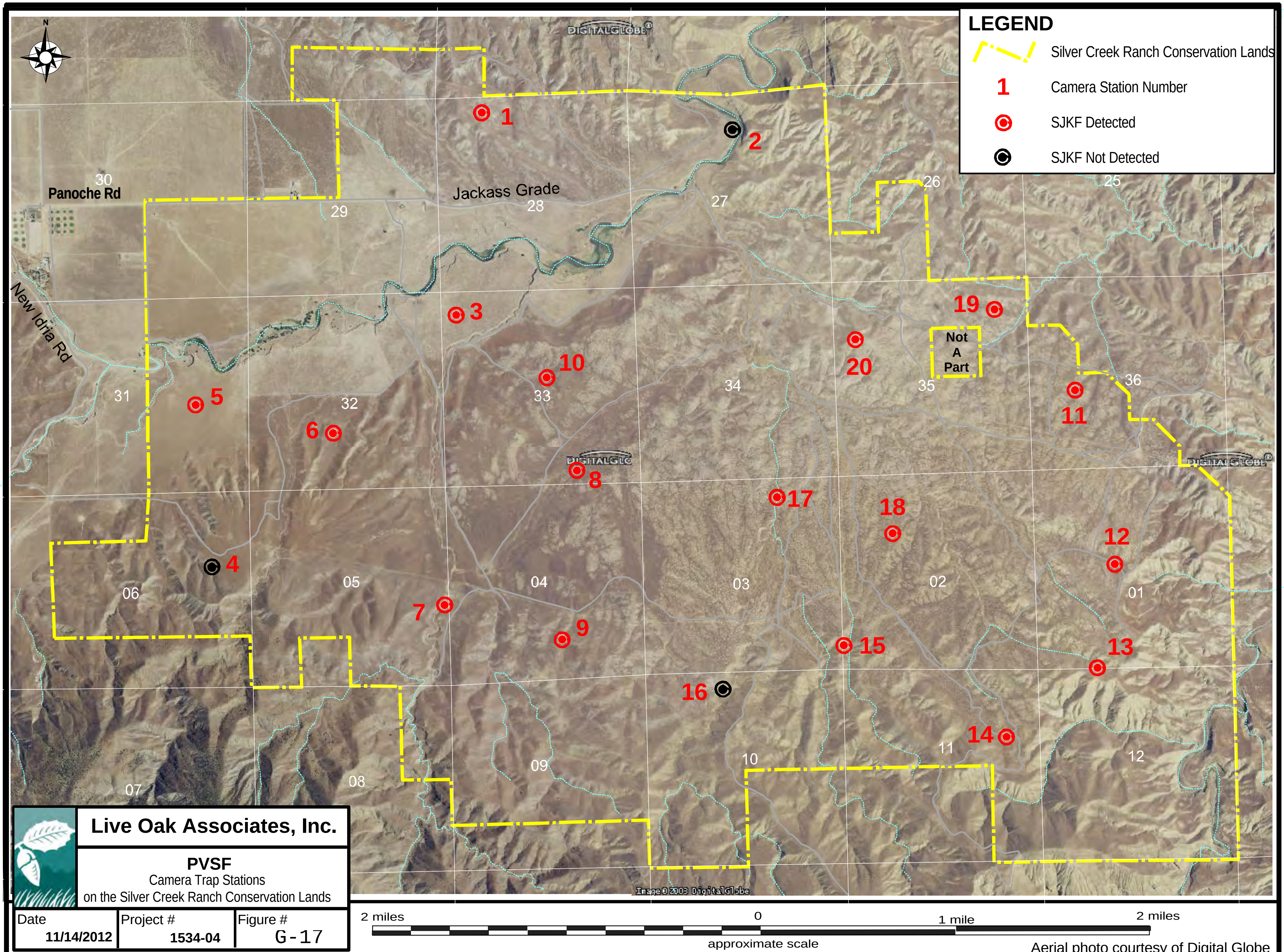
3.3.2 San Joaquin Kit Fox Survey Results

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



LEGEND
Silver Creek Ranch Conservation Lands
1 Camera Station Number
SJKF Detected
SJKF Not Detected
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
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
Image © 2003 DigitalGlobe
Live Oak Associates, Inc.
PVSF
Camera Trap Stations
on the Silver Creek Ranch Conservation Lands
Date
11/14/2012
Project #
1534-04
Figure #
G-17
2 miles
0
1 mile
2 miles
approximate scale
Aerial photo courtesy of Digital Globe

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

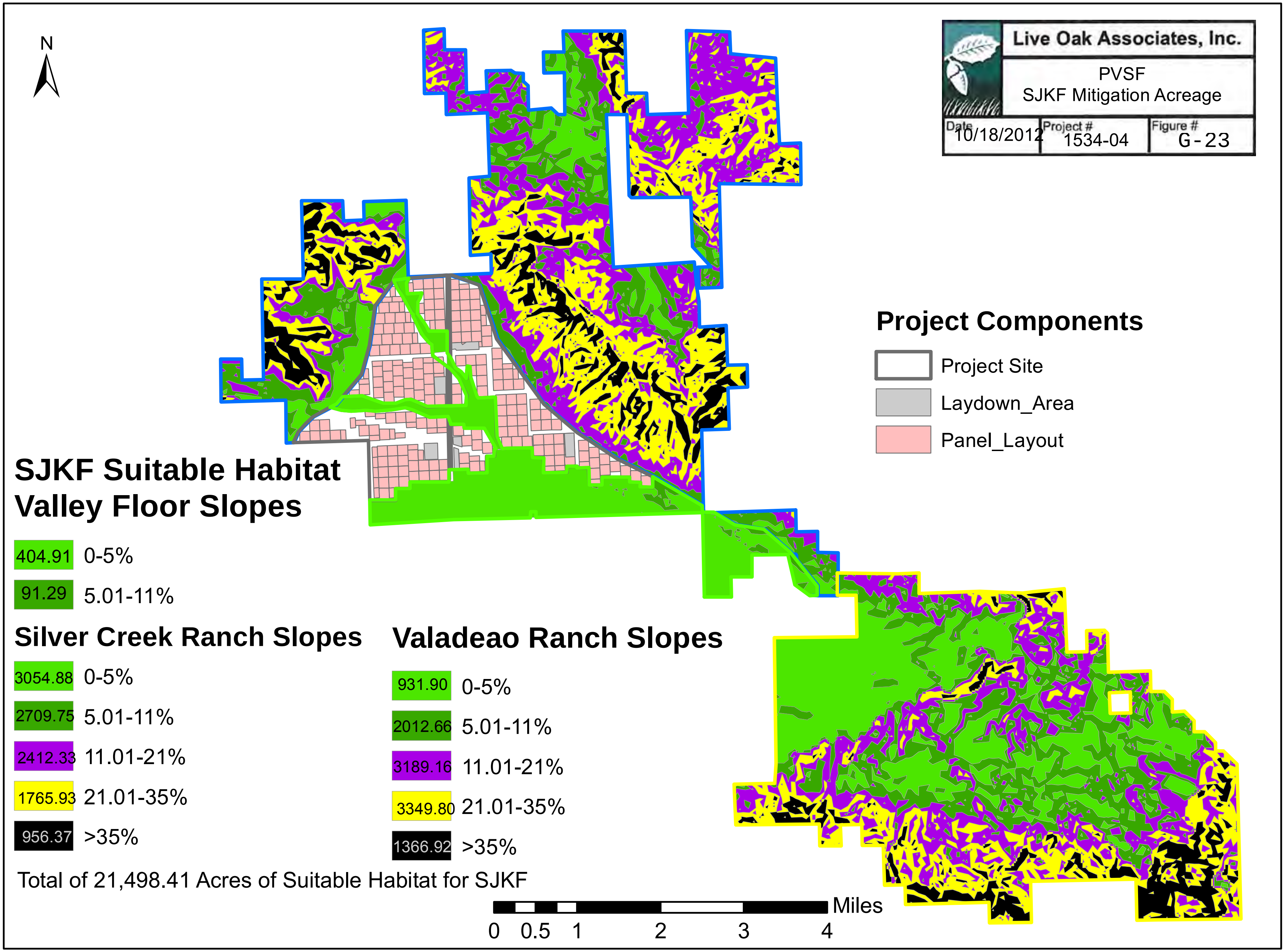
LOA conducted focused BNLL and GKR surveys, as well as SJKF spotlight and camera trap surveys on the Silver Creek Ranch Conservation Lands in order to assess the current conditions of special status species on the Ranch. According to the results of these surveys, the Silver Creek Ranch Conservation Lands support BNLL, SJAS, GKR, and SJKF in high densities.

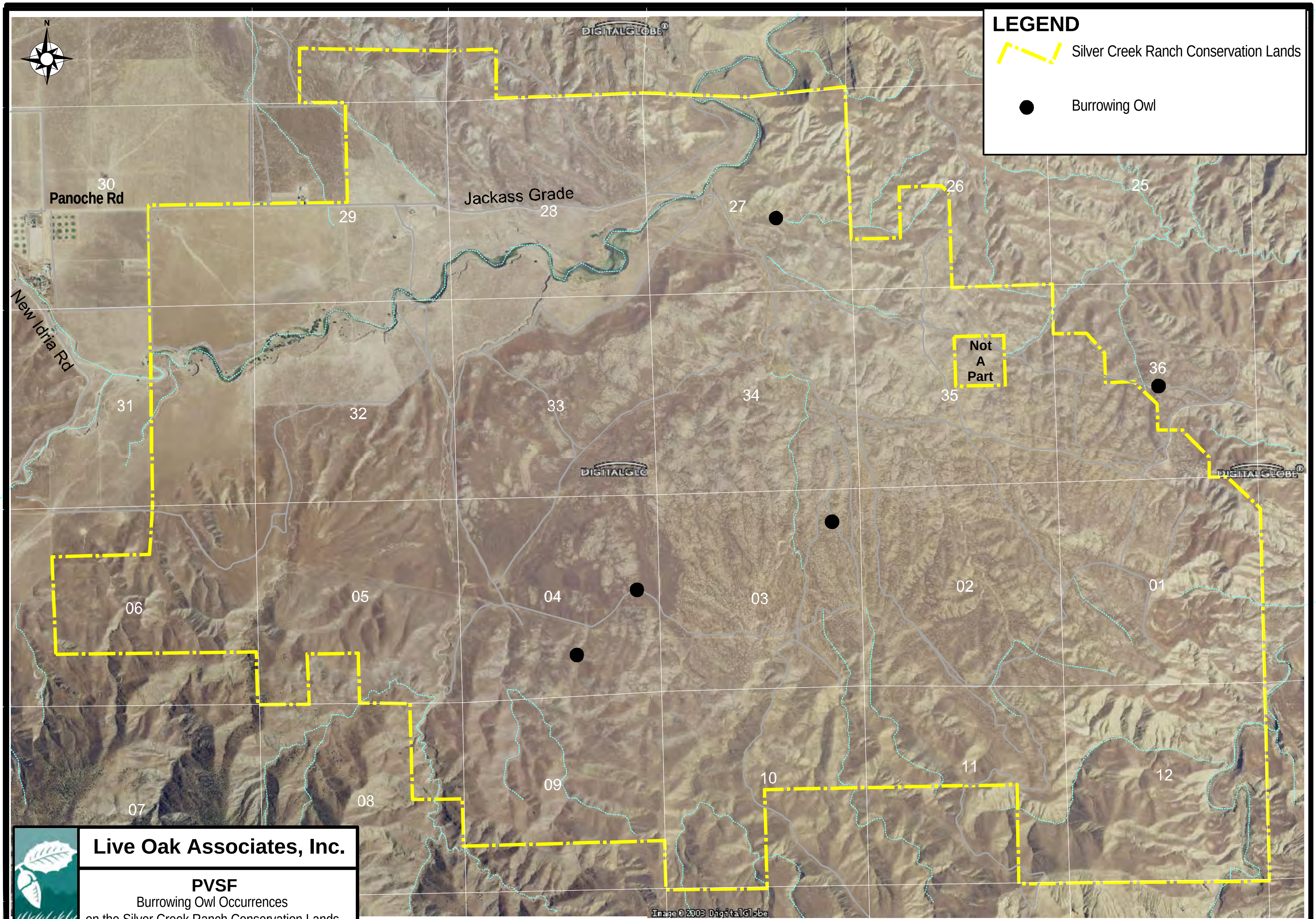
GKR colonies defined by Williams et al. (1995) were confirmed both on the Silver Creek Ranch and on the Valley Floor Conservation Lands. Williams et al. (1995) identified larger and more GKR colonies on the Silver Creek Ranch than on the valley floor in the 1992-1993 study, and this is still true today, 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
0 0.5 1 2 3 4 Miles

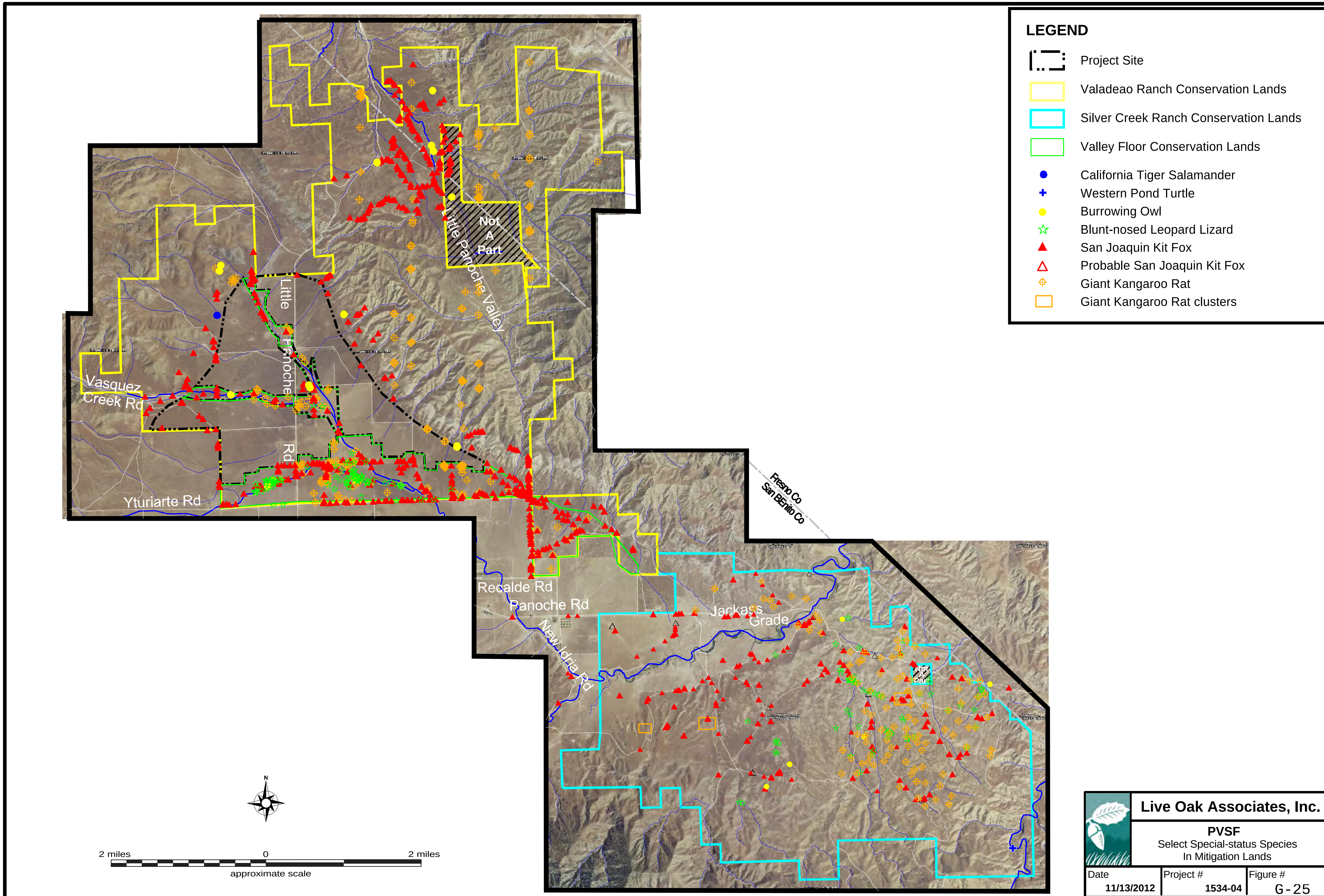


Aerial photo courtesy of Digital Globe

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



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

PROJECT CONTACT:
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EMAIL:
ben.bainbridge@powereng.com
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208-788-0391

POWER ENGINEERS

California Tiger Salamander Mitigation Pond Proposal

PREPARED FOR: PANOCHE VALLEY SOLAR, LLC
PREPARED BY: BEN BAINBRIDGE

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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.

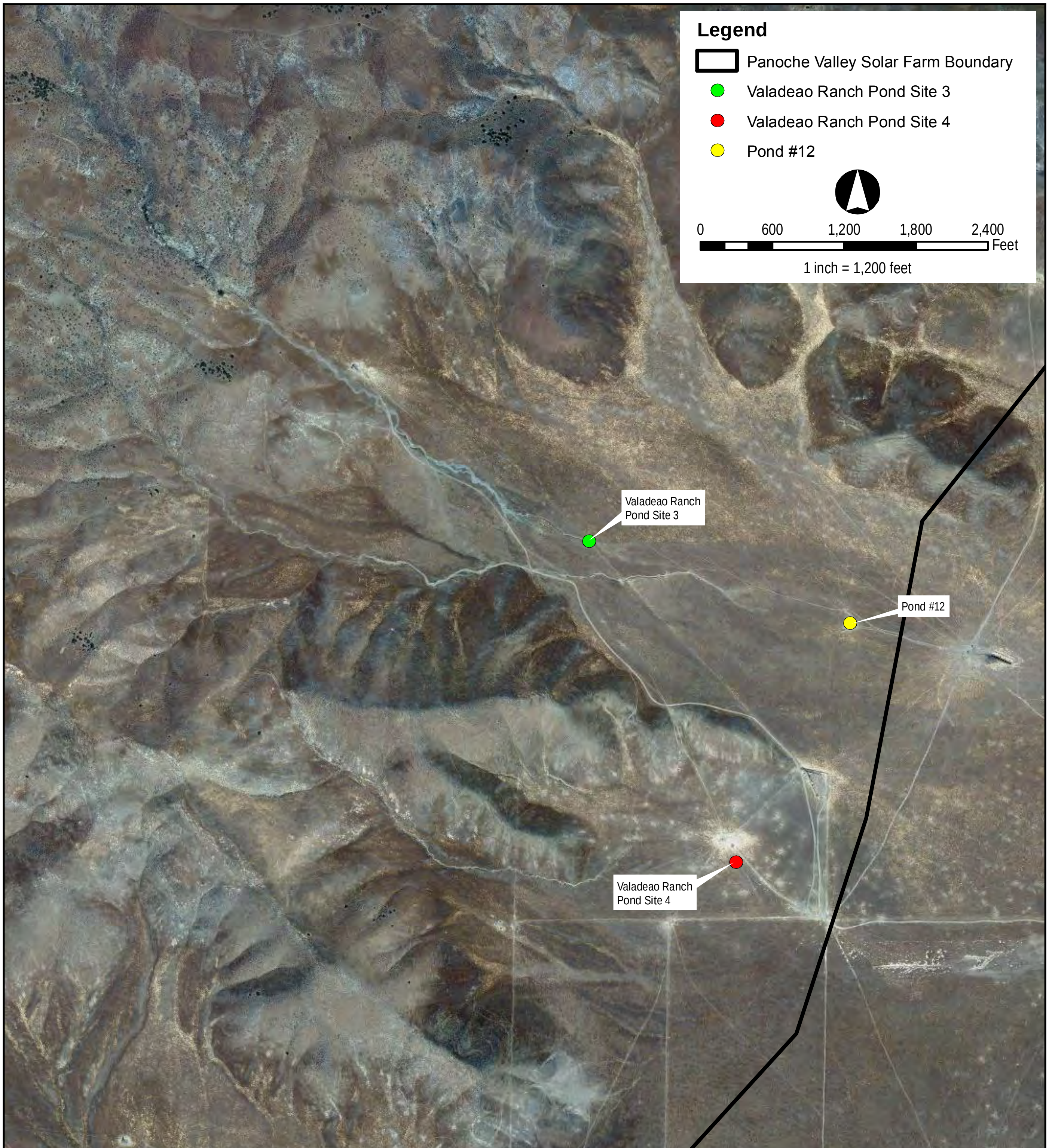
The NRCS mapping indicates that Valadeao Ranch Pond Site 4 is located in Yolo Gravelly Loam, and has a hydraulic conductivity rating of 12.0 micrometers per second, or 1.7 inches per hour. For purposes of the modeling, 2.5% of the NRCS rate was utilized, which is 0.0425 inch per hour. This was based on the infiltration rate demonstrated by Pond 12.

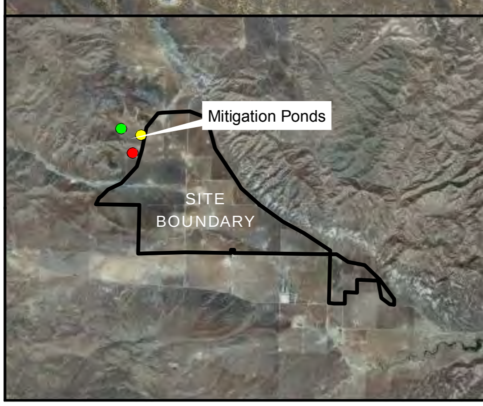
3.3 Silver Creek Pond Site 1

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.



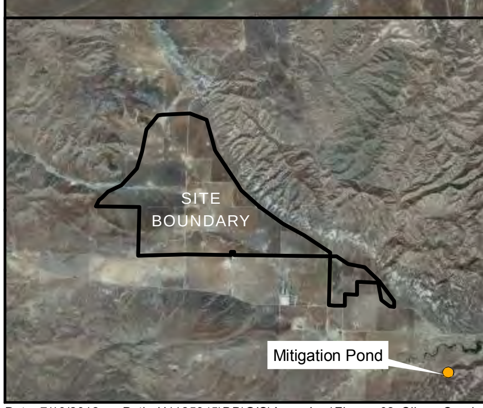


Panoche Valley Solar Farm

Figure 1
Valadeao Ranch Mitigation Ponds

POWER ENGINEERS

Duke Energy Renewables



Panoche Valley Solar Farm

Figure 2
Silver Creek Pond Site 1

POWER ENGINEERS

Duke Energy Renewables

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

[4]Due to unknown specifics of the watershed, a conservative value that is roughly double that of the existing Valadeo Ranch pond was used.

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			

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

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Prepared by:

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Katrina Krakow, M.S. Assistant Project Manager and Staff Ecologist

October 19, 2012 PN: 1534-04

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.

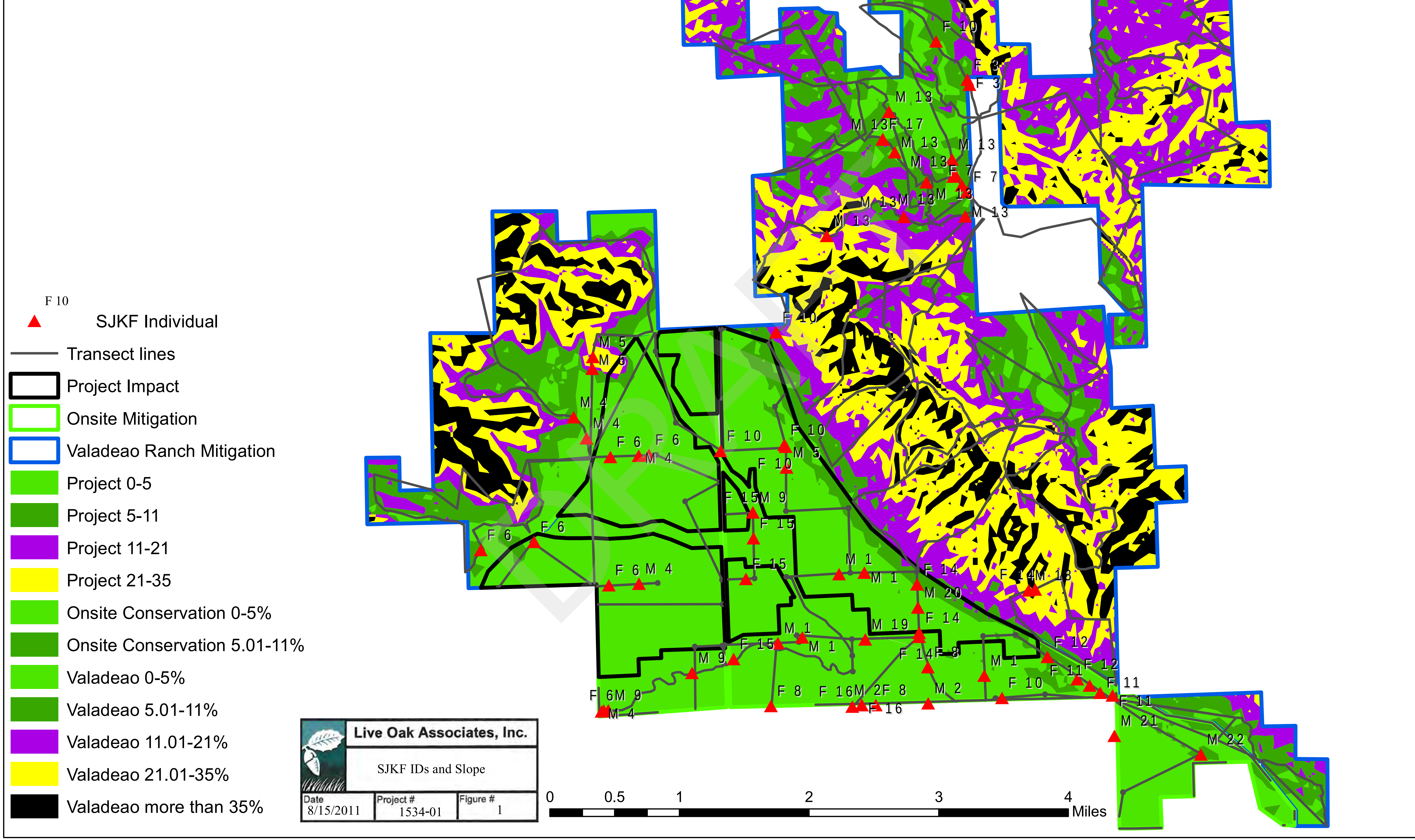
Table 1. Percent of transects sampled within slope ranges.

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



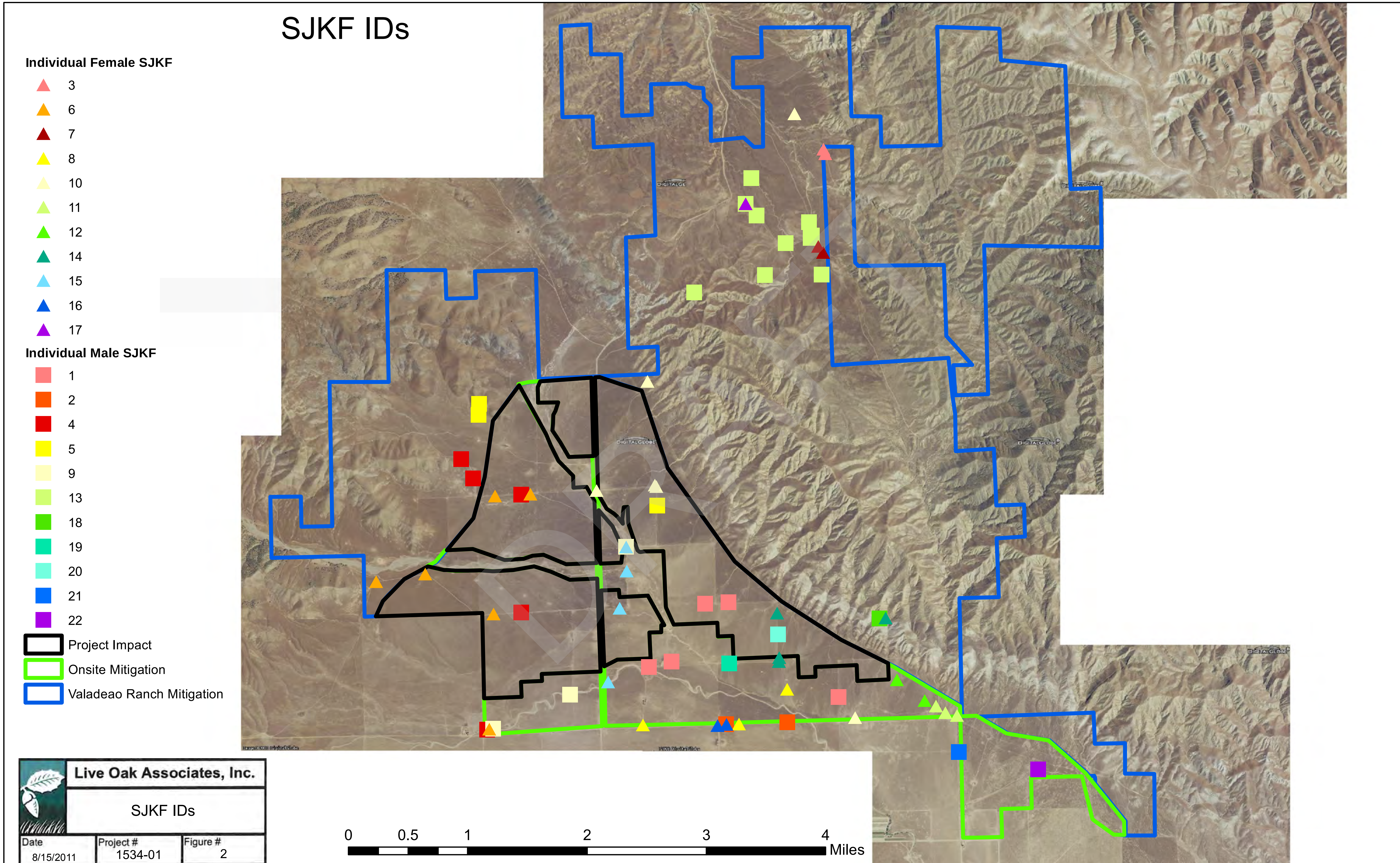
Twenty-two individuals, 11 males and 11 females, were identified by genetic analysis of 69 scat (Table 3, Figure 2). Although nine individuals were found on the Project site, only one individual #20 (male) was located exclusively within the Project boundary; however this was based on the location of 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
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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
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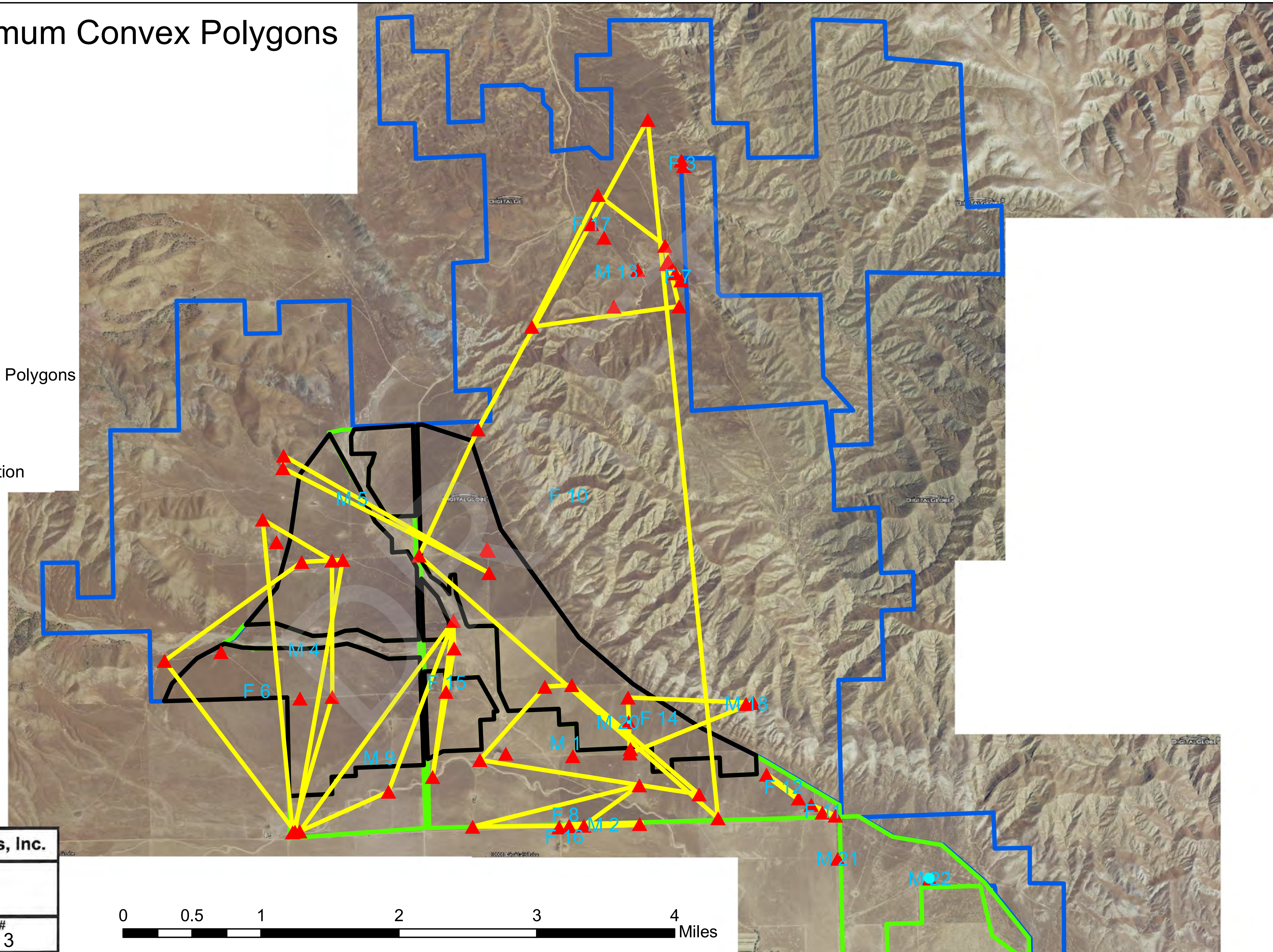
SJKF Minimum Convex Polygons

SJKF Individual
SJKF Minimum Convex Polygons
Project Impact
Onsite Mitigation
Valadeao Ranch Mitigation



Live Oak Associates, Inc.		
SJKF Minimum Convex Polygons		
Date 8/15/2011	Project # 1534-01	Figure # 3

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.

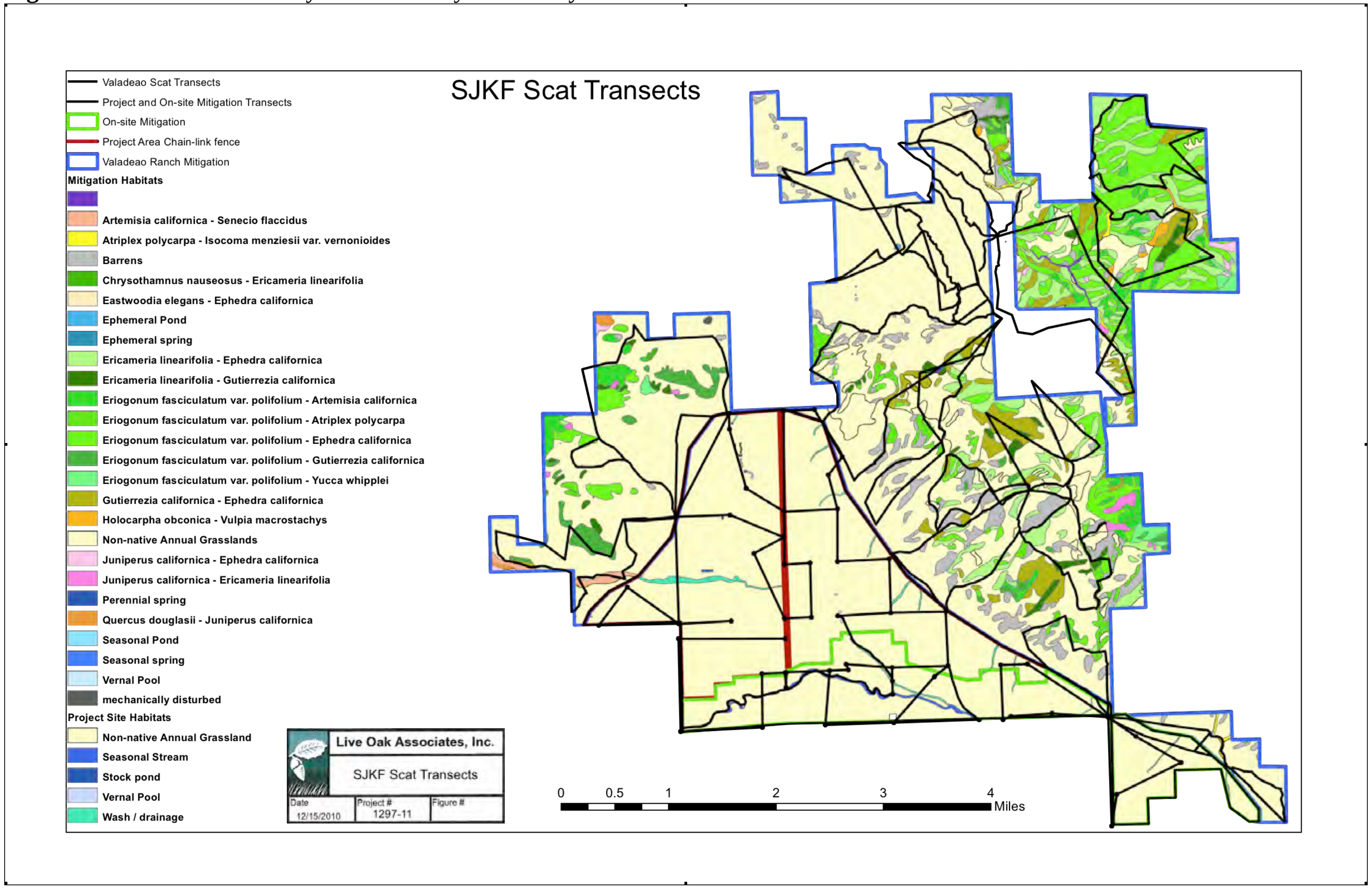
DNA Extraction

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.

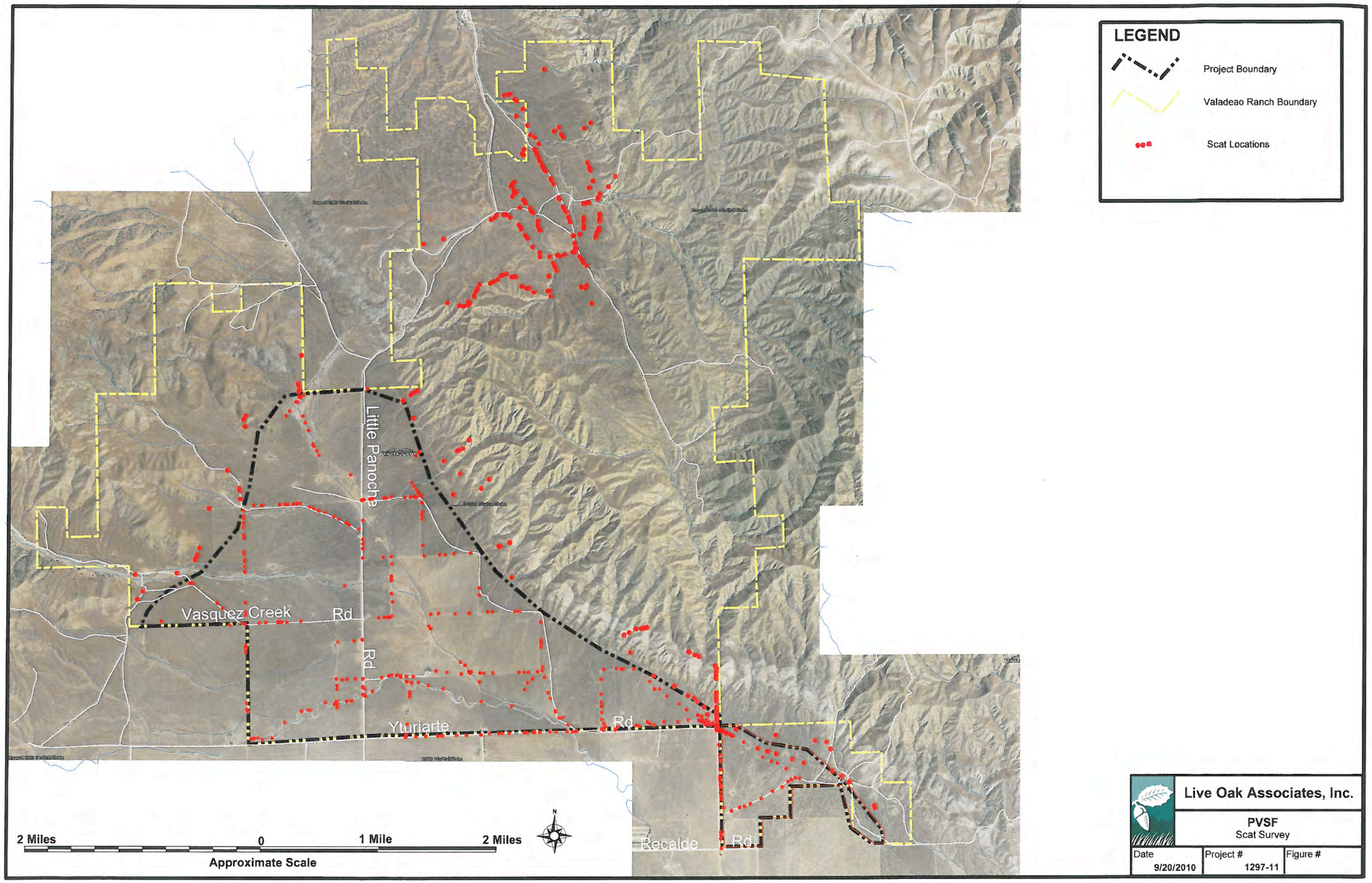
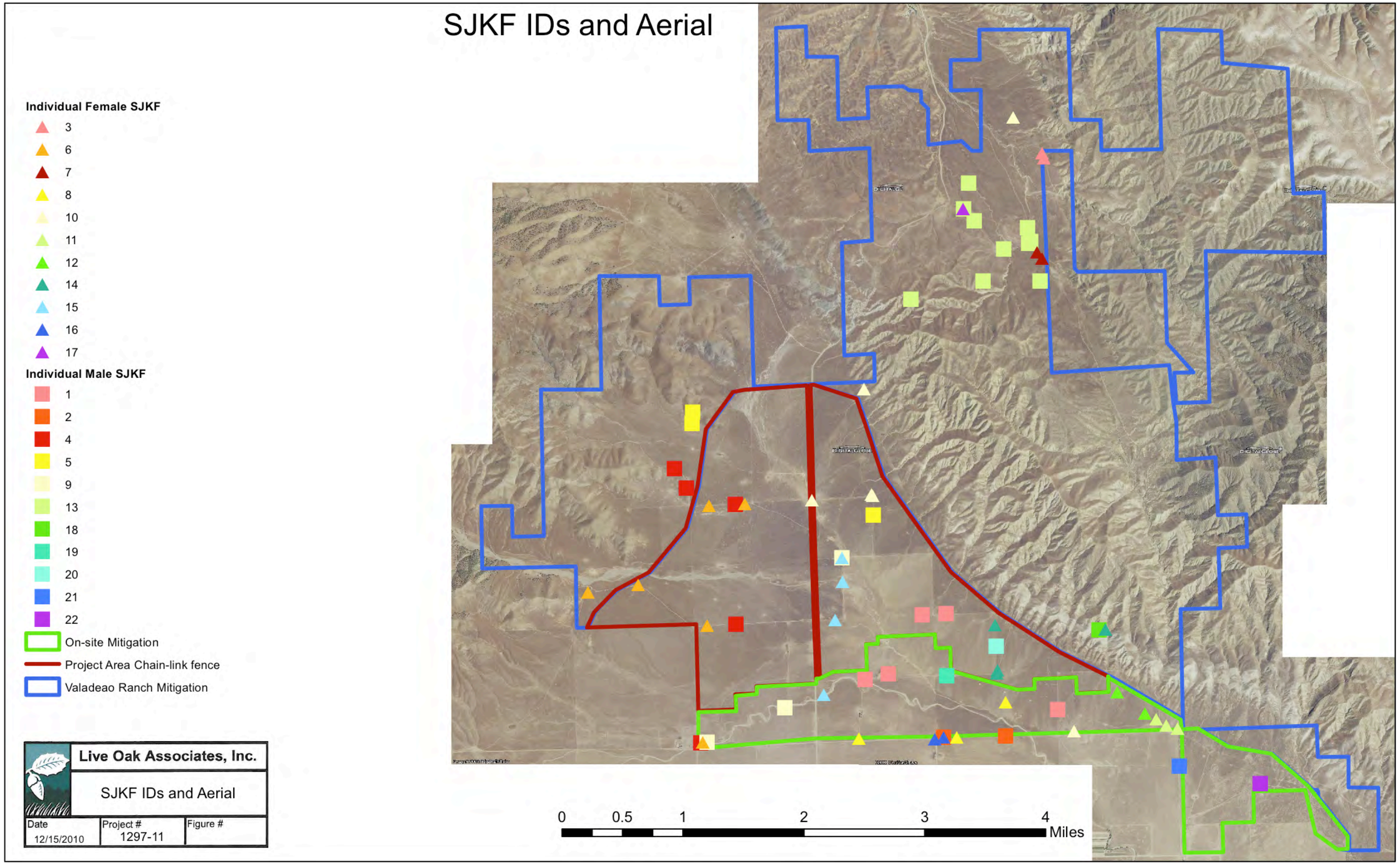


Figure 3. Location of the 69 scat samples that were genotyped and sexed from both surveys. The 22 kit fox individuals are separated by symbols into male and female, and the number of detections for each individual is provided in the legend. The scat collection points are overlaid in the map and scat 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.

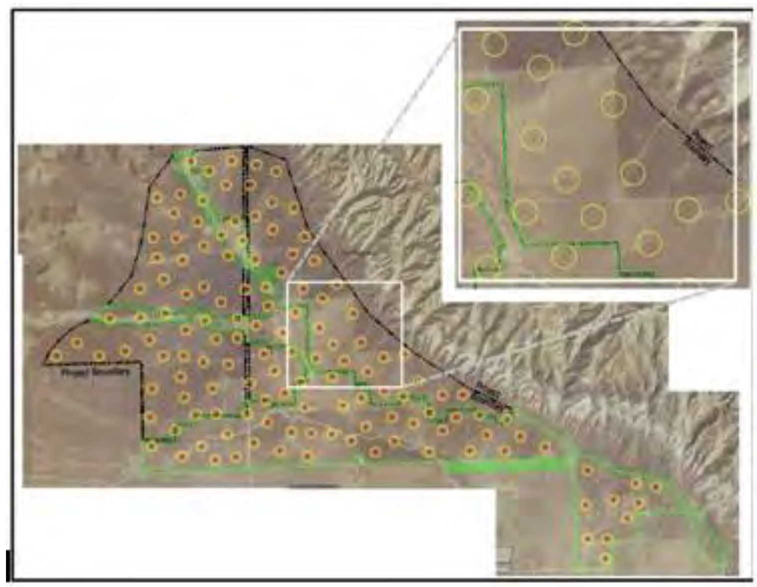
Sampling framework

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.

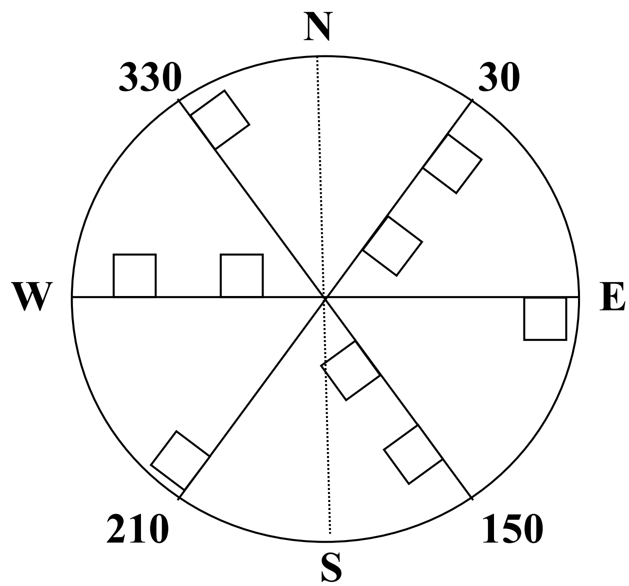


Figure F-2 Layout of Vegetation Sampling Quadrates

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

<u>SJKF Vehicle Strike Analysis</u>

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

Bjurlin, C. D. 2003. Effects of Roads on San Joaquin Kit Foxes: A Review and Synthesis of Existing Data. IN: Proceedings of the 2003 International Conference on Ecology and Transportation, Eds. Irwin CL, Garrett P, McDermott KP. Center for Transportation and the Environment, North Carolina State University, Raleigh, NC: pp. 397-406.

Bjurlin, C. D., B. L. Cypher, C. M. Wingert, and C. L. Van Horn Job. 2005. Urban Roads and the Endangered San Joaquin Kit Fox. Final Report Submitted to the California Department of Transportation Contract Number 65A0136. Pp. i-46.

Constable, J. L., B. L. Cypher, S. E. Phillips, P. A. Kelly. 2009. Conservation of San Joaquin Kit Foxes in Western Merced County, California. Prepared for the U. S. Bureau of Reclamation South-Central California Area Office. Pp. 1-48.

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Orloff, S., F. Hall, and L. Spiegel. 1986. Distribution and Habitat Requirements of the San Joaquin Kit Fox in the Northern Extreme of their Range. Transactions Western Section The Wildlife Society 22: 60-70.

Smith, D. A., K. Ralls, B. L. Cypher, H. O. Clark, Jr., P. A. Kelly, D. F. Williams, and J. E. Maldonado. 2006. Relative Abundance of Endangered San Joaquin Kit Foxes (*Vulpes macrotis mutica*) Based on Scat-Detection Dog Surveys. The Southwestern Naturalist 51(2): 210-219.

USFWS. 2011. U. S. Fish and Wildlife Service Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance. Prepared by the Sacramento Fish and Wildlife Office.

POWER ENGINEERS, INC.
ENERGY, FACILITIES, COMMUNICATIONS
3940 GLENBROOK DRIVE
PO BOX 1066
HAILEY, ID 83333

PHONE 208-788-3456
FAX 208-788-2082

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

<u>List of Attachments:</u>

- 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:	8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required)
First - Eric Middle - T. Last – Cherniss	First - Kevin Middle - L. Last – Lincoln
Company – Solargen Energy	Company – POWER Engineers, Inc.
E-mail Address – echerniss@solargen-energy.com	E-mail Address – kevin.lincoln@powereng.com
6. APPLICANT'S ADDRESS.	9. AGENT'S ADDRESS
Address - 20400 Stevens Creek Blvd. Ste. 700	Address - 3940 Glenbrook Dr.
City – Cupertino State – CA Zip – 95014 Country – USA	City – Hailey State – ID Zip – 83333 Country – USA
7. APPLICANT'S PHONE NOs. W/AREA CODE.	10. AGENT'S PHONE NOs. W/AREA CODE
a. Residence b. Business (408) 460-8200 c. Fax	a. Residence b. Business (208) 309-3389 c. Fax

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)	14. PROJECT STREET ADDRESS (if applicable)
Panoche Creek, Las Aguilas Creek	Address Little Panoche Road Panoche Valley, San Benito County
15. LOCATION OF PROJECT	
Latitude: °N 36.643 Longitude: °W -120.873	City - State – CA Zip -

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	

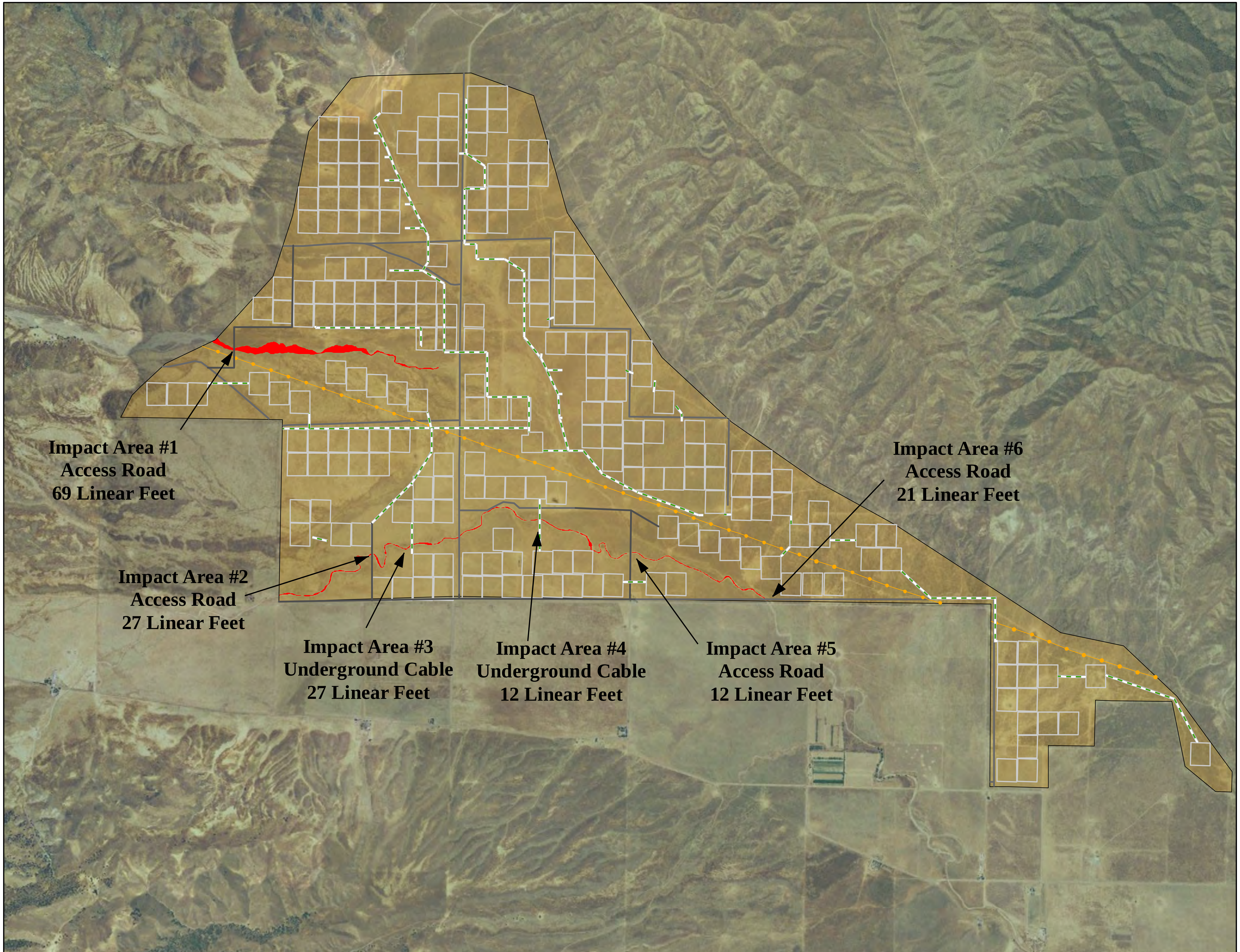
* Would include but is not restricted to zoning, building, and flood plain permits

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

N
W E
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:
Kevin Lincoln
EMAIL:
Kevin.Lincoln@POWEREng.com
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

FIGURES

TABLES

APPENDICES

1.0 INTRODUCTION

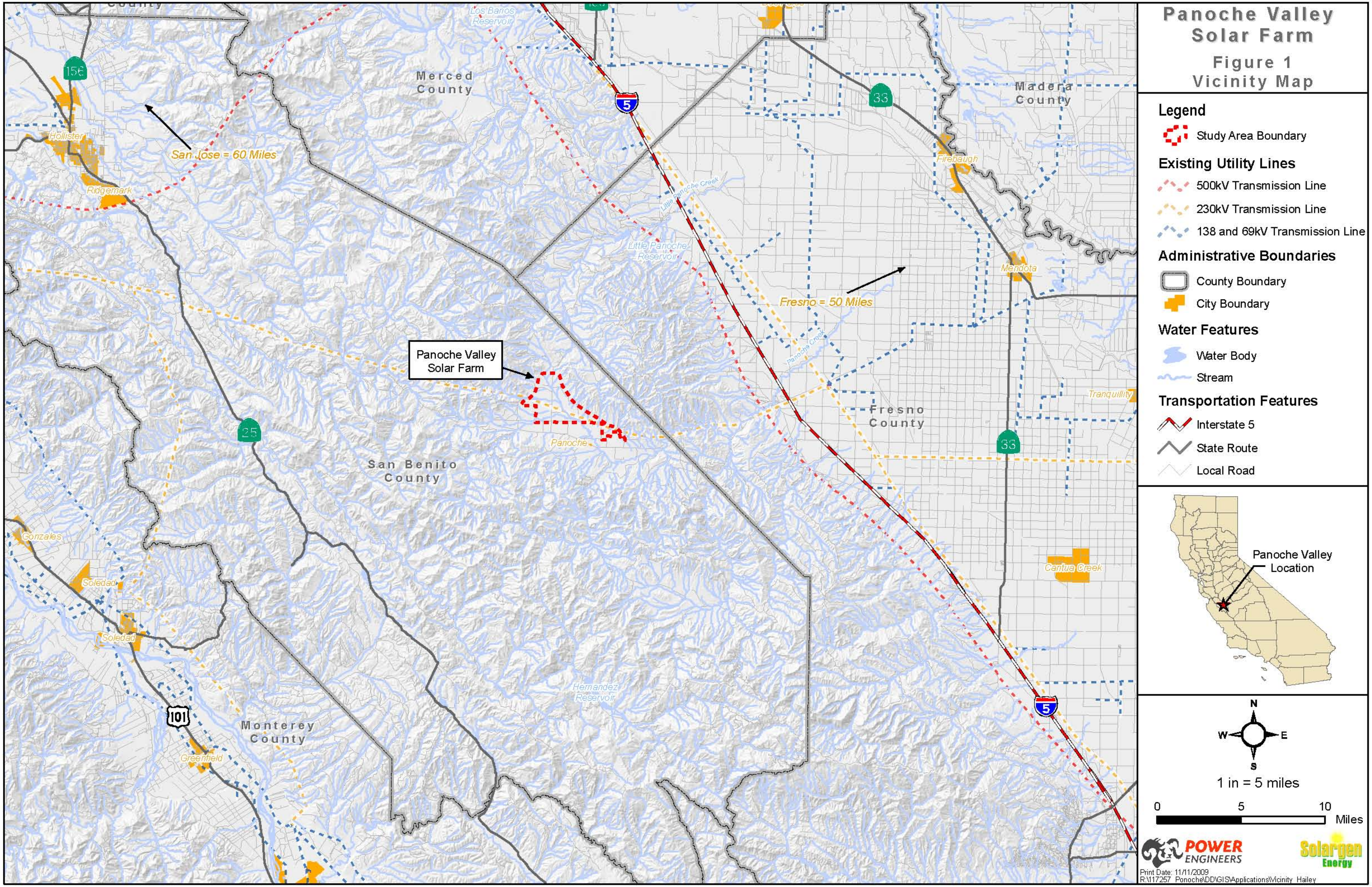
At the request of Solargen Energy, POWER Engineers, Inc. (POWER) conducted a delineation of wetlands and other waters for the Panoche Valley Solar Farm Project site (Study Area). The Study Area is located in eastern San Benito County (Figure 1) approximately 30 miles south of Los Banos. The Study Area 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

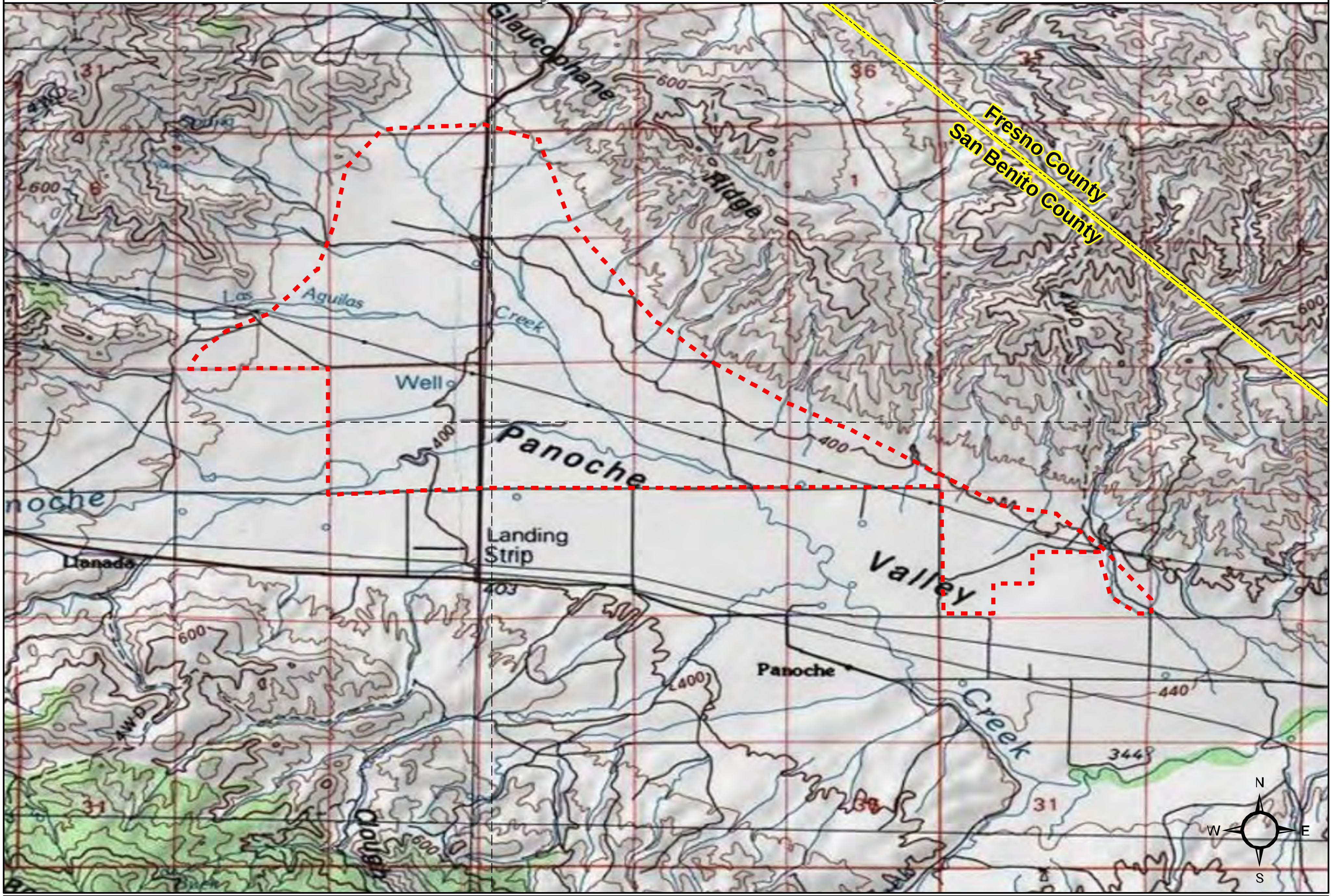
Prior to conducting the field investigation, USGS topographic maps, aerial photography, National Weland Inventory (NWI) maps, and soil surveys of the Study Area were examined to determine locations of potential areas of Corps jurisdiction. In addition, a statistical analysis of peak discharge associated 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
1 in = 5 miles
0
5
10
Miles
N
E
S
W
POWER ENGINEERS
Solargen Energy
Print Date: 11/11/2009
Merced County
Madera County
Fresno County
San Benito County
Monterey County
Panoche Valley Solar Farm
San Jose = 60 Miles
Fresno = 50 Miles
Hollister
Ridgemark
Los Banos Reservoir
Little Panoche Reservoir
Hernandez Reservoir
Firebaugh
Mendota
Tranquillity
Cantua Creek
Panoche
Gonzales
Soledad
Greenfield
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

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1:63,360 1 inch=1 mile

0 1 2 Miles

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

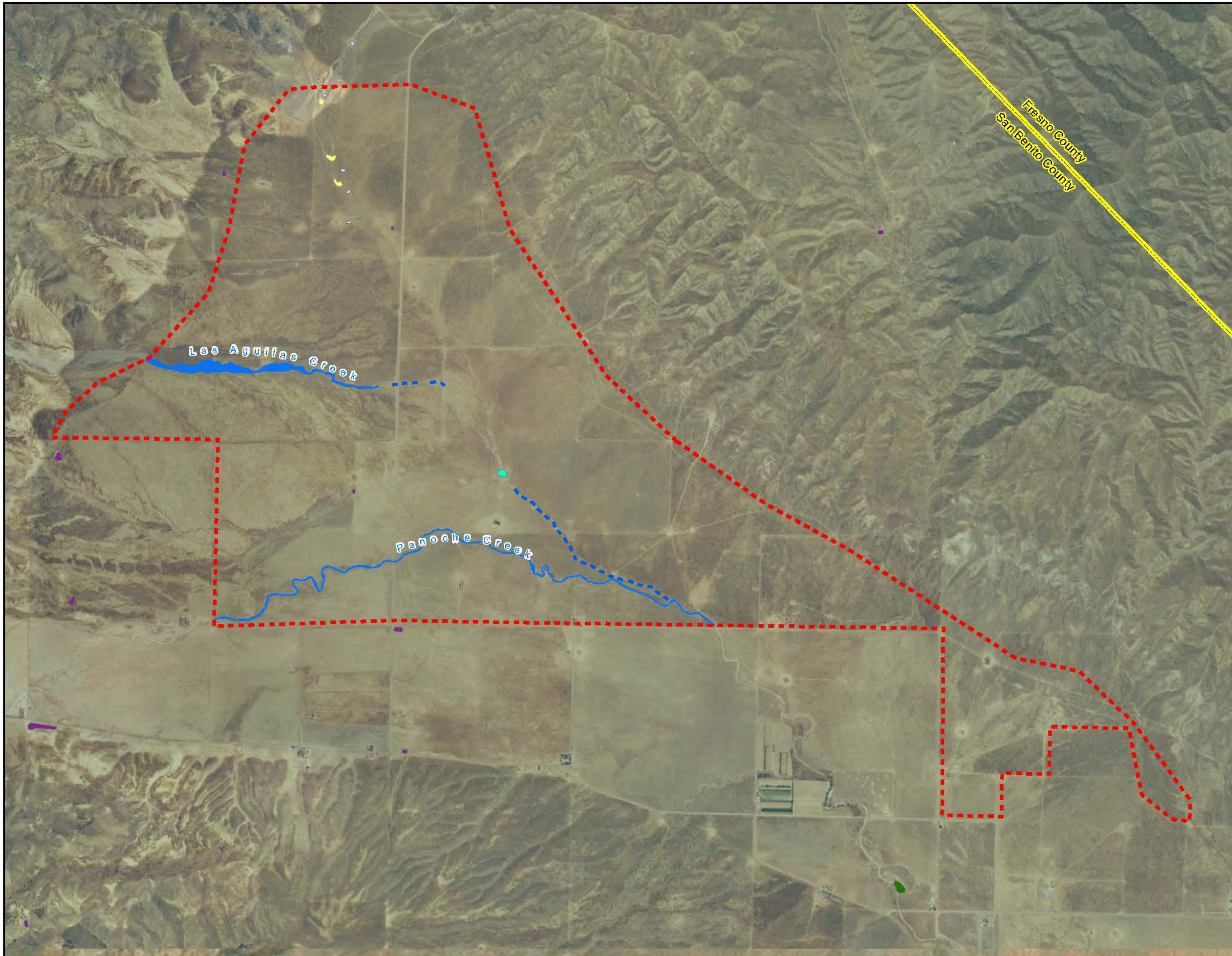
Wetlands

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

N W E S

1 inch = 0.5 Miles

0 0.25 0.5 0.75 Miles

POWER ENGINEERS

Solargen Energy

Print Date: 11/11/2009
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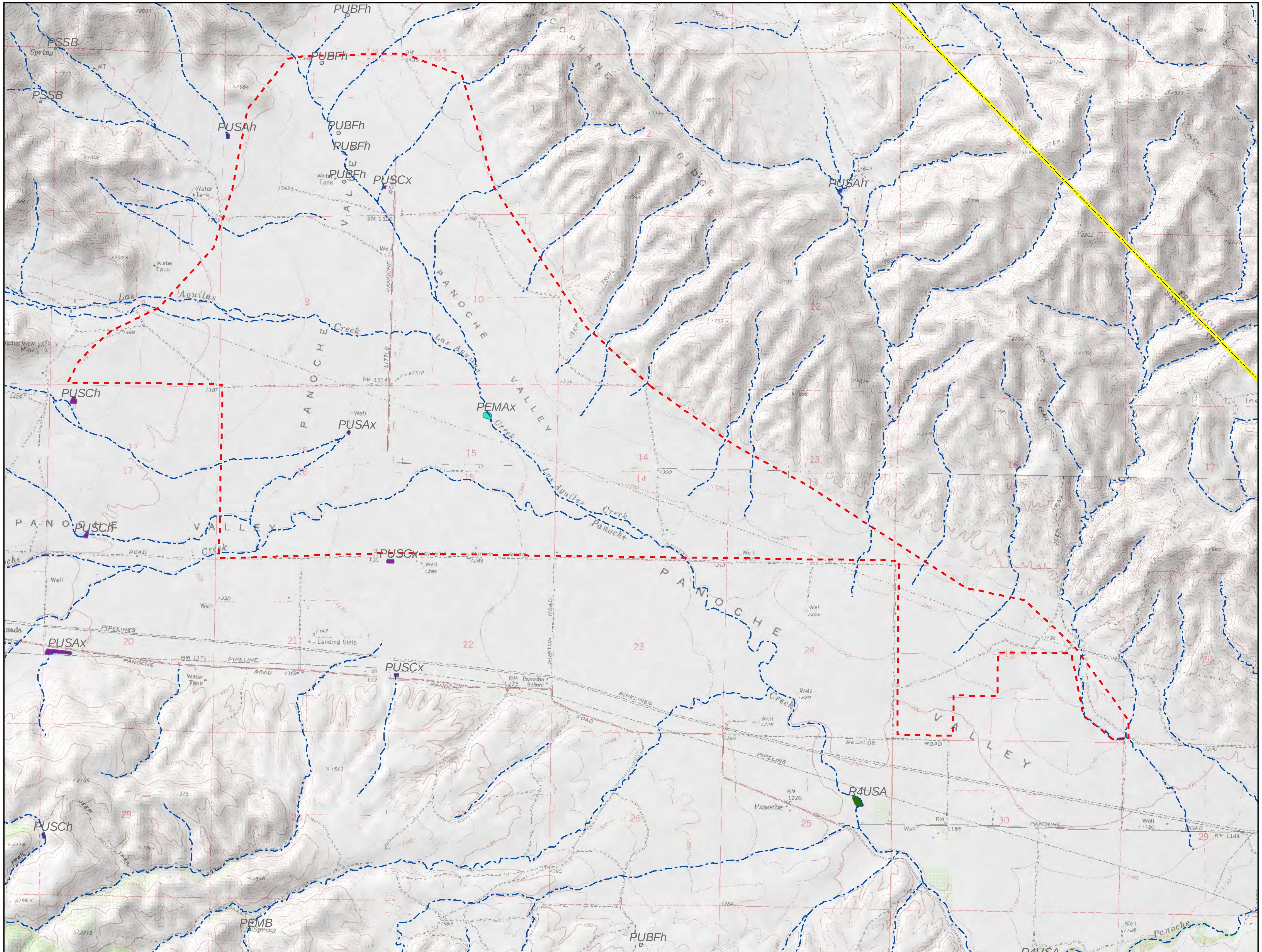

Panoche Valley Solar Farm

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

N
W E
S

1:35,000

0 0.5 1
Miles

Print Date: 11/11/2009
R:\117257_Ponoche\DD\GIS\Applications\Fig4_NWI

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.

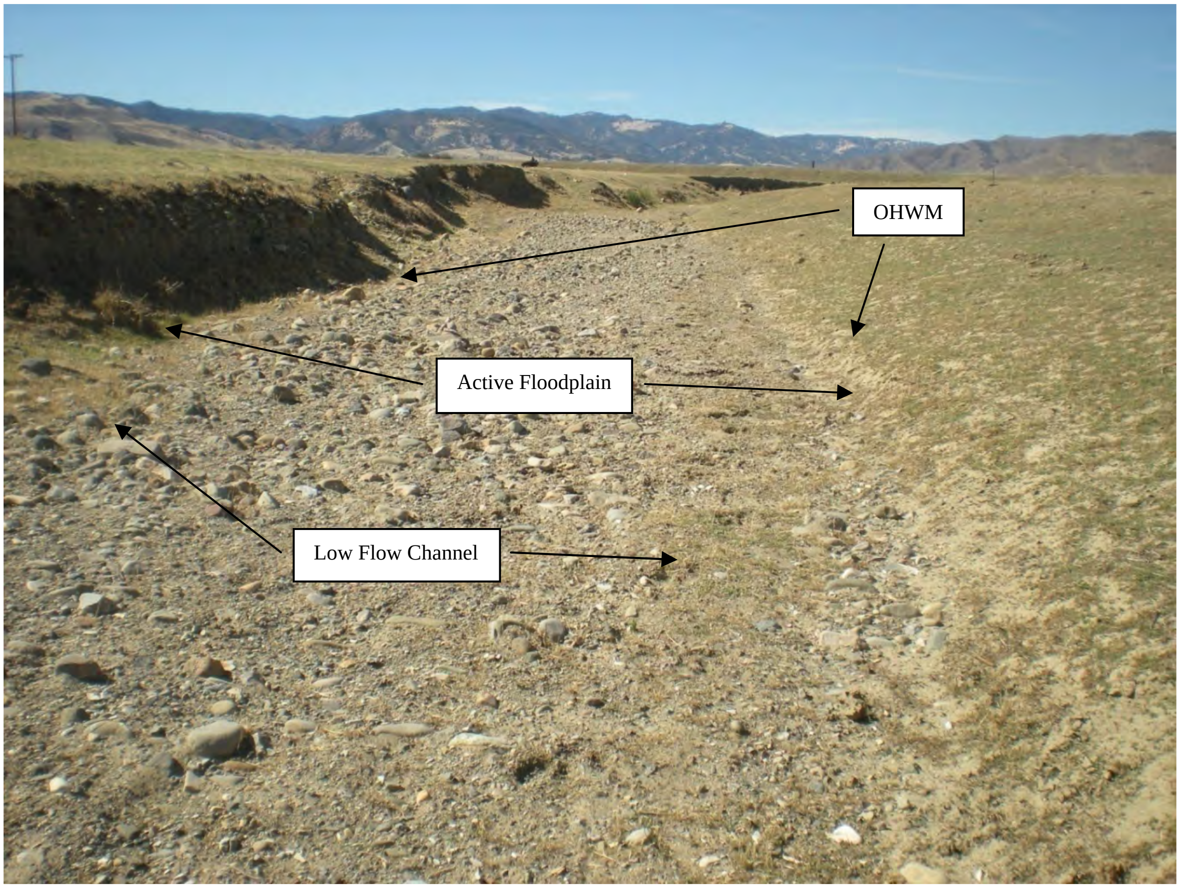

FIGURE 5: Typical OHWM of Panoche Creek

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.

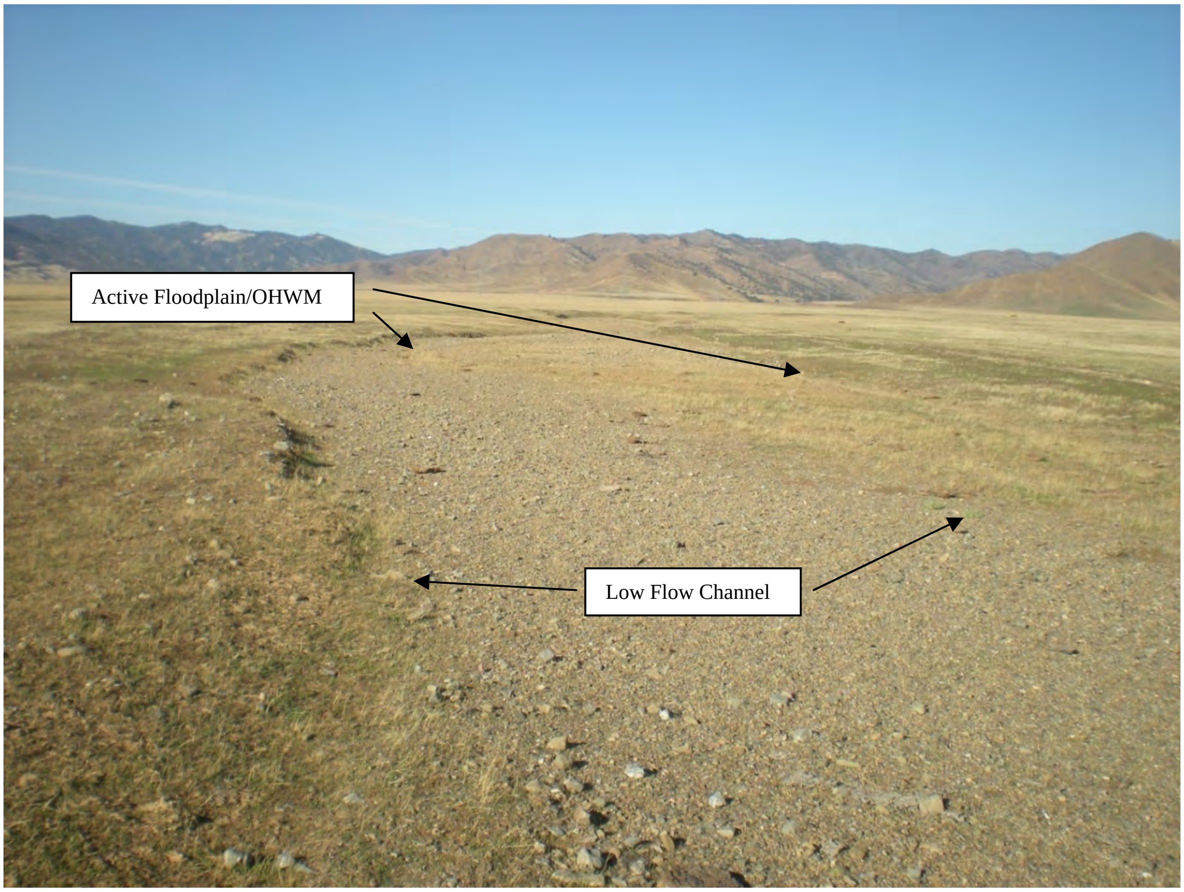

FIGURE 6 Typical OHWM of Las Aguilas Creek

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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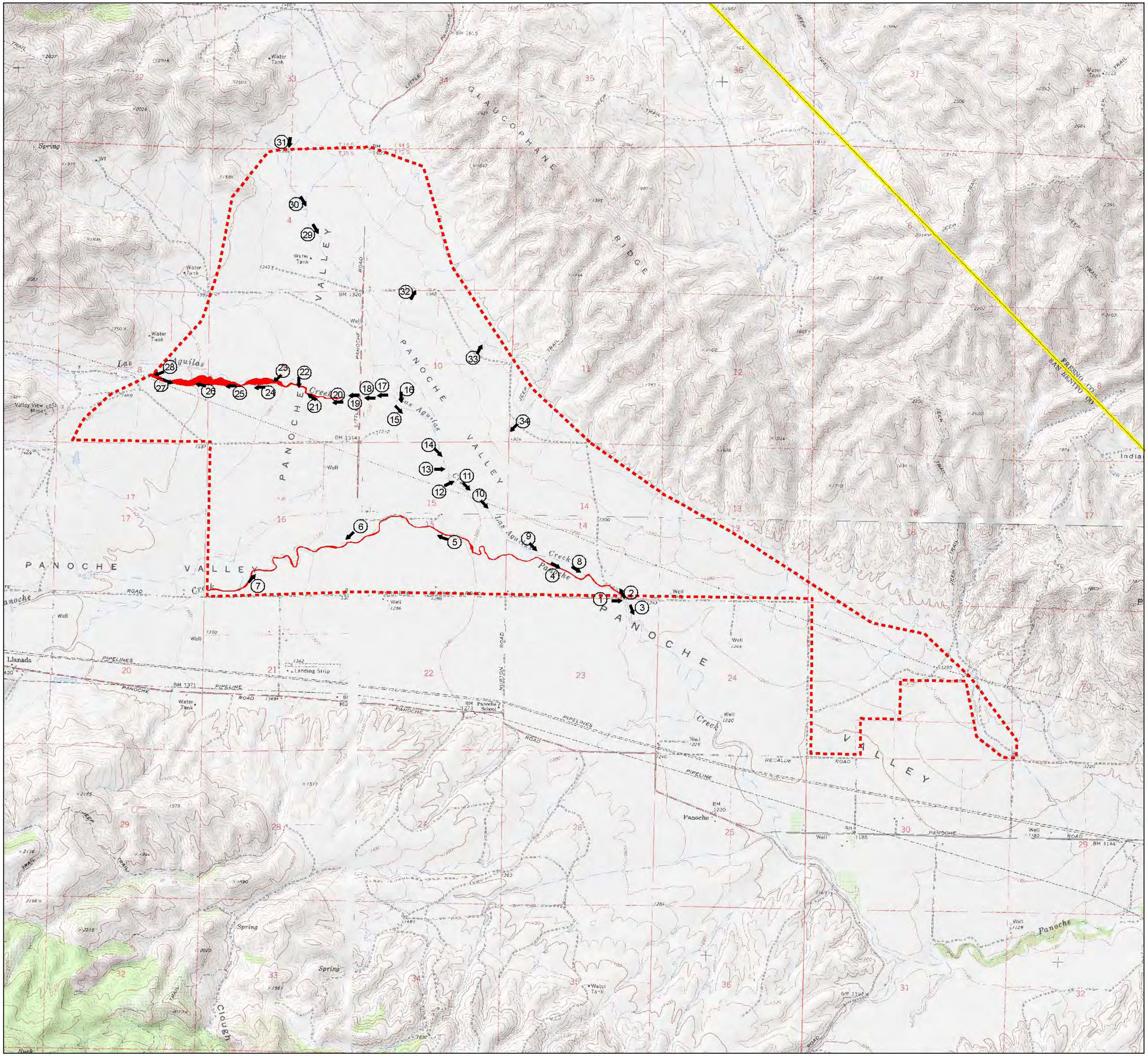
APPENDIX A: PHOTO LOG



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 S

1:27,437

0 0.5 1 Miles

POWER ENGINEERS

Solargen Energy

Print Date: 11/11/2009
R:\117257_Ponoche\DDGIS\Applications\AppendixA_PhotoLog

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 **Project Number:** **Stream:** Las Aguilas 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 38' 8.986" N 120 52' 42.654" W

Notes:

Brief site description: Panoche Valley - Heavily grazed rangeland on relatively level valley floor.

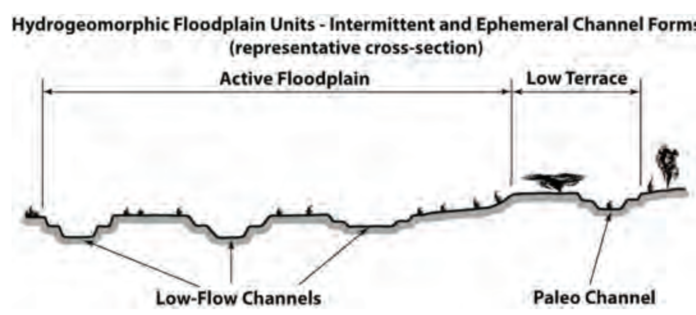
Checklist of resources (if available):

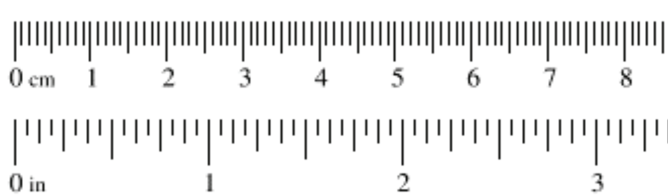
- [x] Aerial photography
  Dates:
- [x] Topographic maps
  Scale:
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [x] Global positioning system (GPS)
- [ ] Other studies

- [ ] 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	Gravel
2.56	64		
		Pebble	Gravel
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





☒	**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.**
☒	**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: ☒ NA ☐ Mid (herbaceous, shrubs, saplings) ☐ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees) Dominant species present: ____________ Other: ☐ ____ ☐ ____ ☐ ____ ☐ ____
☒	**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: ☒ Change in total veg cover ☐ Tree ☐ Shrub ☒ Herb ☒ Change in overall vegetation maturity ☐ Change in dominant species present ☐ Other ☒ Presence of bed and bank ☒ Drift and/or debris ☐ Other: ____________ ☐ Other: ____________
☒	**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) ☒ 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: [ ] ______ [ ] ______ [ ] ______ [ ] ______
[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
Project Number:
Stream: Las Aguilas 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: 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
  - [ ] 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

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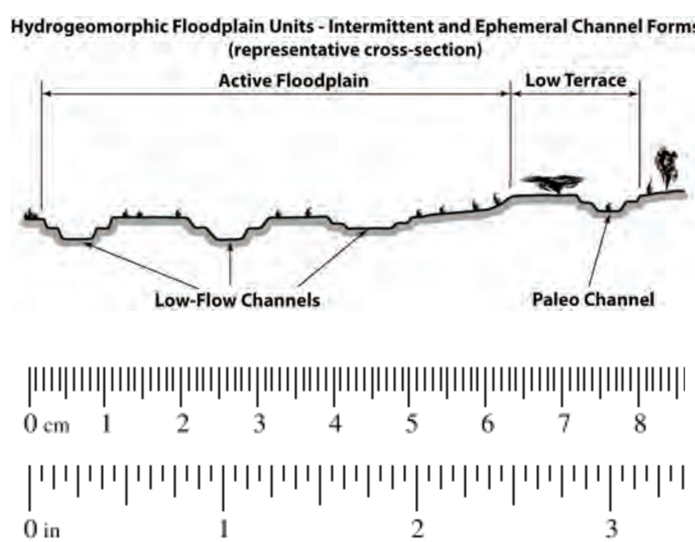
			Boulder	Gravel
	10.08	256		
			Cobble	
	2.56	64		
			Pebble	
	0.157	4		
			Granule	
	0.079	2.00		
			Very coarse sand	Sand
	0.039	1.00		
			Coarse sand	
	0.020	0.50		
			Medium sand	
1/2	0.0098	0.25		
			Fine sand	
1/4	0.005	0.125		
			Very fine sand	
1/8	0.0025	0.0625		
			Coarse silt	Silt
1/16	0.0012	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



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[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: ____
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☒	**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: ☒ Change in average sediment texture ☒ Change in total veg cover ☐ Tree ☐ Shrub ☒ Herb ☒ Change in overall vegetation maturity ☐ Change in dominant species present ☒ Other ☒ Presence of bed and bank ☒ Drift and/or debris ☐ Other: ______ ☐ 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
  Period of record: abc
  - [ ] Clinometer / level
  - [ ] History of recent effective discharges
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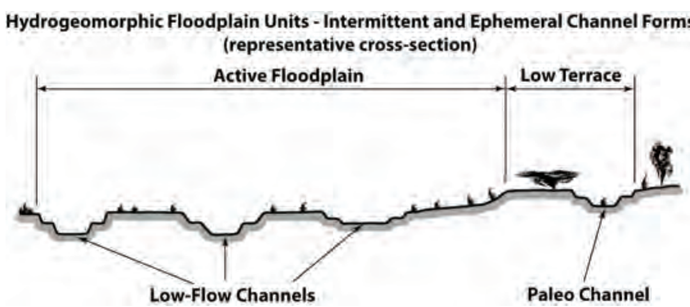
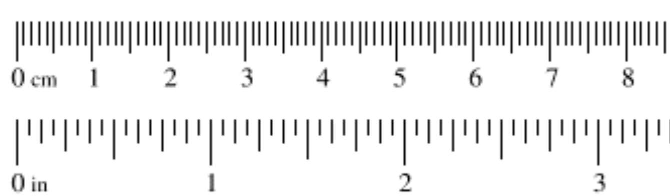
	0.157	4	Granule	Gravel
	0.079	2.00	Very coarse sand	Sand
	0.039	1.00	Coarse sand	Sand
	0.020	0.50	Medium sand	Sand
1/2	0.0098	0.25	Fine sand	Sand
1/4	0.005	0.125	Very fine sand	Sand
1/8	0.0025	0.0625	Coarse silt	Silt
1/16	0.0012	0.031	Medium silt	Silt
1/32	0.00061	0.0156	Fine silt	Silt
1/64	0.00031	0.0078	Very fine silt	Silt
1/128	0.00015	0.0039	Clay	Mud





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☒	**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: ☒ Change in total veg cover ☐ Tree ☐ Shrub ☒ Herb ☒ Change in overall vegetation maturity ☐ Change in dominant species present ☐ Other ☒ Presence of bed and bank ☒ Drift and/or debris ☐ Other: ____ ☐ Other: ____
☒	**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) ☒ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees) Dominant species present: ____ Other: ☐ ____ ☐ ____ ☐ ____ ☐ ____

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Project: Panoche	**Date:** October, 2009	**Time:**
Project Number:	**Town:** Panoche	**State:** CA
Stream: Panoche 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 37' 19.097" N 120 52' 35.711" W

Notes:

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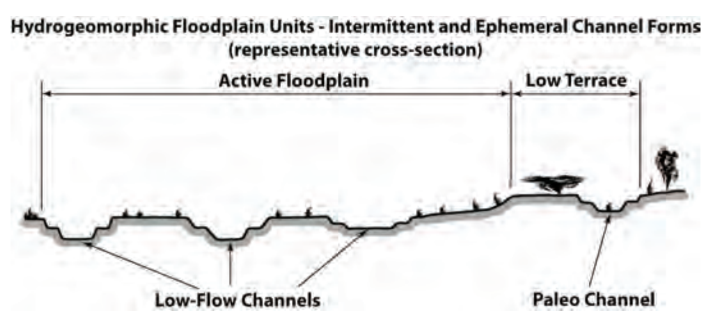
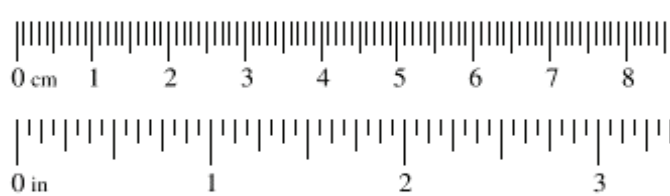
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [x] Global positioning system (GPS)
- [ ] Other studies

- [ ] 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		
			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





☒	**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.**
☒	**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: ☒ NA ☐ Mid (herbaceous, shrubs, saplings) ☐ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees) Dominant species present: ____ Other: ☐ ____ ☐ ____ ☐ ____ ☐ ____
☒	**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: ☒ Change in total veg cover ☐ Tree ☐ Shrub ☒ Herb ☒ Change in overall vegetation maturity ☐ Change in dominant species present ☐ Other ☒ Presence of bed and bank ☒ Drift and/or debris ☐ Other: ____ ☐ Other: ____
☒	**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) ☒ 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: [ ] ______ [ ] ______ [ ] ______ [ ] ______
[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: ______