VOLUNTARY CONSERVATION MEASURES - HABITAT ENHANCEMENT ON THE LOWER YUBA RIVER

YUBA COUNTY, CALIFORNIA

DRAFT ENVIRONMENTAL ASSESSMENT

July 2014

US Army Corps
of Engineers ®
Sacramento District

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

REPLY TO ATTENTION OF

Environmental Resources Branch

DRAFT
FINDING OF NO SIGNIFICANT IMPACT
Voluntary Conservation Measures Habitat Enhancement Project on the lower Yuba River
Yuba County, California

The U.S. Army Corps of Engineers, Sacramento District, has determined that implementing the proposed voluntary conservation measures on the lower Yuba River, between Daguerre Point Dam and Engelbright Dam would have no significant effects on the quality of the natural or human environment. The project is located in Yuba County, California on the lower Yuba River approximately eleven miles northeast of the City of Marysville, California. Project activities would include placing large woody material and heterogeneous mix of gravel and cobble into the lower Yuba River channel.

Implementation of a project would improve the overall function of the habitat of the lower Yuba River by providing spawning gravel to key areas that have been designated as critical habitat for the Central Valley spring-run Chinook salmon *(Oncorhynchus tshawytscha)* and the Central Valley steelhead (*O. mykiss)*.

A 2014 Environmental Assessment (EA) was prepared to evaluate the potential effects to natural and cultural resources in the proposed project area. The EA was circulated for a 15 day public review period from July 3, - July 18, 2014. Based on the evaluation of potential effects described in the EA, I have determined that the proposed project would have no significant adverse effects on existing resources including special status species, fish and wildlife, vegetation, air and water quality, and cultural resources. No additional environmental documentation is required, and the project activities may proceed as proposed.

_____
Date

_____
Michael Farrell
Colonel, U.S. Army Corps of Engineers
District Commander

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APPENDICES

ACRONYMS

APE	Area of Potential Effect
BLM	Bureau of Land Management
BMP	Best Management Practices
BO	Biological Opinion
CDFW	California Department of Fish and Wildlife
CDOT	California Department of Transportation
CDWR	California Department of Water Resources
CESA	California Endangered Species Act
cfs	cubic feet per second
cm	Centimeter
Corps	U.S. Army Corps of Engineers
CRWQCB	California Regional Water Quality Control Board
EA	Environmental Assessment
EDR	Englebright Dam Reach
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FONSI	Finding of No Significant Impact
GAIP	Gravel/Cobble Augmentation Implementation Plan
HTRW	hazardous, toxic, or radiological waste
LWM	Large Woody Material
LWMMP	Large Woody Material Management Plan
MBTA	Migratory Bird Treaty Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
PG&E	Pacific Gas and Electric
SHPO	State Historic Preservation Officer
USFWS	U.S. Fish and Wildlife Service
USFS	U.S. Forest Service
USGS	U.S. Geological Service
VELB	Valley elderberry longhorn beetle
YCWA	Yuba County Water Agency

1.0 Purpose and Need for Action

1.1 Background

The activities under consideration in this Environmental Assessment (EA) are part of the U.S. Army Corps of Engineers, Sacramento District's (Corps) activities associated with Daguerre Point Dam (DPD) on the lower Yuba River. The activities include conservation measures to enhance habitat upstream of DPD for threatened and endangered salmonids. The habitat enhancement projects include implementing the Large Woody Material Management Plan (LWMMP) and the Gravel Augmentation Plan (GAIP), along with associated monitoring.

Five previous NEPA documents have been prepared by the Corps for the same activities listed above. The following NEPA documents have been prepared for similar activities as discussed in this EA, however, these activities were for a short-term actions and not for the long-term activities covered under this EA.

- Lower Yuba River Pilot Gravel Injection Program EA/FONSI – 2007
- Lower Yuba River Gravel Augmentation Project EA/FONSI – 2010
- Lower Yuba River Gravel Augmentation Project Supplemental EA/FONSI – 2012
- Lower Yuba River Gravel Augmentation Project Supplemental EA/FONSI – 2013
- Lower Yuba River Large Woody Material Management Plan Pilot Study EA/FONSI – 2012

1.2 Consultation History

On October 22, 2013, the Corps' submitted a Biological Assessment (2013 BA) to further define the potential effects of the Corps' limited discretionary activities at DPD. The Corps' 2013 BA included several conservation measures which included the activities identified by this EA.

The Section 7 ESA consultation process between the Corps and NMFS associated with operation and maintenance of fish passage facilities at DPD extends back to 2000. BOs were issued by NMFS in 2002, 2007, 2012, and 2014 (2). The gravel placement pilot program began in 2007 with the placement of 500 short tons of gravel. The augmentation program suggested the placement of suitable-sized spawning gravel along the banks of the lower Yuba River in the Englebright Dam Reach (EDR). The first large quantity of gravel (5,000 tons) occurred in the winter of 2010-2011.

1.3 Proposed Action

The Proposed Action includes the placement and monitoring of large woody material and gravel along the lower Yuba River. The proposed action would occur over the next 10 years, in the areas between 300-feet downstream of Englebright Dam and 0.25 miles downstream of DPD along the lower Yuba River. Below are the detailed descriptions of the individual components of the program.

1.3.1 Large Woody Material Management

The Corps initiated the LWMMP Pilot Study in December 2013 to replenish the supply of large woody material (LWM) back into the lower Yuba River. As described in the LWMMP, existing stockpiles at New Bullards Bar Reservoir will be placed at selected sites along the lower Yuba River. Orchard trees may also be used if additional supply of wood is needed. The results of the Pilot Study are being assessed to evaluate the effectiveness of LWM placement in order to help define the long-term LWMMP program.

The Pilot Study entailed placement of LWM wood "complexes", comprised of several large wood pieces along with other branches and stumps. Key large wood pieces, both root wads or pieces 24 feet and longer, were used to anchor wood complexes. The wood complexes will be monitored for any changes in location or structure of the complexes after high flow events. The results of the Pilot Study would be used to adapt placement methodology and locations for subsequent LWM placement events covered under this document.

The Pilot Study was conducted at Lower Gilt Edge Bar, which is identified in Figure 1. Log jams were created by using one of the long wood pieces placed with one end buried in the substrate, and perpendicular to the flow. Other wood pieces were placed on the upstream side of the long pieces to help retain the wood at the location.

It is anticipated that long-term placement of LWM would generally follow this method, with minor adjustments to complex structures and burial strategies if needed. Other locations would also be considered for subsequent placements and may include Hammon Bar, Long Bar, Lost Island, Upper Gilt Edge Bar, and Parks Bar (Figure 1).

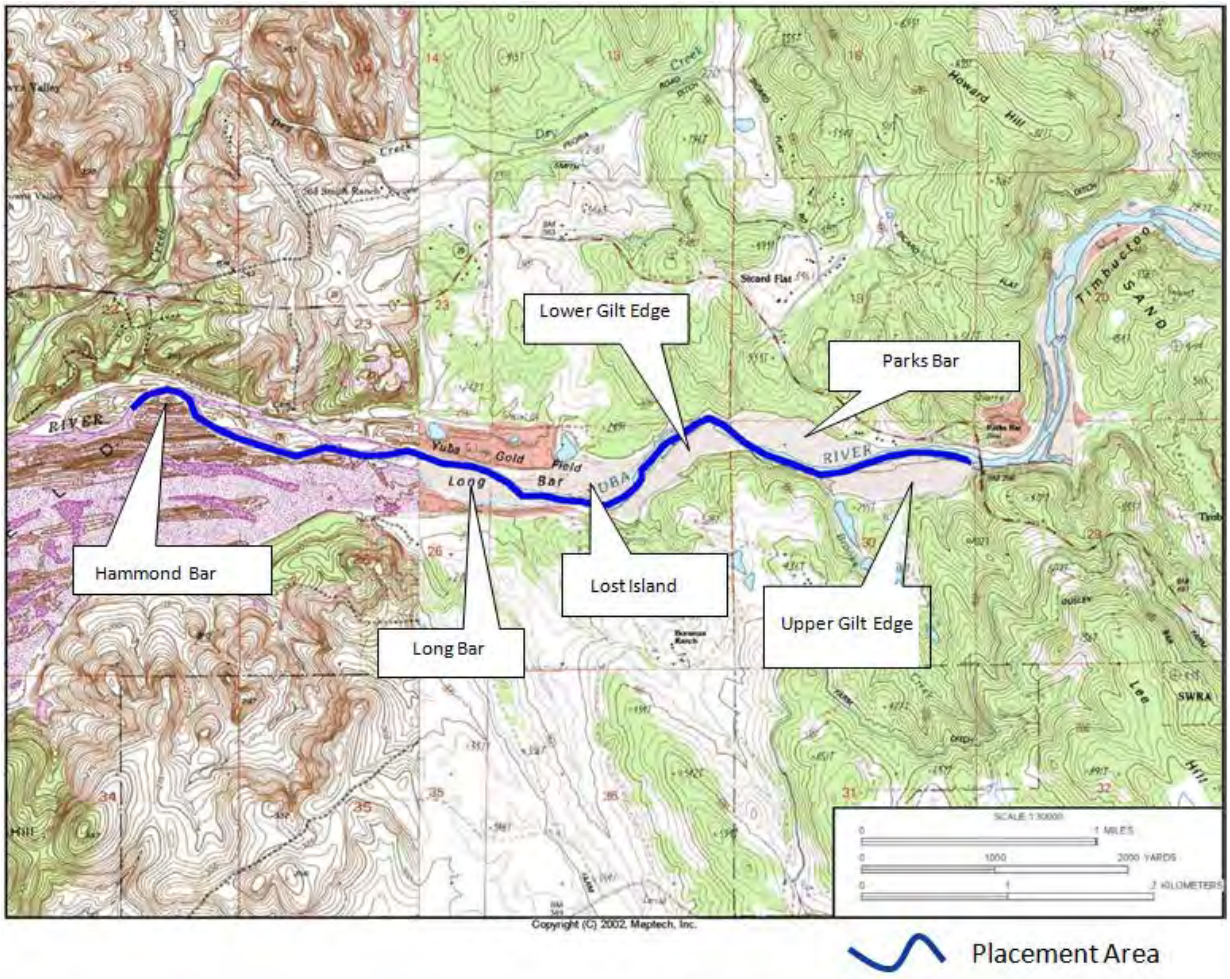

Figure 1 - Possible LWM Placement Locations

1.3.2 Gravel Augmentation and Monitoring

In accordance with the Corps' Gravel/Cobble Augmentation Implementation Plan (GAIP), four separate gravel injection efforts have been undertaken by the Corps between November 2007 and July 2013, with approximately 15,500 tons of heterogeneous mix of gravel and cobble (0.25 to 5.0 inches in diameter) being placed into the Englebright Dam Reach of the lower Yuba River, between Daguerre Point Dam and Englebright Dam.

Monitoring of gravels will also continue after the placement of additional gravel adding to the understanding of the lower Yuba River geomorphic processes. The information gathered from the monitoring of the placed gravel would allow the Corps to determine the quantity of additional gravel to be placed within the EDR below Englebright Dam in future years.

As part of the ongoing monitoring, the Corps would also continue its efforts to investigate whether Chinook salmon and steelhead are utilizing areas where gravel placement occurred by conducting salmonid redd surveys. Surveys for Chinook salmon would occur

between mid September and mid December and Steelhead surveys would occur from mid February to mid May The action described herein is identical to that described in the environmental assessment (EA) prepared in 2010 and Supplemental EA's prepared in 2012 and 2013 with the exception of the dates of implementation, and the gravel mix specifications, which were changed slightly in the 2012 and 2013 Supplemental EA's.

1.4 Location

Daguerre Point Dam is located in Yuba County, California on the lower Yuba River, approximately eleven miles northeast of the City of Marysville, California at River Mile 11.4 of the Yuba River (Figure 2). The proposed actions would occur between DPD and Englebright Dam, which is also located on the Yuba River upstream of DPD at River Mile 23.9.

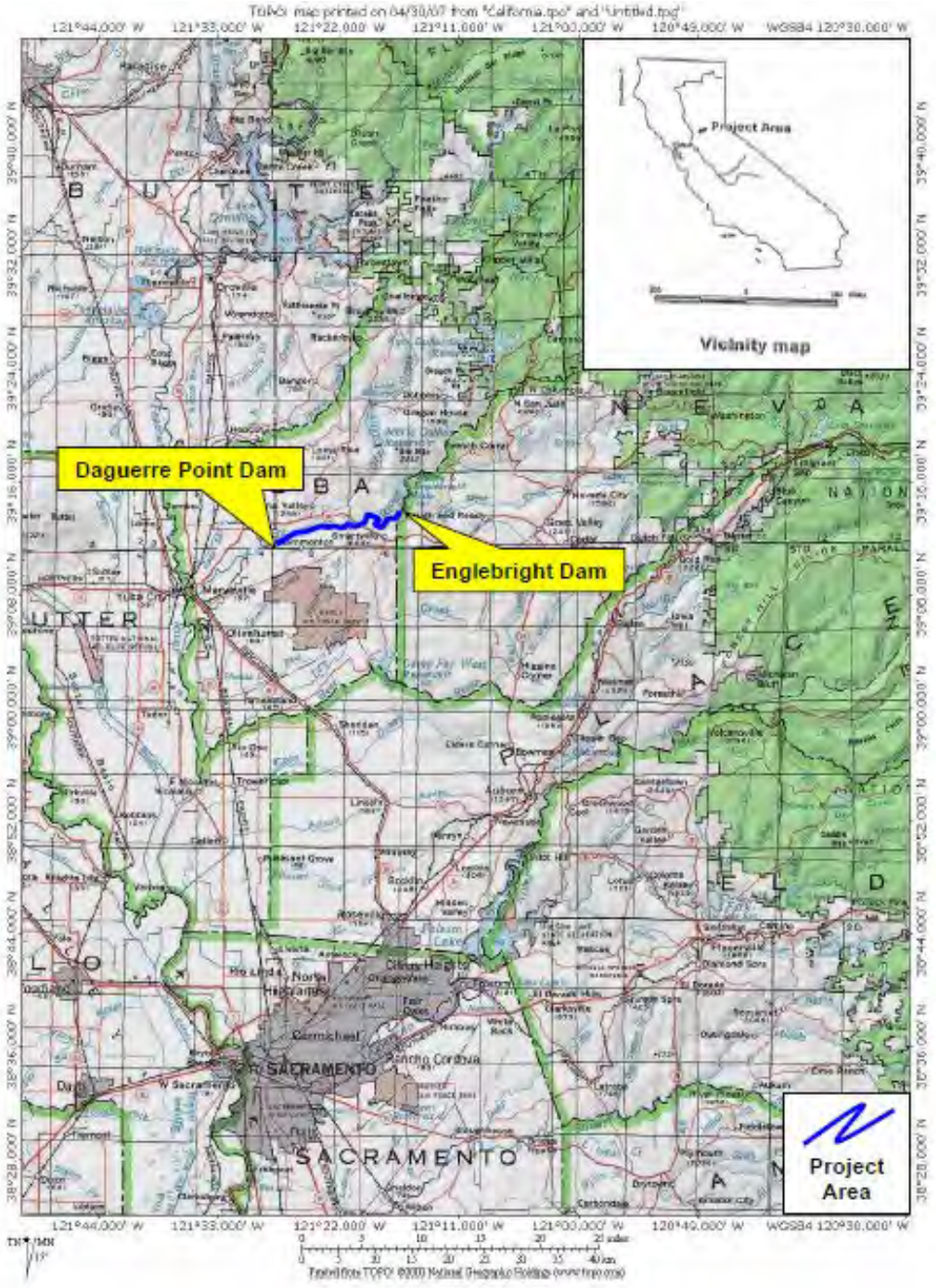

Figure 2 - Project Area

1.4.1 Large Woody Material Management Project Area

Woody material would be placed in the Lower Yuba River at one or more of the following locations: 1) Hammon Bar; 2) Long Bar; 3) Lost Island; 4) Lower Gilt Edge Bar; 5) Upper Gilt Edge Bar; and 6) Parks Bar (Figure 1). Each year the location of the complexes would be identified to provide the maximum benefits for fish habitat within the lower Yuba River. Future year wood complex locations would be determined based on how the previous year's complexes performed and the availability of salvaged wood.

1.4.2 Gravel Augmentation and Monitoring Project Area

Gravel augmentation would occur on the lower Yuba River, starting below Englebright Dam (River Mile 23.9) downstream to DPD (River Mile 11.4), in Yuba and Nevada Counties, California (Figure 2). The proposed gravel placement site is located approximately 1,500 feet downstream of Englebright Dam (River Mile 23.9). This site is less than 1acre and would be confined to the river channel within the EDR, a 0.89-mile long bedrock reach starting at Englebright Dam and ending at the junction with Deer Creek, located in the steep Narrows Canyon off Highway 20, approximately 23 miles east of Marysville, California (Plates 2, 3, and 4). Although fate and transport studies of the placed gravel have not yet been conducted, it is reasonable to assume that some of the materials may be transported as far downstream as the confluence with the lower Feather River, Yuba River mile 0 (Corps 2013).

1.5 Purpose and Need for the Action

The proposed action is needed to implement the proposed voluntary conservation measures that were included in the Corps 2013 BA to enhance juvenile salmonid rearing habitat in the lower Yuba River.

The purpose of placing the LWM is to provide escape cover and relief from high current velocities for juvenile salmonids and other fish species. The LWMMP will provide guidance for the placement and monitoring of LWM to improve juvenile salmonid rearing habit in the lower Yuba River over the next 10 years.

River-rounded gravel and cobble necessary for salmon spawning has been depleted in the reach of the lower Yuba River between Englebright Dam and the confluence with Deer Creek over the years. In particular, spring-run Chinook salmon and steelhead that historically went far upstream would substantially benefit from a gravel augmentation program below Englebright Dam. However, the critical reach is in a narrow canyon that is difficult to access and manage, let alone place thousands of tons of coarse sediment into (Pasternack 2010). The purpose of the proposed gravel augmentation component is to place suitable-sized spawning gravel within the lower Yuba River of EDR.

1.6 Purpose and Scope of the Environmental Assessment

The purpose of this Environmental Assessment (EA) is to determine whether the proposed action would result in significant adverse effects on the environment, thus requiring the preparation of an Environmental Impact Statement (EIS), or whether the types and overall significance of effects of the proposed action would support a Finding of No Significant Impact (FONSI).

This EA presents the proposed action and no action alternatives, describes the environmental resources in the project area, determines the potential effects of the preferred alternative on those resources, and, if appropriate, proposes mitigation measures to reduce the overall adverse environmental effect of the proposed action. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) to provide full disclosure of potential environmental effects.

1.7 Decision Needed

The District Engineer, the Commander of the Sacramento District of the Corps, must decide whether or not to proceed with the proposed action described in this EA and whether a FONSI or EIS is most appropriate. This EA provides the basis for the decision.

1.8 Project Authority

Daguerre Point Dam was authorized by the Rivers and Harbors Act of June 13, 1902 (H.D. No. 431, 56th Congress, 1st Session) as a part of the Yuba River Debris Control Project. The voluntary measures proposed in this draft EA are part of an effort to enhance fish habitat in the project area. The Corps proposed the measures in the 2013 BA for Section 7 Consultation with NMFS.

2.0 Alternatives

This section presents the preferred alternative to meet the purpose and need described above. A No Action alternative is considered to illustrate the potential effects of not implementing the preferred alternative.

2.1 No Action

The No Action alternative serves as the environmental baseline against which the proposed action and its effects can be compared. Under this alternative, the Corps would take no action to implement the conservation measures in the 2013 BA along the lower Yuba River. If no action is taken, the natural supply of woody material along the lower Yuba River would not be augmented by placement of additional LWM. As a result, there would not be any potential

for a corresponding improvement of juvenile salmonid rearing habitat in the lower Yuba River. Additionally, the Corps would not implement the gravel augmentation project and the existing gravel supply in the stream bed and usable gravel stored in current bars would gradually decrease as it is transported downstream, leading to a net deficit of spawning caliber sediment.

2.2 Implementation of the Conservation Measures (Proposed Action)

2.2.1 Large Woody Material

LWM for the proposed program would be procured from wood that is washed into New Bullards Dam and Reservoir during high flow events. A cable-and-buoy line (floating boom) and tug boats are used to capture the woody material that has entered the reservoir. Yuba County Water Agency (YCWA) manages the LWM that is washed into the New Bullards Bar Reservoir from the upstream watershed. Tug boats are used to push LWM into shallow coves that have landside access and the pieces are subsequently stockpiled on the shoreline using a boom. The Corps would coordinate with YCWA to gather LWM from these stockpiles for transport and placement in the selected area. If the amount and size of LWM from the New Bullards stockpiles are insufficient to meet the needs, then orchard trees from existing stockpiles may be used to the extent allowed by the 2014 BO. Alternative sites may also be selected to obtain salvaged wood if sufficient wood cannot be obtained from New Bullard's Bar. Materials will be transported to downstream placement sites via logging or dump trucks. Trucks will utilize existing roads and access sites.

Placement sites would be finalized based on further site assessments, the nature of existing stockpiles, and consultation with resource agencies. The placement sites identified in the LWMMP are approximate locations. The exact placement and configuration of LWM would depend on site conditions (including access) and source materials. The LWMMP calls for LWM to be placed in the functional floodplain, or deposited directly within the low flow channel, as access allows.

Sites within the study area must be legally and physically accessible by required equipment. Placement of LWM would occur when the river stage is low to ensure placement within the boundaries of the functional floodplain but not directly in the low stage water. Placement would not require the removal of existing vegetation or in-water excavation. It is anticipated that placement of LWM within the functional floodplain would result in the natural transport and distribution of some of the material to lower reaches of the river during higher stage flows. An annual monitoring program would assess the effectiveness of LWM placement, would guide subsequent placements and the development of the long-term LWMMP. Materials would be transported to downstream placement sites via logging or dump trucks. Trucks would utilize existing roads and access sites.

The proposed work may be conducted annually over a 10 year period in the late summer or fall, once sufficient stockpiles have been collected to justify construction activities. The Corps will coordinate with the US Forest Service to obtain access to collect the wood and minimize impacts to resident bald eagles. The Corps would also coordinate with NMFS each

year to determine the appropriate time to place materials. Work hours would be limited to weekdays, from 8:00 a.m. to 5:00 p.m.

2.2.2 Gravel Augmentation

Gravel augmentation consists of placing between 5,000 and 15,000 short tons of gravel and cobble directly into the lower Yuba River channel near the Narrows I Powerhouse via gravel sluicing, annually or as needed. Gravel sluicing involves drawing water up from a source and into a flexible pipe, where gravel and cobble is added from the top to produce a water/gravel slurry. The slurry is then piped down to a site for directed placement by one to two operators. Details of staging, gravel sizes, placement, and monitoring for the alternative are provided below.

The gravel/cobble mixture would be monitored after placement within the EDR. The information gathered from the monitoring of the placed material would allow the Corps to determine if it will be necessary to place additional quantities of gravel within the lower Yuba River channel below Englebright Dam (Pasternack 2010).

The sluicing process involves drawing water up from a source (the reservoir) and into an 8-inch diameter "Yelomine" flexible pipe, where gravel and cobble is added from the top to produce a water, sediment slurry. The slurry is then piped down to a site for directed placement by one to two operators. The amount of water used to do the sluicing depends on the pipe and pump configurations, and is typically 1,000 to 1,500 gallons per minute, which is 2.23 to 2.34 cubic feet per second (cfs) (Pasternack 2010). The water pump would be located at the Englebright Lake water's edge, to push the water uphill in a 6 to 8 inch pipe. The pump inlet would be screened to prevent aquatic fauna from entering the pumping system.

Figure 3 - Gravel Augmentation Staging Area

This process is normally a five-person operation: one person would operate the water pump at the source, one person in a loader, would bring gravel to the feeder, one person would operate the feeder in order to prevent clogs and coordinate communications, and two people would operate the end of the nozzle, directing gravel placement and adding pipe as needed to periodically move downstream. This approach would have a minimal construction footprint; Figure 3 illustrates the project design and layout.

The rate of gravel placement via sluicing is approximately 100 to 300 short tons per day, depending upon how frequently the system clogs. At an average rate of 150 short tons per day, it would take approximately 33 to 99 days to place 5,000 to 15,000 short tons of gravel.

The approach that would be used with gravel sluicing is to start at the water's edge, build across the river, and then work downstream. At the outlet of the system, gravel would go into a rigid pipe supported by floating, air-filled barrels. The outlet would be manually directed to the placement point with the aid of ropes as needed. Using this approach, it is possible to place gravel according to a sophisticated design with few constraints.

The water intake pump system, which includes fish screening, would be positioned right on the water's edge of Englebright Lake, along the gravel road on the north side of the reservoir that runs close to the dam. From there, the water would be pumped in one or two 6 to 8-inch diameter pipes approximately 1,070-feet up the side of the road to the crest (Figure 3).

The pipes would go over the crest of the hill, and down the side of the paved road, approximately 1,500 feet to the switchback. At that location, a screened hopper on the north side of the road would receive gravel from a front loader, transferring the material the short distance from the stockpile. The loader operator would gently bounce the bucket to trickle the gravel into the hopper as the primary control on the flow rate; a hopper operator would be stationed there to ensure no blockages, clean out finger rocks as needed, and communicate conditions with other operation participants by radio.

Under the hopper, the gravel and water would join in a metal pipe that would then connect to the beginning of the 8-inch diameter, semi-flexible "Yelomine" pipe. This pipe would then run approximately 500-feet, to the river's edge. From there, the outlet pipe would be maneuvered within the river to place the gravel in areas as directed by the placement oversight team.

The Anadromous Fish Restoration Program, a U.S. Fish and Wildlife Service (USFWS) program that is tasked by the Central Valley Project Improvement Act to make "all reasonable efforts to at least double natural production of anadromous fish in California's Central Valley streams on a long-term, sustainable basis" (USFWS 2010), has recommended gravel specifications to ensure that the placed gravel provide some usable spawning habitat and optimal egg survival rates for the salmonids within the lower Yuba River. These specifications are shown in Table 1 (Pasternack 2012). This gravel would be obtained from a commercial

aggregate source located near the project site, within the lower Yuba River watershed, and would arrive screened and pre-washed to the placement site.

The composition of the gravel mix was changed slightly in 2012 based on the results of the 2011 monitoring program (discussed in Section 2.2.6). Results from the 2012 monitoring program indicated the gravel mix for 2013 should remain the same as the mix from 2012. The mix will be monitored during the sluicing process to ensure that it meets the specifications described below.

Table 1- Gravel and Cobble Specifications for Salmonid Spawning and Egg Incubation

Gravel Size (inches)	Percent Retained	Target % of Total Mix
3.5 to 5	30	30
1.25 to 3.5	80	50
3/4 to 1.25	88	8
1/2 to ¾	96	8
1/4 to ½	100	4

Source: USFWS 2010

The selection of the specific location for focusing gravel and cobble placement has been guided by constraints in powerhouse operations, potential benefits to the river, and feasible delivery methods. Powerhouse operations presently preclude gravel augmentation between Englebright Dam and the Narrows powerhouses. To get the most benefit and longevity from adding gravel to the river, the further upstream it is introduced, the better. To avoid having to fill the scour pool adjacent to the Narrows I facility, and yield riffle habitat for immediate spawning use with the least amount of initial gravel placement during a gravel sluicing operation, the placement should begin approximately 115-feet downstream of the Narrows I powerhouse, where the maximum depth of the pool is under 5-feet at 855 cfs of flow (Pasternack 2010).

There would be one staging area for the project, located at the gravel turnouts along the paved access road to Narrows II. This area would be used primarily for vehicle parking and temporary storage of truck trailers loaded with gravel. The same turnouts would be used to stockpile the gravel; prior to the start of sluicing operations, the gravel would be stockpiled in the three parking/turnout areas on the north side of the dam. This location is behind a locked gate and inaccessible to the public.

The likely truck haul route that would be used to deliver gravel from the commercial source to the project site would begin at the intersection of State Route 20 and Peoria Road, and end on the Narrows II access road, at a bench downstream of, and level with, the top of Narrows II (Figure 2).

The proposed work would be conducted from July through the end of August. Work hours would be limited to normal workdays, from 8:00 a.m. to 5:00 p.m. Any work conducted

past August 2014 will also conform to the same time frames, or as approved by the resource agencies.

3.0 Affected Environment and Environmental Consequences

3.1 Environmental Resources Not Considered in Detail

Initial evaluation of the potential effects of the alternatives indicated that there would not be any adverse direct, indirect, or cumulative effects on many resources due to the scale, scope, and schedule of the proposed action. These resources are discussed in Sections 3.1.1 through 3.1.11.

3.1.1 Climate

The project area has a Mediterranean, semi-arid climate characterized by cool, moist winters and warm, dry summers. Summer temperatures average approximately 90 degrees Fahrenheit (°F) during the day and 50 °F at night. Winter daytime temperatures average in the low 50's, and nighttime temperatures average in the upper 30s. Precipitation data have been recorded daily at Englebright for the National Weather Service since 1955 (WRCC 2005). Annual precipitation averaged over this 50-year time span is about 34.5 inches, with approximately a 40 percent chance of precipitation occurring on any given day between November 15 and March 1. Heaviest monthly rainfall periods of record include December 1955 at 17.65 inches, March 1995 at 16.60 inches, and January 1969 at 16.11 inches (WRCC 2005). The Proposed Action would not result in any changes to climate. The alternatives evaluated in this EA would not have an effect on climate due to the nature of the activities.

3.1.2 Geology and Seismicity

The surface of the Central Valley is composed of unconsolidated Pleistocene (two to three million years ago) and Recent (10,000 year ago) sediments. The valley floor is composed of alluvial fan and channel deposits from the various rivers in the area (Corps 1998).

Yuba County lies in east-central California, an area experiencing relatively low seismic activity. The nearest active fault is the Cleveland Hill Fault, located about 20 miles northeast of Marysville. This fault was the source of the 5.7 magnitude earthquake in the Oroville area in 1975. The Foothills Fault system in Yuba County is a continuation of the Cleveland Hill Fault. Seismic activity in the area is estimated to have a very long recurrence interval so special seismic zoning for the Foothills Fault system is not necessary (Corps 1998).

The current and historic lower Yuba River channel contains water-worn pebbles, cobbles, and boulders. For about four miles upstream of Daguerre Point Dam, the south bank is composed of dredge spoils from the Yuba Goldfields, and the north bank is predominantly composed of the Riverbank Formation, which is a highly resistant red sand, silt, gravel, and small cobble from the Pleistocene. The alternatives evaluated in this EA would not have an effect on geological or seismic conditions.

3.1.3 Land Use

The Yuba County General Plan identifies the types of land use in the vicinity of the project area as public land, foothill agriculture, extractive industrial, and open space (QUAD Consultants 1994). The Corps holds fee title to approximately 165 acres of land surrounding the dam at Englebright. Further downstream from Englebright, land ownership in the vicinity of the lower Yuba River includes the Pacific Gas and Electric Company (PG&E) and University of California, respectively, followed by private parcels and several gravel mining operations. The largest gravel extractive operation occurs in the Yuba Goldfields, located south of the Yuba River and downstream of the Highway 20 Bridge (Corps 2001). BLM has proposed a land exchange in the Yuba Goldfields along the Yuba River from the Highway 20 Bridge downstream to Daguerre Point Dam (Corps 2001).

The alternatives evaluated in this EA would not have an effect on land use due to the nature of the activities. Specifically, there would be no encroachments that are incompatible with recreational and wildlife uses. All haul trucks will use existing roads and access areas.

3.1.4 Agriculture and Prime and Unique Farmland

The Proposed Action Alternative is not located in the vicinity of any land designated as prime or unique farmland. The alternatives evaluated in this EA would not have an effect on agricultural or Prime and Unique Farmland due to the nature of the activities

3.1.5 Socioeconomics and Environmental Justice

The Proposed Action Alternative is a minor undertaking that would not affect the socioeconomic conditions in the area. There would not be disproportionately high or adverse effects on the health or environment of minority and low-income populations. Additionally, no populations live in or around the project area; therefore, the project would have no effects on populations or minority/low income housing.

3.1.6 Aesthetics

The visual character of the lower Yuba River is varied. Rolling hills above the river are covered with green grass and wildflowers in the spring, fading to a golden brown in the summer and fall. Annual grasslands dominate areas where land is not being farmed. Interspaced riparian, vernal pool, and wetland habitat is located along river corridors and in annual grassland depressions

Views along the lower Yuba River have been extensively altered due to gold and gravel mining with gravel mining still taking place on both sides of the river. Because the river in this area has undergone extensive modification, riparian vegetation has only re-established itself in a few small areas. There are large areas with little or no vegetation (Bureau of Land Management, 2011).

The amount of in-stream woody material in the lower Yuba River has declined over the years because upstream dams impede some downstream transport of LWM. The proposed plan calls for placing woody material into the lower Yuba River's functional floodplain to restore natural conditions prior to the construction of the upstream dams. It will be visible to casual observers in the short-term, until materials is naturally broken down or transported downstream. The proposed action would temporarily add natural woody materials along the lower Yuba River. Given the scale of the river channel and current lack of woody material, the proposed action would have no significant or long-term adverse effects on the visual resources in the area.

The gravel would be placed into the lower Yuba River below the high-water mark, and would be visible to casual observers in the short-term, until natural algal development and sedimentation occurred to blend the newly placed gravel with the surrounding streambed substrate. The proposed action site is located in the vicinity of the Narrows I and II hydropower generating facilities. The proposed action would occur each year for the next 10 years for approximately two to six weeks each year. Although the proposed action would add to a temporary disruption of the visual setting along the lower Yuba River, it would have no significant or long-term adverse effects on the visual resources in the area.

3.1.7 Traffic

Currently, public river access is limited to just a few points: the Highway 20 Bridge at Parks Bar, Hammon Grove Park, Hallwood Boulevard, and the Highway 70 Bridge in Marysville (Community Center of Practice, 2011). The primary traffic use of the roads within the project area is low-density; mainly rural traffic. Existing haul routes in the project are used relatively frequently due to several gravel mining and ranching operations in the area. Many roads accessing the river are not well-maintained and may require specialized vehicles.

The Proposed Action will use existing roads and access points and may have temporary effects on recreation traffic entering and exiting the area. These effects would include temporarily increased traffic volume due to transport trucks traveling to and from the stockpiles and the placement site, but would not reduce the overall level of service along the roads.

3.1.8 Hazardous, Toxic, and Radiological Waste

The operation of motorized equipment used for the proposed action activities and trucks used for hauling material to the site would increase the risk of discharging hazardous substances (oil, diesel fuel, hydraulic fluids) into the environment.

Appropriate best management practices would be implemented in order to ensure that the risk of hazardous materials spills is minimized. Staff working in the area would be properly trained to use standard spill prevention and cleanup equipment and techniques including rapid deployment of onsite spill absorption and retention materials. Additionally, if gravel is acquired from a commercial quarry it would arrive pre-washed to remove sediments containing any potential hazardous or toxic materials. The alternatives evaluated in this EA would not have an effect on hazardous, toxic, or radiological waste due to the nature of the activities.

3.1.9 Recreation

The primary recreation activities within the project area are fishing, boating, recreational exercise, and wildlife viewing. Other activities may include hunting, swimming, and gold panning. Public access to the proposed placement sites is limited. Structures that protrude into a river channel, block the channel, or are designed to trap floating materials can be hazardous to recreational users and boaters (Saldi-Caromile et al. 2004). The woody material will be placed in the functional floodplain in areas subject to watering only during high stage flows when recreational users do not use the area. Although the proposed action could temporarily diminish the recreational experience of visitors due to the noise, dust, and in-water activities caused by the introduction of gravel sluicing equipment, the project would have no significant adverse effects on recreation in the project area. Placement areas are not located in the vicinity of recreation activities and therefore there would be no impact to recreation from the placement of gravel or LWM. The alternatives evaluated in this EA would not have an effect on recreation due to the location, public access, duration, and nature of the activities.

3.1.10 Noise

Construction activities from the proposed action, such as the running transport trucks, placement tractors, and gravel sluicing would temporarily increase the noise levels near the project area. Temporary construction activities are not expected to significantly adversely affect sensitive receptors in the project area. The alternatives evaluated in this EA would not have an effect on noise due to the location, lack of sensitive receptors, and nature of the activities.

3.1.11 Vegetation and Wildlife

The major vegetation types surrounding the project area include grassland, blue oak woodland, open gray pine woodland, and chaparral. Some of the dominant species include interior live oak, blue oak, gray pine, buttonbrush, blackberry, poison oak, wild oat, foxtail, and ripgut brome. The lower Yuba River channel within the Narrows Canyon is mostly devoid of vegetation. Small isolated clumps of shining willow, mulefat, and other riparian species are widely scattered along the otherwise barren rocky banks along the proposed gravel placement site and for approximately two miles downstream within the Narrows Reach.

Downstream of the Narrows Reach, past gold and gravel mining operations have left extensive piles of cobble and gravel, significantly reducing the quality and quantity of vegetation types within the Garcia Gravel Pit Reach. The dominant vegetation species along the flood plain consists of narrow strips of Fremont cottonwood, sandbar willow, red willow, and box elder. Individual elderberry plants may attain small tree stature in the vicinity of Daguerre Point Dam.

The riparian and adjacent upland oak/grassland habitat along the lower Yuba River supports a variety of wildlife species. Mammals that might be found within the project area include the California blacktail deer, western gray squirrel, black-tailed jackrabbit, California ground squirrel, gray fox, mountain lion, bobcat, coyote, spotted skunk, striped skunk, raccoon, long-tailed weasel, beaver, muskrat, river otter, Botta's pocket gopher, western harvest mouse, and numerous bats.

Reptiles and amphibians that are known to inhabit the project area include the western pond turtle, common garter snake, Pacific gopher snake, western rattlesnake, western fence lizard, western whiptail lizard, western skink, horned lizard, western aquatic garter snake, California kingsnake, Pacific tree frog, and bull frog.

Bird surveys conducted between June and August 1999 by a Corps biologist included observations of California valley quail, mourning dove, scrub jay, mallard, Anna's hummingbird, American crow, turkey vulture, tree swallow, killdeer, belted kingfisher, and downy woodpecker (Corps 2001). Migratory birds and their habitats are protected under the Migratory Bird Treaty Act (MBTA), as amended (16 U.S.C703 et seq.). Several migratory birds, including waterfowl, shorebirds, song birds, hummingbirds, vultures, and raptors commonly are found along the lower Yuba River and around Englebright Lake, including red-tailed hawks and bald eagles. Songbirds, in particular, have the potential to utilize habitat located within the project area, including field sparrow, song sparrow, fox sparrow, orange-crowned warbler, tree swallows, and the lesser and American goldfinch.

The proposed action would not have any adverse effect on vegetation or wildlife due to the limited scope and duration of the action and the lack of riparian vegetation in the vicinity of the activities. The proposed action would not involve removal of any existing vegetation. If nesting birds are found, coordination with the appropriate resource agencies will occur to determine if the proposed action would have an effect on the nesting activities. Any wildlife displaced by this action would be expected to return to the area soon after the action is completed. The alternatives evaluated in this EA would not have an effect on vegetation and wildlife because no vegetation will be removed and wildlife will temporary relocate to nearby areas and return once activities are completed.

3.2 Air Quality

3.2.1 Existing Conditions

The project area is located in the Sacramento Valley Air Basin, which is composed of Butte, Colusa, Glenn, Placer, Sacramento, Shasta, Solano, Sutter, Tehama, Yolo, and Yuba Counties (CARB 2007). The major air pollution problems in the Sacramento Valley Air Basin are high concentrations of oxidants and suspended particulates. Both pollutants frequently exceed air quality standards. The largest source of oxidants in the basin is motor vehicles, and the major source of suspended particulates is agriculture. Yuba County is designated as "unclassified" or "in attainment" for carbon monoxide, nitrogen dioxide, and sulfur dioxide. Yuba County is in "non-attainment" for ozone and coarse particulate matter ($PM_{10)}$ (FRAQMD 2004, 2010).

3.2.2 Effects

Basis of Assessment

An alternative would be considered to have an adverse effect on air quality if the action would violate any ambient air quality standard, contribute on a long-term basis to an existing or projected air quality violation, expose sensitive species or humans to substantial pollutant concentrations, or not conform to applicable Federal standards.

No Action Alternative

Under this alternative, the air quality conditions in the vicinity of the project area would remain the same. Air quality would continue to be influenced by climatic conditions, and local and regional emissions from vehicles and agricultural activities.

Proposed Action

The proposed action would have minor short-term effects on air quality in the area as a result of emissions and fugitive dust from vehicles used for loading, hauling, and placing of LWM and gravel operation of the conveyor equipment, a loading dozer, and material transport vehicles would produce emissions and PM_{10}, as well as increase fugitive dust from placement activities. To reduce impacts to air quality from dust, best management practices such as water trucks would be used if needed. With the implementation of best management practices, no significant adverse effects to air quality are anticipated. Therefore, no mitigation would be required.

The placement of approximately 5,000 to 15,000 short tons of gravel would be expected to take place over six to eight weeks. It would take a 20-ton haul truck 250 trips to haul 5,000 short tons of gravel from the commercial source. Over the course of eight weeks that would equal approximately eight haul trips a day. Table 9 denotes the estimated emissions for the proposed action. Based on the equipment needed and estimated hours of operation for each piece of equipment, the estimated emissions and PM10would not be expected to exceed Federal, State, or Local standards or de minimus thresholds. No conformity determination would be required.

TABLE 9.

Emissions Calculation for the lower Yuba River Gravel Augmentation

Emissions Estimates				**Total**	**Exhaust**	**Fugitive Dust**	**Total**	**Exhaust**	**Fugitive Dust**	
	ROG	**CO**	**NO_X**	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**$PM_{2.5}$**	**$PM_{2.5}$**	**$PM_{2.5}$**	**CO_1**
***De minimus* Thresholds (Tons/year)**	50	100	50	100	-	-	100	-	-	-
Maximum (pounds/day)	10.1	40.3	51.1	18.1	3.1	15	6	2.9	3.1	4,977.90
Total (tons/construction project)	0.2	0.5	0.7	0.3	0	0.2	0.1	0	0	68.6

3.3 Hydrology and Water Quality

3.3.1 Existing Conditions

Hydrology

The Yuba River watershed drains approximately 1,300 square miles on the western slope of the Sierra Nevada from a maximum height of 9,100 feet at Mt. Lola to 30 feet at the Yuba River's confluence with the Feather River at Marysville, California. The lower Yuba River extends approximately 24 miles from Englebright (at elevation 282 feet) to its confluence with the Feather River. Much of the watershed is controlled by several reservoirs that store water and trap sediments to varying degrees. These include Englebright, Daguerre Point Dam, and New Bullards Bar Reservoir, which is located approximately 16 miles upstream of Englebright. The total storage capacity of the watershed is 1,377,000 acre-feet of water.

The flow in the Yuba River is partially controlled by New Bullards Bar Reservoir, the largest reservoir in the watershed, which was constructed by the YCWA in 1969. The YCWA stores water in New Bullards Bar Reservoir for release through the New Colgate powerhouse to provide in-stream flows for fishery enhancement, flood control, power generation, recreation, and to provide irrigation water to member units that have water rights and water service contracts. The YCWA has also supplied water from New Bullards Bar Reservoir for municipal, industrial, and fish and wildlife purposes through a number of temporary transfers lasting less than a year. Except for New Bullards Bar Reservoir, there is only minimal storage for retention of snowmelt within the basin. Hence, much of the spring and early summer flow to the lower

Yuba River is the result of uncontrolled snowmelt within the basin. In the summer and early fall, prior to the precipitation season, most of the flow in the lower Yuba River is regulated by releases from New Bullards Bar Reservoir.

Englebright Dam, marking the upstream boundary for the project area, is downstream of New Bullards Bar Reservoir. PG&E constructed the FERC-licensed Narrows I powerhouse approximately 0.25 mile below Englebright Dam. YCWA constructed the FERC-licensed Narrows II powerhouse immediately below Englebright Dam as part of its Yuba River Development Project. The coupled operation of New Bullards Bar includes releases through the New Colgate, Narrows I, and Narrows II powerhouses thus providing the principal regulation of the lower Yuba River. Englebright dam has no operations as there are no gates. Water simply flows over the top of the dam once the lake reaches a certain elevation.

Water that is released from New Bullards Bar Reservoir generally passes through Englebright Reservoir without modifying Englebright Reservoir elevations. Most of the lower Yuba River flow downstream of Englebright is released as outflow from FERC-licensed hydroelectric power generation. Consequently, the 0.2 mile of river between Englebright and the Narrows II hydroelectric facility normally has standing water, except when Englebright is spilling (CDFG 1991).

Yuba River flows are measured at Smartville near Englebright Dam at the upper end of the lower Yuba River (Smartville Gauge – U.S. Geological Survey [USGS] Station No. 11418000) and at Marysville, about six miles upstream of the mouth of the Yuba River (Marysville Gauge – USGS Station No. 11421500). Data from the Yuba River's Smartville station indicate that flows average 2,600 cfs annually, with the highest flows in February and March.

Water Quality

As defined by the Central Valley Region of the California Regional Water Quality Control Board (CRWQCB), waters below Englebright Dam support numerous beneficial uses including irrigation, power generation, recreation, cold and warm freshwater habitat for resident fishes, and cold and warm freshwater migration and spawning habitat for anadromous fishes (CRWQCB 1998).

The overall water quality of the lower Yuba River is good and has improved in recent decades due to controls on hydraulic and dredge mining operations, and the establishment of minimum in-stream flows (Beak Consultants, Inc. 1989). Several factors that influence water quality in the river include rainfall and runoff patterns, quality of the irrigation water supply, crop acreages, crop cultural practices (pesticide and herbicide use), water management, and soil characteristics. Currently, there is continued coordination with the Lower Yuba River Accord process which serves to protect and enhance fisheries resources through adaptive water management.

Dissolved oxygen concentrations, total dissolved solids, pH, hardness, alkalinity, and turbidity are well within acceptable or preferred ranges for salmonids and other key freshwater

organisms (Table 2). The minimum, maximum, and average levels of pH, turbidity, dissolved oxygen, total organic carbon, nitrogen, phosphorus, and electrical conductivity for the lower Yuba River are presented in Table 2 below. The data (27 samples) were collected on the Yuba River near Marysville over a 3-year period (1996 to 1998) (USGS 2002a, 2002b)

Table 2 - Water Quality of the Lower Yuba River near Marysville, California

Parameter	Minimum	Maximum	Average
pH (standard units)	7	7.8	7.5
Turbidity (mg/L)	1	153	30
Dissolved Oxygen (mg/L)	8	12.4	11.4
Total Organic Carbon (mg/L)	0.7	2.4	1.1
Nitrogen (mg/L)	0.05	0.14	0.07
Phosphorus (mg/L)	0.01	0.02	0.01
Electrical Conductivity (µS/cm)	44	105	73

Notes: mg/L = milligrams per liter. µS/cm = microsiemens per centimeter

As required under CFR 40, Part 230, Section 404(b)(1) of the Clean Water Act, a Section 404(b)(1) analysis was performed to determine the potential for adverse effects on the lower Yuba River aquatic ecosystem posed by the specific dredged or fill material discharge activities associated with the proposed sediment/gravel management and gravel placement (Appendix B). Under consideration were the potential short and long-term effects of the proposed gravel placement on the physical, chemical, and biological components of the aquatic environment. The LWM placement will occur above the high water line and therefore does not require a 404(b)(1) analysis.

Discharges into waters of the U.S. that require a Federal permit or license also require certification in accordance with Section 401 of the Clean Water Act from the CRWQCB (Appendix C). The certification is necessary to ensure that the discharge would comply with the State's water quality standards that protect the beneficial uses of California's waters against quality degradation.

3.3.2 Effects

Basis of Assessment An alternative would be considered to have an adverse effect on hydrology if the action would alter local or regional existing flow patterns sufficient to introduce unintended substrate scour or deposition, mobilize local sediments, or substantially increase turbidity levels.

An alternative would be considered to have an adverse effect on water quality if it would substantially degrade water quality, contaminate a public water supply, substantially degrade or deplete ground water resources or interfere with groundwater recharge, or expose sensitive species or humans to substantial pollutant concentrations.

No Action Alternative Water from Englebright Dam is released through either the Narrows I or II Powerhouse or, if the Englebright Reservoir is full, over the top of the dam (FERC 1992). Controlled releases are made through the powerhouses up to a combined total rate of 4,200 cfs; above that rate, releases are made over the spillway at the top of Englebright Dam and are essentially uncontrolled. If no action is taken, these releases are expected to remain unchanged and the water quality and hydrology in the lower Yuba River is expected to remain the same. Fresh water would continue to be of good quality, and used for agriculture, recreational, and domestic purposes.

Proposed Action Alternative

Large Woody Material

The amount of LWM would be placed in the river over the 10 year period so that no adverse affect on the hydrology of the lower Yuba River, and no change the rate or efficiency flow of the river's hydrology would occur.

The placement of LWM into the lower Yuba River would occur in areas that are dry and would not enter or disturb the 'wet' river channel. The material being placed would be free of debris and therefore, would not increase turbidity in the river once river levels rise. The placement will occur in gravel and cobble areas and not likely include disturbance of soil. Any potential turbidity associated with the placement process would be insignificant.

The Placement of LWM would also not affect water quality because the material being placed will be clear of debris and would not be contaminated. The placement would also not have an effect on water supply as the action of placing LWM would not change the existing water supply or water quality. Therefore, this alternative would not have an effect on the overall water quality if implemented.

Gravel Augmentation

Approximately 5,000 to 15,000 short tons of a heterogeneous mix of gravel and cobble (0.25 to 5.0 inches in diameter) would be placed directly within the lower Yuba River channel at the proposed placement site (less than one acre) over a maximum period of six weeks. No ground-breaking activities are associated with the gravel augmentation. No mechanized equipment would be entering the channel or operating within the 100-year floodplain. The placement of this gravel within the channel would increase the amount of suspended sediment and thus turbidity in the immediate vicinity of the placement site and for an unknown distance downstream. The proposed placement site is located within a hydraulically efficient stretch of the lower Yuba River. Therefore the source of any increased turbidity would be attributed to the introduction of sediment particles adhering to the placed gravel and not from sediments disturbed and suspended from the channel bottom and sides. Turbidity associated with the gravel placement would not exceed the CRWQCB objectives for turbidity in the Sacramento River Basin. The CRWCQB turbidity limits are as follows:

a) Where natural turbidity is less than 1 Nephelometric Turbidity Units (NTUs), controllable factors shall not cause downstream turbidity to exceed 2 NTU;
b) Where natural turbidity is between 1 and 5 NTUs, increase shall not exceed 1 NTU;
c) Where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent;
d) Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs;
e) Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent.

Turbidity would be monitored during placement to ensure levels do not increase more than 15 percent above naturally occurring background levels. The Smartsville USGS Stream Gage would be adversely affected if high flows flush gravel downstream in mass, causing stream gauge inaccuracies as a result of coarse sediment deposition near the gauge. This would require stream gauge rating work to be performed.

The lower Yuba River hydrologic analysis includes a basic assessment of dams, hydrologic alteration by dams, a characterization of the flow regime, determination of geomorphically significant flows, and a flood frequency analysis (Pasternack 2008). The post placement hydrology, after the 2007 pilot gravel injection project, was gauged in the bedrock canyon roughly half way down (USGS Smartsville Gauge #11418000). During the 2007-2008 water years, the maximum flow was 3,500 cfs (Pasternack 2009). The pilot-project had no effect on the hydrology of the lower Yuba River. Moreover, the currently proposed gravel augmentation would not be expected to have an effect on the hydrology of the lower Yuba River. The placement of gravel in to the lower Yuba River is not expected to change the rate or efficiency flow.

3.2.3 Mitigation

As required under 40 CFR Part 230 and Section 404(b)(1) of the Clean Water Act, an analysis was performed to determine the potential for adverse effects on the lower Yuba River aquatic ecosystem posed by the specific dredged or fill material discharge activities associated with the Proposed Action (Appendix B). Under consideration were the potential short- and long-term effects on the physical, chemical, and biological components of the aquatic environment.

The findings of the Section 404(b)(1) analysis determined compliance with the requirements of the guidelines specified under 40 CFR Part 230 with the inclusion of the appropriate and practicable discharge conditions to minimize pollution or adverse effects to the aquatic ecosystem.

Discharges into waters of the U.S. that require a Federal permit or license require certification in accordance with Section 401 of the Clean Water Act from the CRWQCB (Appendix C). The certification is necessary to ensure that the discharge would comply with the Federal and State water quality standards that protect the beneficial uses of California's waters against quality degradation. The Section 401 Water Quality Certification, which is in process, may provide additional conditions that are required in order for the Corps to proceed with the

project. Those conditions, if applied by the CRWQCB, will be included in the Final EA. At a minimum the following best management practices will be included with the implementation contract specifications:

- A practicable condition requiring all woody material and gravel arrive pre-washed and clean to the placement site if material is not already clean.
- Standard pollution prevention measures, including the monitoring of turbidity levels during construction.
- Erosion and sediment control measures, proper control of non-stormwater discharges.

Implementation of these measures would prevent significant adverse effects. With the inclusion of the above measures, no significant adverse effects on hydrology or water quality are anticipated. No mitigation is required.

3.4 Aquatic Fauna

3.4.1 Existing Conditions

Fisheries

Twenty-eight species are known to inhabit the lower Yuba River downstream of Englebright Dam (CDFG 1991a). Of these, eight are anadromous and spend a part of their life cycle in the lower Yuba River. The fish species that inhabit the lower Yuba River are shown in Table 3.

Descriptions of key species supported by the lower Yuba River are provided directly below. In addition, the lower Yuba River supports three species that are Federally listed as threatened: Central Valley steelhead, Central Valley spring-run Chinook salmon (also State listed as threatened), and green sturgeon. This river also supports one State and Federally listed species of special concern: Central Valley fall/late fall-run Chinook salmon. Although the Green Sturgeon is a Federally listed species they only occur below DPD.

Sacramento Sucker

The Sacramento sucker is widely distributed through the Sacramento and Feather River systems. Sacramento suckers occupy waters from cold, high-velocity streams to warm, nearly stagnant sloughs. They are common at moderate elevations (600 to 2,000 feet). Sacramento suckers feed on algae, detritus, and benthic macroinvertebrates. They usually spawn for the first time in their fourth or fifth years. When they cannot move upstream and end up spawning in the lake habitat, they typically orient themselves near areas where spring freshets flow into the lake. They typically spawn in stream habitat on gravel riffles from late February to early June. The eggs hatch in three to four weeks, and the young typically live in the natal system for a couple of years before moving downstream to a reservoir or large river (Moyle 2002).

Sacramento Pikeminnow

Sacramento pikeminnows occupy rivers and streams throughout the Sacramento–San Joaquin River system, including the Lower Yuba River. Sacramento pikeminnows spawn in April and May, with eggs hatching in less than a week. Within a week of hatching, the fry are free swimming and schooling. Adult pikeminnows may feed on other fish, including juvenile pikeminnow, Chinook salmon, and steelhead, but according to Moyle (2002), are overrated as predators on salmonid species in natural environments. Pikeminnows tend to remain in well-shaded, deep pools with sand or rock substrate and are less likely to be found in areas where there are higher numbers of introduced predator species such as largemouth bass and other centrarchid species.

Striped Bass

Striped bass are anadromous fish that have been an important part of the sport-fishing industry in the Delta. They were introduced into the Sacramento–San Joaquin estuary between 1879 and 1882 (Moyle 2002). Their range in the Lower Yuba River is limited to the reach of the rivers below the dams. Striped bass may move into the lower reaches of the rivers year round but probably most often between April and June, when they spawn. The species tends to remain in deep, slow-moving water, where it has access to prey without having to expend a great deal of energy.

American Shad

American shad are anadromous fish that have been introduced into the Central Valley and have become established as a popular sport fish. The main American shad runs in California are in the Sacramento River up to Red Bluff and in the lower reaches of the river's major tributaries (American, Feather, and Yuba Rivers), as well as the Mokelumne and Stanislaus Rivers. American shad enter the lower Yuba River to spawn during the spring (primarily May and June) and support a seasonal fishery downstream of Daguerre Point Dam. Shad abundance increases at higher Yuba River flows relative to flows in the Feather and Sacramento Rivers.

Table 3 - Fish Species that Inhabit the Lower Yuba River

Species Common Name *Scientific Name*	**Location**			**Native or Nonnative**		**Salmonid**
	Downstream of Daguerre	**Upstream of Daguerre**	**Unknown**	**Native**	**Non-native**	**Predator**
Anadromous Fish						
Fall-run chinook salmon *Oncorhynchus tshawytscha*	X	X		X		
Spring-run chinook salmon *Oncorhynchus tshawytscha*	X	X		X		
Central Valley steelhead *Oncorhynchus mykiss*	X	X		X		X
Green sturgeon *Acipenser medirostris*	X			X		
White sturgeon *Acipenser transmontanus*	X			X		
Pacific lamprey *Lampetra tridentate*	X	X		X		
Striped bass *Morone saxatilus*	X	X			X	X
American shad *Alosa sapidissima*	X	X			X	X
Resident Fish						
Rainbow trout *Oncorhynchus mykiss*	X	X		X		X
Hardhead *Mylopharodon conocephalus*	X	X		X		X
Speckled dace *Rhinichthys osculus*	X	X		X		
California roach *Lavinia symmetricus*			X	X		
Sacramento sucker *Catostomus occidentalis*	X	X		X		
Sacramento pikeminnow *Ptychocheilus grandis*	X	X		X		X
Mosquitofish *Gambusia affinis*			X		X	
Largemouth bass *Micropterus salmoides*	X				X	X

Species Common Name *Scientific Name*	**Location**			**Native or Nonnative**		**Salmonid**
	Downstream of Daguerre	**Upstream of Daguerre**	**Unknown**	**Native**	**Non-native**	**Predator**
Smallmouth bass *Micropterus dolomieui*	X				X	X
Green sunfish *Lepomis cyanellus*			X		X	
Bluegill *Lepomis macrochirus*			X		X	
Redear sunfish *Lepomis microlophus*			X		X	
Tule perch *Hysterocarpus traski*	X	X		X		
Riffle sculpin *Cottus gulosus*	X	X		X		
Common Carp *Cyprinus carpio*			X		X	
Brown Bullhead *Ameiurus nebulosus*			X		X	
White Catfish *Ameiurus catus*			X		X	
Channel Catfish *Ictalurus punctatus*			X		X	
Threespine stickleback *Gasterosteus aculeatus*			X	X		

Aquatic Macroinvertebrates

Qualitative aquatic macroinvertebrate sampling conducted by Corps biologists within the EDR reach of the lower Yuba River indicated that the aquatic macroinvertebrate community contains a high density of individuals, but low diversity in the numbers of invertebrate taxonomic orders and families represented. Table 4 identifies the aquatic macroinvertebrates that were field identified within the project site (Corps 2007).

Table 4 -Occurrence of Aquatic Macroinvertebrates within the Englebright Dam Reach of the Lower Yuba River

	TRANSECT		
	Upstream reach	**Mid-reach**	**Downstream Reach**
Arthropoda			
Insecta			
Diptera			
Chironomidae	X	X	X
Simulidae	X		X
Empididae		X	
Ceratopogonidae	X	X	
Ephydridae		X	X
Unknown			X
Ephemeroptera			
Baetidae	X	X	X
Caenidae	X		
Leptophlebiidae	X		
Unknown	X	X	X
Crustacea			
Amphipoda	X	X	X
Chelicerata			
Arachnida		X	X
Annelida	X		
Nematoda	X		
Coelenterate			
Hydridae	X	X	X
Mollusca			
Gastropoda			
Physidae	X	X	
Planorbidae			X
Platyhelminthes	X		

3.4.2 Effects

Basis of Significance

An alternative would be considered to have an adverse effect on aquatic fauna if it would result in a reduction in fish populations or substantially degrade the water quality of fish habitat by increasing the concentrations and total amounts of suspended solids or toxic substances. Additionally, an alternative would be considered to have an adverse effect on macroinvertebrates if it would substantially degrade water quality.

No Action Alternative

If no action is taken, the supply of woody material along the lower Yuba River would not be augmented by placement of additional LWM. As a result, there would not be a potential for a corresponding improvement of juvenile salmonid rearing habitat in the lower Yuba River. In the long-term, dams upstream of Englebright will continue to disrupt downstream transport from the upper watershed, therefore disrupting the flow and accumulation of woody materials acting as fish habitat. Because the placement of woody material was proposed in the 2013 BA as a conservation measure to reduce the affects to listed fish species, the no action alternative would require reinitiation of consultation under the Endangered Species Act Section 7.

Without additional gravel delivery to the channel immediately below Englebright Dam, the existing gravel supply in the bed and usable gravel stored in downstream bars would decrease as it is gradually transported downstream and out of the project reaches. A continued degradation to physical habitat structure and ecological function of the lower Yuba River would be expected. In the long term, the gradual transportation of sediment and gravel downstream, out of the Englebright Dam Reach, would continue the current degradation of fish and aquatic macroinvertebrate habitat.

Proposed Action

Large Woody Material

The deposition of LWM directly into the low flow channel may include minimal short-term effects such as localized and temporary disturbance, displacement, or impairment of feeding, migration, or other behaviors by adult and juvenile salmon and steelhead from noise, suspended sediment, turbidity, and sediment deposition generated by LWD placement activities. There would be no short-term adverse effects on fish and macroinvertebrates due to placement of LWM in seasonal floodplains that are not inundated at the time of placement. There would be, however, long term beneficial effects, as the instream LWM provides escape cover and relief from high current velocities for juvenile salmonids and other fishes.

Gravel Augmentation

Gravel placed into the river would cause short-term increases in turbidity and would temporarily disturb aquatic fauna in the stream channel. Increases in turbidity (suspended sediments) could affect redds or fish that may be present during injection, disrupt feeding activities of common fish species or result in temporary displacement from preferred habitats. Gravel placed into the river bed could also bury stream substrates that provide habitat for aquatic invertebrates, an important food source for fishes. Consequently, growth rates of fish could be reduced if turbidity levels or sediments substantially exceed ambient levels for prolonged periods. However, because of the limited amount of gravel, as well as the movement and settling of the gravel and sediments, the elevated turbidity levels would be short term, localized, and less than significant. There would be no long-term adverse effects on fish. There would, however, be long-term beneficial effects, as the new gravel becomes available to salmonids for

spawning and in the increased habitat diversity available to the benthic macroinvertebrate community within the EDR.

3.4.3 Mitigation

As there would be no significant effects on fish, no mitigation would be required. However, to minimize the effects of the proposed action, gravel would arrive pre-washed from the commercial quarry. Additionally any requirements identified in the 401 permit would be implemented to prevent significant adverse affects to macroinvertebrate populations.

3.5 Special Status Species

3.5.1 Existing Conditions

Special-status species that have the potential to occur in the vicinity of the project area were determined through a review of USFWS species lists and the California Natural Diversity Database (CNDDB) Rarefind electronic database in the Smartville and Browns Valley U.S. Geological Survey 7.5 Minute Quads (CDFG 2010), as well as a review of the California Native Plant Society Inventory of Rare and Endangered Plants, 7th edition (online) (CNPS 2010). Special-status wildlife, fish, and plant species obtained through these sources were consolidated and are listed in Appendix D.

Previous ESA coordination with NMFS resulted in Biological Opinions on the continued operation and maintenance of Englebright Dam and Reservoir, Daguerre Point Dam, and recreational facilities on and around Englebright Reservoir dated May 12, 2014. Species consulted on in this BO include spring-run Chinook salmon, California Central Valley Steelhead, and the Southern DPS of North American Green Sturgeon.

USFWS provided a list of Federally-listed species with the potential to exist in the study area and a Coordination Act Report (CAR) dated July 3, 2014 (Appendix D). Species considered in this report include the Central Valley spring-run Chinook salmon and the Central Valley steelhead.

Each species on the list was evaluated for its potential to occur within the project area. Species that are not found in land cover types present in the project area, or whose known range falls outside of the project area, were eliminated from further consideration. Special status species that are known to occur or have the potential to occur within the project area are further evaluated in the following sections.

Wildlife Species.

Eight special status wildlife species were identified as having the potential to occur in the project area or are known to occur in the project area. These wildlife species include:

- long-eared owl (*Asio otus*)

- Swainson's hawk (*Buteo swainsoni*)
- tricolored blackbird (*Agelaius tricolor*)
- western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)
- northwestern pond turtle (*Clemmys marmorata marmorata*)
- valley elderberry longhorn beetle (*Democerus californicus dimorphus*)

Long-eared Owl

The long-eared owl is designated as a California species of concern. The long-eared owl requires wooded areas for daytime roosting with adjacent open areas to forage. Their habitat requirements do not change between breeding and wintering, although during breeding season the owls become very territorial and subsequently dispersed, whereas during the winter months they roost communally in groups of 7 to 50 birds. In the west and southwest, long-eared owls are found in deciduous woods near lakes and streams where growth of climbing vines provide dense roosting cover during winter. The long-eared owl does not build its own nest and instead will use old crow, magpie, squirrel, or other large abandoned stick nests. Irregularly, it will also use a natural cavity in a tree, cliff, or on the ground.

A CNDDB records search did not identify occurrences of long-eared owls within the project area. However, a nest tree is located several miles south of the project area in the Spenceville Wildlife Area operated by the California Department of Fish and Wildlife (CDFW) (CDFW 2010). Formal surveys have not been performed to determine whether this species is currently present and nesting within the project area.

Swainson 's Hawk

The Swainson's hawk is designated as a California threatened species. In the Central Valley, the Swainson's hawk nests primarily in riparian areas adjacent to agricultural fields or pastures, although it sometimes uses isolated trees or roadside trees. The Swainson's hawk nests in mature trees; preferred tree species are valley oak, cottonwood, willow, sycamore, and walnut. Nest sites typically are located near suitable foraging areas. The primary foraging areas for Swainson's hawk include open agricultural lands and pastures.

The riparian forest in the vicinity of Daguerre Point Dam is dominated by native woody riparian tree species that provide potential nest sites for Swainson's hawk. Formal surveys have not been performed to determine whether this species is currently present and nesting within the project area. However, Swainson's hawk is expected to forage in the lower portion of the project area.

Tricolored Blackbird

The tricolored blackbird is designated as a California species of concern. The tricolored blackbird inhabits open valleys and foothills, and may be found in streamside forests, alfalfa and rice fields, marshes, and along reservoirs. This blackbird usually nests in marshes, but may also nest in willow and blackberry thickets and on the ground in clumps of nettles. They forage in wet meadows, rice and alfalfa fields, and in rangelands. They commonly roost in trees or

marshes. Whether they are roosting, foraging, or nesting, these birds are always found in very large flocks. The tricolored blackbird both nests and winters in interior valleys from southern Oregon (east of the Cascades) to northwest Baja California.

A CNDDB records search identified a historical tricolored blackbird colony site near the confluence of Dry Creek and the Yuba River. This site has since been developed as an RV Park. The last tricolored blackbird sighting in this area was April 23, 1994 (CDFG 2010).

Western Yellow-Billed Cuckoo

The Western yellow-billed cuckoo is State listed as an endangered species and is a proposed threatened for Federal listing. This species requires large patches (25 acres or larger) of mixed old-growth riparian forests composed of willow and cottonwood trees with dense understory. Dense cottonwood riparian forest is present in the vicinity of Daguerre Point Dam. However, the riparian forest exists as narrow patches found upstream and downstream of Daguerre Point Dam. A CNDDB records search did not identify occurrences of western yellow-billed cuckoos within the project area (CDFW 2010). In addition, statewide surveys conducted in 1999/2000 by USGS and USFWS documented no individuals nesting downstream within the Feather River channel.

Northwestern Pond Turtle

The northwestern pond turtle is designated as a California species of concern. The northwestern pond turtles inhabit permanent or nearly permanent waters with little or no current. The channel banks of inhabited waters usually have thick vegetation, but basking sites such as logs, rocks, or open banks must also be present. Eggs are laid in nests along sandy banks of large slow-moving streams or in upland areas, including grasslands, woodlands, and savannas. Nest sites are typically found on a slope that is unshaded, has a high clay or silt composition, and soil at least 4 inches deep.

Ponded water bodies and some agricultural ditches and canals in the vicinity of the project area provide suitable habitat for this species. A CNDDB records search identified three occurrences of northwestern pond turtles in the vicinity of the project area (CDFW 2010). Two occurrences were associated with natural stream courses and agricultural ditches adjacent to the proposed gravel haul route on Peoria and Scott Forbes Roads.

Valley Elderberry Longhorn Beetle

Elderberry shrubs are the host plant of the valley elderberry longhorn beetle (VELB), which is Federally listed as threatened. Current information on the habitat of the beetle indicates that it is found only with its host plant, the elderberry. Adult VELB feed on foliage and are active from early March through early June. The beetles mate in May, and females lay eggs on living elderberry shrubs. After hatching, the larvae burrow in the stems of the shrubs within which they pupate. Before they pupate and metamorphose into an adult, the larva creates a circular exit hole, through which it emerges as an adult.

Elderberry shrubs in the Central Valley are commonly associated with riparian habitat, but also occur in oak woodlands and savannas and in disturbed areas. There are several CNDDB records of VELB occurrences in the vicinity of Daguerre Point Dam (CDFW2010).

Fish Species

The following special-status fish species and designated critical habitats were identified as having the potential to occur or are known to occur in the project area. These fish species and designated critical habitats include:

- Central Valley fall/late fall-run Chinook salmon (*Oncorhynchus tshawytscha*)
- Central Valley spring-run Chinook salmon and critical habitat (*Oncorhynchus tshawytscha*)
- Central Valley steelhead and critical habitat (*Oncorhynchus mykiss*)
- Green sturgeon (*Acipenser medirostris*)

During the early to mid-1900s, upstream migration by anadromous fish species was adversely affected by ineffective fish ladders at Daguerre Point Dam (Corps 2013). Low streamflows and high water temperatures in the Yuba River also had negative impacts on the species. As a result of the floods of 1963 and 1964, most of Daguerre Point Dam was washed out. The dam and fish ladders, which were designed in accordance with USFWS and CDFG design criteria, were reconstructed. The new design included extensions to the fish ladders and slide gates were added to both upstream ends of the ladders in 1965, permitting the passage of fish. The commencement of operations at New Bullards Bar Dam in 1970 improved conditions for salmonids in the lower Yuba River by providing cooler water temperatures and more reliable flows in the summer and fall (NMFS 2005b).

Fall/Late Fall-run Chinook Salmon

On September 16, 1999 (64 FR 50393), NMFS downgraded the fall-run Chinook salmon to candidate status. There is no State protection for fall-run or late fall–run Chinook salmon. NMFS indicated that the Central Valley fall-run and late fall–run Chinook salmon are a single evolutionarily significant unit (ESU), therefore they are discussed together in this section.

Fall-run Chinook salmon are the most abundant anadromous fish in the Central Valley. The total fall-run Chinook salmon population during the November 2007 to April 2008 period, as derived from escapement surveys, was 10,222 fish (CDFG 2010a).

Optimal water temperatures for egg incubation for Chinook salmon are 44 to 54°F (Rich 1997). Newly emerged fry remain in shallow, lower velocity edgewaters, particularly where debris collects and makes the fish less visible to predators (CDFG 1998). The duration of egg incubation and time of fry emergence depend largely on water temperature. In general, eggs hatch after a three to five month incubation period, and alevins (yolk-sac fry) remain in the gravel until their yolk-sacs are absorbed (two to three weeks).

Juvenile Chinook salmon move out of upstream spawning areas into downstream habitats in response to many factors, including inherited behavior, habitat availability, flow, competition for space and food, and water temperature. The numbers of juveniles that move, and the timing of movement, are highly variable. Storm events and the resulting high flows appear to trigger movement of substantial numbers of juvenile Chinook salmon to downstream habitats.

Adult fall-run Chinook salmon migration and holding generally occurs in the lower Yuba River beginning in July and peaking in November. By the end of November, typically greater than 90 percent of the run has entered the river. Timing of the adult Chinook salmon spawning activity is strongly influenced by water temperatures (YCWA 2006).

Spring-Run Chinook Salmon

NMFS designated the Central Valley spring-run Chinook as threatened on September 16, 1999 (64 FR 50393). On February 5, 1999, the California Fish and Game Commission listed spring-run Chinook salmon as threatened under CESA. Critical habitat for this ESU, which includes the lower Yuba River, was designated on September 2, 2005.

Juveniles display considerable variation in stream residence and migratory behavior. Juvenile spring run Chinook salmon may leave their natal streams as fry soon after emergence or rear for several months to a year before migrating as smolts or yearlings (Yoshiyama et al. 1998). Triggers for downstream movement are similar to those described for fall-run Chinook salmon above. Recent fish trapping operations in the lower Yuba River indicate that large numbers of Chinook salmon fry leave the river in December to March (CDFW unpublished data). A second, smaller peak of smolt-sized fish emigrates in April to June.

Historically, spring-run Chinook salmon were the second most abundant run of Central Valley Chinook salmon (Fisher 1994). They occupied the headwaters of all major river systems in the Central Valley where there were no natural barriers. However, habitat has been in a steady decline since the 1920s due to migration barriers, hydraulic mining, and water diversions. The total spring-run Chinook salmon population during the November 2007 to April 2008 period, as derived from escapement surveys, was 6,158 fish (CDFG 2010a).

As of 2008, the Feather River Fish Hatchery (located in the Yuba River) population had dropped significantly to 1,418 Feather River fish (CDFG 2010a). Part of the significance of this fishery is that it supports natural reproduction that is not augmented with hatchery transplants, although CDFW did conduct a one-time stocking of a small number of juvenile spring-run fish from the Feather River Hatchery into the lower Yuba River in 1980 (CDFG 1991a).

Spawning surveys and adult monitoring at the fish ladders on Daguerre Point Dam conducted by CDFW have detected the continued presence of a small population of spring-run Chinook salmon migrating into the lower Yuba River. In the spring of 2004, a~~t~~ total of 413 adult Chinook salmon were detected migrating up past Daguerre Point Dam from April through June (NMFS 2005b). The migration timing and location of these fish indicate that they were all Central valley spring-run Chinook salmon. During 2005, there were 1,021 Chinook salmon (including grilse) observed (YCWA 2006). During the 2008 period, a total of 2,268 Chinook

salmon were observed (LYRA 2010). During the 2009 to 2010 redd survey conducted by the Yuba River Accord River Management Team, a total of 2,221 redds were observed from Daguerre Point Dam to Englebright Dam.

According to Pasternack (2008), the Englebright Dam Reach was found to be lacking habitat for spring-run Chinook salmon spawning, even though this is where many such fish come and attempt to spawn on the bedrock. The upper half of this reach lacks self-sustainable conditions and is purely governed by bedrock canyon geometry (Pasternack 2008).

On February 16, 2000, NMFS designated critical habitat for the Central Valley spring-run Chinook salmon ESU (63 FR 11482) (NMFS 2002). The project falls within the area designated as critical habitat which consists of water, substrate, and adjacent riparian zone of accessible estuarine and riverine reaches. Critical habitat for Central Valley spring-run Chinook salmon is designated to include all river reaches accessible to Chinook salmon in the Sacramento River and its tributaries in California (NMFS 2002). Also included are river reaches and estuarine areas of the Sacramento-San Joaquin Delta; all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge. Excluded are areas above specific dams or above longstanding naturally impassable barriers.

Central Valley Steelhead

NMFS reaffirmed the threatened status of the Central Valley steelhead on January 5, 2006, to include all naturally spawned Central Valley steelhead populations below natural and manmade impassable barriers in the Sacramento and San Joaquin Rivers and their tributaries, as well as two artificial propagation programs: the Coleman National Fish Hatchery and Feather River Hatchery steelhead hatchery programs. The critical habitat final designation was published on September 2, 2005 (70 FR 52488), with an effective date of January 2, 2006.

Historically, steelhead spawned and reared in most of the accessible upstream reaches of Central Valley rivers, including the Yuba, Feather, and Sacramento Rivers and their perennial tributaries. Compared with Chinook salmon, steelhead generally migrated farther into tributaries and headwater streams where cool, well-oxygenated water was available year-round. Declines in steelhead abundance have been attributed largely to dams that eliminated access to most of their historic spawning and rearing habitat, and restricted steelhead to less suitable habitat below the dams. Other factors that have contributed to the decline of steelhead and other salmonids include habitat modification, over-fishing, disease and predation, inadequate regulatory mechanisms, climate variation, and artificial propagation (NMFS 2006).

Since 1975, the steelhead run size has not been estimated, but is believed to be “stable” and supports a significant recreational fishery (McEwan and Jackson 1996). CDFW stopped stocking steelhead into the lower Yuba River in 1979, and currently manages the river to protect the natural steelhead production through strict “catch-and-release” fishing regulations. In 2008, a total of 424 steelhead were observed passing through the VAKI system at Daguerre Point Dam (LYRA 2010).

Currently, upstream migration in the lower Yuba River occurs from August through March and peaks in October and February (CDFG 1991a). Central Valley steelhead spawning generally occurs from January through April in the lower Yuba River (CDFG 1991a). Egg incubation time in the gravel is determined by water temperature, with optimal egg incubation temperatures reported to range from 48°F to 52°F (CDFG 1991b). Steelhead fry usually emerge from the gravel two to eight weeks after hatching, usually between February and May, but sometimes into June (CDFG 1991b). Newly emerged steelhead fry move to shallow, protected areas along streambanks and then move to faster, deeper areas of the river as they grow. Juvenile steelhead feed on a variety of aquatic and terrestrial insects and other small invertebrates.

Juvenile steelhead rear throughout the year and may spend from one to three years in freshwater before migrating to the ocean; juvenile steelhead rear in the lower Feather and Bear Rivers throughout the year (CDFG 1991b). Smolting steelhead generally migrate from March to June (CDFG 1991b).

The project falls within critical habitat for Central Valley steelhead which is designated to include all river reaches accessible to listed steelhead in the Sacramento River and San Joaquin Rivers and their tributaries in California (NMFS 2002). Also included are river reaches and estuarine areas of the Sacramento-San Joaquin Delta; all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge. Excluded are areas of the Merced River confluence and areas above specific dams or above longstanding naturally impassable barriers.

Green Sturgeon

On April 7, 2006, NMFS published the final rule to designate the southern district population segment (DPS) of green sturgeon as threatened effective June 6, 2006 (71 FR 17757). There is no State protection for this species. There are confirmed observations of green sturgeon (*Acipenser medirostris*) in the Feather River near the mouth of the Yuba River (NMFS 2005a), and unconfirmed species observations of sturgeon in the lower Yuba River below Daguerre Point Dam (NMFS 2005b). Because the existing fish ladders at Daguerre Point Dam were constructed to provide passage for Chinook salmon and steelhead, they may be considered a barrier to the upstream migration of green sturgeon in the lower Yuba River. As a result, green sturgeon are unable to ascend the fish ladders on the dam, or otherwise pass over or around the structure. In order to accommodate green sturgeon, a major modification to the existing structure would have to be authorized by Congress. It is important to note that the critical habitat for green sturgeon does not extend upstream of Daguerre Point Dam.

Although life stages in fresh water may last up to two years, green sturgeon are the most marine of sturgeon species, coming into rivers mainly to spawn. Adults and juvenile sturgeon are benthic feeders, but may also take small fish. Juveniles in the Delta estuary primarily feed on opossum shrimp and amphipods (Moyle 2002).

Incidental capture of larval green sturgeon in salmon out-migrant traps indicates that the lower Feather River may be a principal spawning area; green sturgeon may also spawn in the mainstem Sacramento River. Adults have been reported as far upstream as Red Bluff, and young have been recorded in a number of places downstream. Some spawning may also take place in the lower San Joaquin River because young green sturgeon have been taken at Santa Clara Shoal in the Brannan Island State Recreational Area. Preferred spawning substrate is likely large cobble, but can range from clean sand to bedrock. Eggs are broadcast and externally fertilized in relatively fast water and probably in depths greater than approximately 10 feet. The importance of water quality is uncertain, but a small amount of silt is known to prevent the eggs from adhering to each other, thus increasing survival (Moyle 2002).

Essential Fish Habitat

Essential Fish Habitat (EFH) is the aquatic habitat (water and substrate) necessary for fish to spawn, breed, feed, or grow to maturity (NMFS 2002) that will allow a level of production needed to support a long-term, sustainable commercial fishery and contribute to a healthy ecosystem. For the Sacramento River watershed, the aquatic areas identified as EFH for Chinook salmon are within the hydrologic unit map numbered 18020109 (Lower Sacramento River) and 18020112 (upper Sacramento River to Clear Creek) (NMFS 2002). The upstream extent of Pacific salmon EFH in the Yuba River is to Englebright Dam at river mile 23.9.

Plant Species

Only one special-status plant species, Brandegee's Clarkia (*Clarkia biloba* ssp. *Brandegee*), was identified as having the potential to occur in the project area, or is known to occur in the project area. The California Native Plant Society lists the plant with a status of 1B.2, meaning that the taxon is "rare, threatened, or endangered in California and elsewhere; seriously threatened in California" (CDFG 2010). This plant species is discussed below.

Clarkias are colorful California native annuals. There are about 40 species of *Clarkia*, almost all in western North America. Brandegee's Clarkia is found in dry habitats below 2,500 feet elevation in six counties of the northern Sierra. It typically grows on gravelly slopes above creeks and rivers and along roadsides. Brandegee's Clarkia may bloom from May to July depending on weather conditions and location. A CNDDB records search identified one occurrence of Brandegee's Clarkia in the vicinity of the project area (CDFG 2010). This occurrence (recorded in 1971) was located east of the Sierra Foothill Research and Extension Center near Scott Forbes Road.

3.5.2 Effects

Basis of Significance

An alternative would be considered to have an adverse effect on special status species, critical habitat, or EFH if it would result in the decline of a Federally or State-listed threatened or endangered species, adversely affect designated critical habitat, or substantially affect any other special status species, including degradation of its habitat.

No Action Alternative

Within the Yuba River Basin, several dams have altered the downstream movement of large wood into the lower Yuba River. If no action is taken, the Corps will not be compliant with Section 7 of the Endangered Species Act as these conservation measures were proposed in the 2013 BA and must be implemented to comply with the determination of "not likely to adversely affect". The supply of woody material along the lower Yuba River would not be augmented by the placement of additional LWM. As a result, there would not be a potential for a corresponding improvement of juvenile salmonid rearing habitat in the lower Yuba River. According to the BA, the vast majority of salmonid spawning and rearing habitat in the Yuba River was first impacted by gold mining activities in the mid-1800's. In 1941, the upper Yuba River was totally cut off by the construction of Englebright Dam. In the long-term, upstream dams will continue to disrupt downstream transport of LWM from the upper watershed, therefore disrupting the flow and accumulation of woody materials which can provide habitat value for fish.

Without additional gravel delivery to the channel immediately below Englebright, the existing gravel supply in the bed and usable gravel stored in downstream bars would decrease as it is gradually transported downstream and out of the project reaches. A continued degradation to physical habitat structure and ecological function of the lower Yuba River would be expected. There is not anticipated to be any negative impact on listed terrestrial vegetation or wildlife if no action is taken.

Proposed Action

As there is no suitable habitat for any of the wildlife or plant species in or near the potential placement sites, the proposed action would have no adverse effects on any of these species. Correspondence from FWS in the form of a CAR (Appendix D) states their support for the implementation of this project, which would increase beneficial habitat for the Central Valley spring-run Chinook salmon and the Central Valley steelhead. A determination was made that the project would not affect any listed species under FWS jurisdiction and therefore no Section 7 consultation is required.

Large Woody Material

There is the potential for a reduction in growth rates of salmonids if suspended sediment and turbidity levels substantially exceed ambient levels for prolonged periods. Because no in

water work would occur suspended sediment and turbidity would not increase with the implementation of the project. In the long term, LWM placement could have a positive effect on Federally listed species or their designated critical habitat, including the threatened Central Valley spring-run Chinook salmon, threatened Central Valley steelhead, the respective designated critical habitats for these salmonid species, and the threatened southern Distinct Population Segment of North American green sturgeon.

The Corps' LWM conservation measure in the 2013 BA adds LWM in the lower Yuba River to create additional salmon habitat. Whether the placement of instream LWM offers more favorable habitat for escape cover and relief from high current velocities, and whether more favorable fish habitat translates to increased biological production remains uncertain. The deliberate placement of wood in streams and floodplains to form discrete structures at specific locations may create habitat immediately, or may take years to develop (Saldi-Caromile et al. 2004).

Gravel Augmentation

The proposed gravel placement may include minimal short-term effects such as localized and temporary disturbance, displacement, or impairment of feeding, migration, or other behaviors by adult and juvenile salmon and steelhead from noise, suspended sediment, turbidity, and sediment deposition generated during gravel placement activities. Gravel placed into the river would cause short-term increases in turbidity and temporarily disturb salmonids within the stream channel. Even though mortality to juvenile salmon is not expected to occur, there is a slight chance that single mortality could occur during gravel placement. The amount of mortality is not expected to cause the decline in species, and the long-term positive effects from the gravel augmentation would be beneficial to the species. Short-term increases in turbidity and suspended sediment may disrupt feeding activities of salmonids or result in temporary displacement from preferred habitats. Gravel placed into the river bed could also bury stream substrates that provide habitat for aquatic invertebrates, an important food source for salmonids. Consequently, growth rates of salmonids could be reduced if suspended sediment and turbidity levels substantially exceed ambient levels for prolonged periods. The proposed project site is mostly devoid any river-rounded gravel/cobble (Pasternack 2010), this material is the basic building block of alluvial morphological units necessary for salmonid spawning. Additionally, none of the gravel from the 2007 pilot project has migrated as far downstream as to the currently proposed gravel placement site. Thusly, there is no chance of salmonid redds or embryos to occur within the proposed placement site.

Long-term effects of the proposed gravel placement on the critical habitat of salmonids include alteration of substrate conditions within the river channel. The total aquatic volume of the pool at the placement site may be initially decreased by deposition of the gravel. However, it is expected that a substantial portion of the introduced substrate would eventually be transported downstream to hydraulically shielded areas during periods of greater discharge.

Whether the modified channel offers more favorable habitat for spawning and rearing, and whether more favorable fish habitat translates to increased biological production remains uncertain. The proposed gravel placement site within the Narrows reach may have primarily

served as a pathway for fish traveling to and from spawning habitat farther upstream in the drainage network. With upstream migration blocked by Englebright, this mainstream channel becomes the upstream-most available location to create alluvial habitat.

The key challenge is to balance the need for reduced gravel mobility with the biological requirement of preferred substrate, depth, and flow velocity for spawning and redd survival. Achieving this balance is particularly difficult because of the wide range of flow magnitudes that must be accounted for. Implementation of the proposed gravel placement project would improve the understanding of how gravel resources (spawning habitat) respond to changes in flow, and would continue to allow better identification of channel reaches where the long-term gravel augmentation program would be most beneficial.

3.5.3 Mitigation

The timing of the LWM placement depends on the proximity of heavy equipment (such as haul trucks) to the river. If it is not necessary to use heavy equipment very close to river beds, there will be no seasonal limitation to the placement of LWM. However, if it is necessary to use heavy equipment close to the river bed, there is a potential for noise and vibration to disturb fish species. Therefore, to avoid or minimize potential effects on these listed species, the proposed placement of LWM would be scheduled for a late-fall timeframe. The timing of the action was determined by both coordination with NMFS, and by the natural history of the salmonids. By then, Central Valley spring-run Chinook salmon would have moved upstream and away from the placement site to seek more favorable spawning gravels. It is expected that any remaining fish would temporarily avoid the woody materials placement sites by moving out of the affected area.

To avoid or minimize potential effects on these listed species, the proposed placement of gravel would be scheduled for a late-summer timeframe. The timing of the action is currently late July to August, and was determined by both coordination with NMFS, and by the natural history of the salmonids. By then, Central Valley spring-run Chinook salmon would have moved upstream and away from the placement site to seek more favorable spawning gravels. It is expected that any remaining fish would temporarily avoid the gravel placement site by moving out of the affected area. Gravel would also arrive pre-washed from the commercial quarry. Any elevated turbidity resulting from residual gravel sediments would be temporary and localized, and would not have long-term, permanent effects.

However, some relatively minor amounts of take have the potential to result from the contruction/implementation phase of these voluntary conservation measures. As a result, the Corps has determined that implementation of the gravel augmentation project and woody debris placement below Englebright Dam (in accordance with its conservation measures contained in the 2013 BA) may affect, and are likely to adversely affect the listed Central Valley spring-run Chinook salmon and Central Valley steelhead because there remains the remote possibility of low amounts of incidental take. Section 7 Consultation with NMFS provided take of 62 Chinook salmoids and 32 Central Valley steelhead that may occur over the next 10 years of gravel placement. These actions provide an overall beneficial effect and improve key habitat utilized by these species. Additionally, potential adverse effects to critical habitat for these species, or potential impacts to EFH within the Yuba River are expected to be discountable and/or insignificant. Additionally, placement of gravel and LWM in the lower Yuba River will create

beneficial habitat for salmonids, therefore, no mitigation would be required. USFWS and NMFS coordination records and concurrences are included in Appendix D.

3.6 Cultural Resources

3.6.1 Existing Conditions

To date, no archaeological surveys have located prehistoric sites within the project area. Archival research was conducted in 2004 by ENTRIX, a Corps consultant, at the California Historical Resources Information System, North Central Information Center, Sacramento, to locate all previously recorded sites situated within a 1/8-mile radius of the project area. This review resulted in the identification of four previously recorded archaeological sites probably associated with Gold Rush Era placer mining (CA-YUB-144-H, CA-YUB-626-H, CA-YUB-669-H, and CA-YUB-736-H) located within a 1/8-mile radius of the project area. Of these, site CA-YUB-669-H is situated adjacent to the project area. None of the four sites are listed on or have been determined to be eligible for listing on the National Register of Historic Places. In addition, none of the sites are listed on the California Register of Historic Resources. No testing or further archaeological investigation has occurred at any of the sites.

At least four in-field reconnaissance level archaeological surveys have been conducted within and adjacent to the project area. The first, entitled "A Reconnaissance Archeological and Historical Site Survey of Selected Portions of the Parks Bar Lake Project Alternative, Marysville Lake Project," was reported in November 1974 and covered the entire project area. This survey initially located the four sites referred to in this section. The second survey, entitled "Cultural Resources of the Marysville Lake, California Project (Parks Bar Site), Yuba and Nevada Counties, California," was completed in August 1978. This survey covered the entire project area and re-visited the previously recorded sites. The third survey was conducted in 2002 by YCWA to analyze the effects of a proposal to install a full-flow bypass structure on the Narrows II hydropower facility adjacent to the 2007 gravel pilot placement site. The survey included the exterior of the power plant, the immediate surrounding area, and the locations that would be used for staging and spoils disposal. No cultural resources were identified at that time. It was determined that the steep slopes of the canyon made this location unsuitable for early historic or prehistoric occupation despite the area's proximity to the Yuba River (YCWA 2006). On March 19, 2007, a fourth in-field reconnaissance level archaeological survey was conducted by a Corps' archaeologist within and adjacent to the project area for the pilot gravel injection project (Corps 2007). The area of potential effect (APE) was determined to be the lower Yuba River channel and the paved haul roads from the commercial gravel site to the base of Englebright Dam.

3.6.2 Effects

Basis of Assessment

An alternative would be considered to have an adverse effect on cultural resources if it would diminish the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association. Types of effects include physical destruction, damage, or alteration;

isolation or alteration of the character of the setting; introduction of elements that are out of character with the property; neglect; and transfer, lease, or sale of the property.

No Action Alternative

Under this alternative, there could be some effects to cultural resources. Natural processes such as erosion, root and rodent intrusion, and flooding could affect sites by exposing them to the elements and vandals.

Proposed Action

In accordance with 36 CFR 800.3(a)(1), the Corps determined that the project action has no known potential to cause effects to cultural or historic properties within the project area's APE. The haul roads are not historically significant, and there are no historic properties present in the lower Yuba River channel. There are additionally no cultural resources or historic properties identified within the project area's APE. Since this undertaking does not have the potential to cause effects on cultural resources or historic properties, the Corps has no further obligations under Section 106 of the National Historic Preservation Act of 1966. Should any prehistoric (arrowheads, mortar, or human bones) or historic artifacts (glass, ceramics, metal, or nails) be discovered during implementation of the proposed action, work activities would be stopped until mitigation is determined in consultation with the SHPO and Native American representatives.

3.6.3 Mitigation

As the proposed action would have no effects on cultural resources or historic properties, no mitigation would be required.

4.0 Growth-Inducing Effects

An action agency must consider the indirect effects of a proposed action when preparing an EA. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate (40 CFR 1508.8[b]). The proposed action would have no effect on population growth or densities. Growth in the project area would proceed as projected in the Yuba County general plans.

5.0 Cumulative Effects

NEPA requires that an EA discuss project effects which, when combined with the effects of other projects, could result in significant cumulative effects. NEPA defines a cumulative effect as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7).

Currently, there are multiple planned and ongoing resource restoration projects within the Yuba River watershed with the goal of increasing and stabilizing anadromous fish populations. These projects include improved sediment management, fish screening alternatives at diversions, habitat improvement and restoration, and improved fish passage. The California Department of Water Resources, the lower Yuba River Technical Working Group, and the lower Yuba River Accord River Management Team are all also supporting development of long-term restoration planning to assist in prioritizing actions to complete restoration and enhancement of salmonid habitat. The proposed action, in combination with past, present, and potential future restoration actions on the lower Yuba River, would contribute to the overall health and vigor of the watershed.

The proposed action could contribute to the cumulative environmental effects of these planned and ongoing resource-restoration projects within the Yuba River watershed. However, it is assumed that these projects have been or would be conducted in compliance with all applicable environmental laws and regulations, including implementation of mitigation measures.

The proposed action, in combination with past, present, and potential future actions, would likely contribute to the overall health and vigor of the watershed. The proposed actions habitat restoration efforts (gravel augmentation) within the EDR downstream from Englebright Dam, where there is a net deficit of spawning sediment, may provide disproportionately important spawning habitat, would result in a benefit to production of the system (Moir 2006, Corps 2007).

6.0 Compliance with Relevant Environmental Laws and Regulations

Bald Eagle Protection Act of 1940, as amended, 16 U.S.C. 668-668d, 54 Stat. 250. *Full Compliance*. This law provides for the protection of the bald eagle and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds. The proposed action would have no adverse effects on bald or golden eagles as the project would occur outside of nesting season and no known nest occur in the area.

Clean Air Act of 1972, as amended, 42 U.S.C. 7401, et seq. *Full Compliance*. The Corps completed an analysis of air quality effects from the proposed action and determined that the estimated emissions and PM_{10} would not exceed Federal *de minimus* thresholds. The Corps has also determined that the proposed action would have no adverse effect on the future air quality of the project area. Therefore, no conformity determination would be required.

Clean Water Act of 1972, as amended, 33 U.S.C. 1251, et seq. *Partial Compliance.* The proposed action includes placement of materials in the waters of the U.S. Gravel and LWD placement may result in the temporary suspension of sediments at and immediately downstream of the proposed gravel and LWM placement site. A Section 404(b) (1) evaluation for the project determined compliance, with the inclusion of the appropriate and practicable discharge conditions to minimize pollution or adverse effects to the aquatic ecosystem. The Section 401 Water Quality Certification as issued by CRWQCB will be included in the Final EA.

Endangered Species Act of 1973, as amended, 16 U.S.C. 1531, et seq. *Full Compliance*. Previous consultation with NMFS resulted in a Biological Opinion on the continued operation and maintenance of existing fish passage facilities at Daguerre Point Dam dated May 12, 2014. The introduction of LWM and gravel augmentation to contribute to salmonid juvenile rearing habitat were included in this consultation process, and NMFS concurred that these actions would provide a net beneficial effect for listed fish species.

Executive Order 12989, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. *Full Compliance*. This Executive Order states that Federal agencies are responsible to conduct their programs, policies, and activities that substantially affect human health of the environment in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons from participation in, denying persons the benefits of, or subjecting persons to discrimination under such programs, policies, and activities because of their race, color, or national origin. The proposed action is in compliance with this Executive Order and would not affect any minority or low-income communities.

Executive Order 13112, Invasive Species. *Full Compliance.* This order directs Federal agencies to: prevent the introduction of invasive species; detect and respond rapidly to and control such species; not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species unless the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions. The proposed action would not result in the introduction or spread of any new invasive or noxious plant species with the implementation of BMP's such as washing of material and equipment prior to use on the project.

Fish and Wildlife Coordination Act of 1958, as amended, 16 U.S.C. 661, et seq *FullCompliance*. The USFWS has participated as an active member of the Yuba River Technical Working Group in evaluating the proposed gravel placement project and the Corps has coordinated with USFWS as required under this Act. The USFWS concurred that the proposed project would have minimal impacts and would immediately create beneficial habitat for the Central Valley spring-run Chinook salmon and the Central Valley steelhead. The USFWS Coordination Act Report will be included in the Final EA (Appendix D).

Magnuson-Stevens Fishery Conservation and Management Act. *Full Compliance*. Salmonid species that may be affected by the proposed action are evaluated in this EA. The Corps has determined that the proposed gravel and LWM placement project would have no significant adverse effects on these species, nor would it likely destroy or adversely modify the designated critical habitat for these species. NMFS concurs that because the proposed action has been designed to avoid adverse impacts to the aquatic and riparian habitat within the Yuba River and has incorporated conservation measures to ensure that EFH features will not be diminished, EFH Conservation Recommendations are not required at this time.

Migratory Bird Treaty Act of 1936, as amended, 16 U.S.C. 703 et seq. *Full Compliance*. The Migratory Bird Treaty Act implements various treaties and conventions between the United States, Canada, Japan, Mexico, and Russia, providing protection for migratory birds as defined in 16 U.S.C. 715j. Construction activities would occur outside of the nesting season or when fledglings have left the nest. Therefore, the proposed action is in compliance with provisions of this Act.

National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321, et seq. *Partial Compliance*. Comments received during the public review period will be considered and incorporated into the final EA as appropriate. The District Engineer will then determine if the proposed action qualifies for a FONSI or if an environmental impact statement must be prepared. With the completion of one of these actions, the Corps will be in compliance with this act.

National Historic Preservation Act of 1966, as amended. *Full Compliance*. Section 106 of this act requires a Federal agency to consider the effects of Federal undertakings on historical and archeological resources. There are no cultural resources or historic properties identified within the project area's APE. Since this undertaking does not have the potential to cause effects on cultural resources or historic properties, the Corps has no further obligations under Section 106 of the National Historic Preservation Act of 1966.

Wild and Scenic Rivers Act, 16 U.S.C. 1271 et seq. Full Compliance. The purpose of the Wild and Scenic Rivers Act is to preserve and protect wild and scenic rivers and immediate environments for the benefit of present and future generations. The lower Yuba River has not been designated as a component of either the Federal or State Wild and Scenic Rivers systems.

7.0 Agencies and Persons Consulted

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8.0 Public Notice

In accordance with NEPA regulations and the Corp's procedures for implementing NEPA, a notice of availability of the FONSI will be sent to concerned agencies, organizations, and the public, as identified in Appendix E (40 CFR 1501.4(e)(1); 33 CFR 230.11).

9.0 Conclusions

Based on this EA and agency coordination, the proposed Fish Augmentation Program as a whole would not result in a significant adverse effect on the environmental resources in the project area, including threatened and endangered species, and other wildlife and vegetation. The Program would provide benefits to fish habitat which would assist in the recovery of listed fish species in the project area.

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APPENDIX A

Lower Yuba River Large Woody Material Management Plan

Lower Yuba River
Large Woody Material
Management Plan

U. S. Army Corps of Engineers
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1325 J Street
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December 15, 2011

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1.0 Introduction

Instream large woody material (LWM) provides escape cover and relief from high current velocities for juvenile salmonids and other fishes (**Figure 1**). Snorkeling observations in the lower Yuba River have indicated that juvenile Chinook salmon had a strong preference for near-shore habitats with instream woody material (JSA 1992). As part of the Central Valley Project Improvement Act Anadromous Fish Restoration Program, the United States Fish and Wildlife Service (USFWS) (1995) identified the need for increasing the amount of instream woody material to improve juvenile salmonid rearing habitat in the lower Yuba River. Beak (1996, as cited in CALFED and YCWA 2005) recommended the addition of instream woody material as a habitat enhancement action to increase annual salmonid smolt production in the lower Yuba River.

Figure 1. Juvenile salmonids associated with LWM.

It has been reported by the lower Yuba River Fisheries Technical Working Group (CALFED and YCWA 2005) that little instream woody material occurs in the lower Yuba River, because upstream dams block some downstream transport of woody material, and because of the lack of riparian vegetation throughout much of the lower Yuba River. However, the CALFED and YCWA (2005) report did not indicate that any surveys or studies were conducted to support these statements. Some woody material may not reach the lower Yuba River due to collecting on the shoreline and sinking in Englebright Reservoir. However, Englebright Dam does not substantively block woody material from reaching the lower Yuba River because there is no woody material removal program implemented for Englebright Reservoir, and accumulated woody material therefore spills over the dam during uncontrolled flood events (R. Olsen, Corps, pers. comm. 2011). Nonetheless, few pieces of large wood reportedly are found within the reach of the lower Yuba River extending from Parks Bar to Hammon Bar, presumably due to upstream dams disrupting downstream transport from the upper watershed and the overall lack of supply and available inventory along the riparian corridor of the river downstream of Englebright Dam (USFWS 2010).

On November 21, 2007, National Marine Fisheries Service (NMFS) issued a long-term biological opinion (BiOp) regarding the U.S. Army Corps of Engineers' (Corps) operation and maintenance of Daguerre Point and Englebright dams. The BiOp included an incidental take statement (ITS) with several terms and conditions. Term and condition D.2. requires the Corps to "*develop and implement a long term program to replenish large woody materials in the lower Yuba River*." In accordance with this term and condition, the Corps must "*determine an effective method of*

replenishing the supply of large woody material ... back into the lower Yuba River, in a manner that provides instream cover, invertebrate flood sources, and micro-habitat complexity…"

In October of 2011, the Corps submitted a Biological Assessment (BA) to NMFS assessing the effects of ongoing operations and maintenance of Englebright and Daguerre Point dams in the lower Yuba River. The BA included a conservation measure addressing LWM. The conservation measure in the BA stated that the Corps will: (1) develop a plan or policy for management of LWM, consistent with recreation safety needs; (2) conduct a pilot program to identify suitable locations and evaluate the efficacy of placing large instream woody material to modify local flow dynamics to increase cover and diversity of instream habitat for the primary purpose of benefitting juvenile salmonid rearing; and (3) based upon the outcomes of the pilot program, develop and implement a long-term Large Woody Material Management Plan (LWMMP) for the lower Yuba River, anticipated to occur within one year following completion of the pilot program.

This LWMMP has been prepared consistent with term and condition D.2. in the BiOp and the conservation measure presented in the BA, with technical assistance provided by HDR Engineering, Inc. It includes the following key elements.

- Metrics for assessing LWM value and selection criteria
- Design considerations including LWM sources, collection location(s), collection methods, transportation methods, and stockpiling location(s).
- Description of a LWMMP Pilot Program

1.1 Goals of the LWMMP

The overall goal of this plan is to provide and manage LWM in the lower Yuba River downstream of Englebright Dam to improve habitat for juvenile salmonids and other non-listed fish species, by improving cover and diversity of instream habitat for rearing juvenile anadromous salmonids, and provide increased cover, invertebrate food sources, and micro-habitat complexity. The Corps recognizes that the accomplishment of this goal has to occur while maintaining recreation and public safety values.

2.0 LWMMP Design Considerations

The application of LWM to improve habitat for juvenile salmonids and other non-listed fish species in the lower Yuba River considers several design characteristics including the source of LWM, collection methods, size and type criteria for selection, access and transportation of LWM, and placement techniques for optimal benefit of LWM.

LWM is a naturally occurring feature in stream channels. LWM may alter existing hydrodynamics, habitat availability and use, and a redistribution of species (Saldi-Caromile et al. 2004). The deliberate placement of wood in streams and floodplains to form discrete structures at specific

locations may create habitat immediately, or may take years to develop (Saldi-Caromile et al. 2004). Wood can be a naturally occurring feature anywhere in a stream system where trees are present in the adjacent riparian zone or upstream watershed. However, there is risk associated with adding mobile wood to certain stream types. For example, as the velocity and depth of flow increases, so do the buoyant and drag forces acting to transport LWM. And as the width and depth of the stream increases, the likelihood of wood getting wedged between banks, or held up on bank and channel obstructions decreases. Consequently, the risk of wood transport (though not necessarily project failure) increases with channel gradient, channel depth, and channel width (Saldi-Caromile et al. 2004). Ideal locations for wood replenishment include less developed watersheds where infrastructure is not located within or immediately adjacent to the stream (Saldi-Caromile et al. 2004).

2.1 LWM Availability and Collection

Within the Yuba River Basin, several dams have altered the downstream movement of large wood into the lower Yuba River. New Bullards Bar Dam and Reservoir is located relatively low in the watershed and functions as the dominant flood control and water supply reservoir in the Yuba River Basin (CALFED and YCWA 2005). The drainage area of the North Yuba Basin is approximately 489 square miles (mi^2), which is the largest drainage area of the three Yuba River sub-basins (i.e., North Yuba River Basin, South Yuba River Basin, and Middle Yuba River Basin). Since completion of New Bullards Bar Dam in 1969, the movement of LWM from the North Yuba River Basin into the Yuba River has been reduced. A cable-and-buoy line (floating boom) spans New Bullards Bar Reservoir just upstream of the dam, which captures woody material that has entered and traveled downstream on the reservoir's surface.

The woody debris that accumulates on New Bullards Bar Reservoir consists of various materials, including leaves, twigs, branches, logs, root-wads, and trees. However, the quantity, size, and type of LWM entering New Bullards Bar Reservoir on an annual basis are not well known. In general, the most commonly available floating wood is generally small diameter material, with large diameter trees occurring less frequently and usually associated with flood events.

A flood event that occurred December 31, 2005 reportedly resulted in approximately 6,300 cubic yards (yd^3) of floating woody material on the surface of New Bullards Bar Reservoir (**Figure 2**). The Yuba County Water Agency (YCWA) obtained a Federal Emergency Management Agency (FEMA) grant to gather up and remove the woody material, and about 4,800,000 pounds of wood was chipped and hauled to Oroville to be used as fuel for a biomass generation unit.

Because the availability of LWM is related to magnitude, duration and frequency of large floods (City of Tacoma 2004), it is likely that the quantity and quality of LWM entering New Bullards Bar Reservoir from the North Yuba River vary inter-annually. Research quantifying the large wood loading in the Yuba River Basin is presently underway by Anne Senter, a UC Davis student advised by Dr. Pasternack (USFWS 2010). Preliminary estimates have quantified the volume of wood stored in New Bullards Bar Reservoir at two times - 1998 and 2006.

Figure 2. Large Woody Material in New Bullards Bar Reservoir (YCWA 2006).

Aerial photography examinations resulted in an estimated 34,400 yd^3 of wood accumulated on New Bullards Bar Reservoir during 1998, and an estimated 110,000 yd^3 accumulated on New Bullards Bar Reservoir during 2006 (A. Senter unpublished data, as cited in USFWS 2010).

YCWA presently manages the LWM that is washed into New Bullards Bar Reservoir from the North Yuba River Basin upstream. Although no formal LWM Management Plan has been established, YCWA methods currently involve pushing the floating LWM into shallow coves of New Bullards Bar Reservoir using tug boats, and subsequently gathering and removing the dry LWM from the reservoir using a boom (G. Rabone, YCWA, pers. comm.). USFWS (2010) reports that accumulated wood from New Bullards Bar Reservoir is burned every 1 to 3 years.

Consistent with past LWM removal efforts on New Bullards Bar Reservoir, YCWA will continue to manage LWM on New Bullards Bar Reservoir by pushing the floating LWM using tug boats into shallow coves that have landside access along New Bullards Bar Reservoir, and subsequently stockpiling the LWM on the shoreline using a boom. The Corps will coordinate with YCWA to gather some of the stockpiled LWM along New Bullards Bar Reservoir and place it onto transport trucks for relocation downstream in the lower Yuba River. It is anticipated that LWM that is not

selected for enhancement downstream will be burned on the shoreline of New Bullards Bar Reservoir.

For the Pilot Program (see Section 4.0, below), the Corps will use LWM available from the stockpiles located along New Bullards Bar Reservoir, which is anticipated to be dominated by coniferous species. However, if the amount, type and size of available LWM from the stockpiled sources along New Bullards Bar Reservoir are insufficient to meet the needs of the Pilot Program, then the LWMMP will consider augmentation of LWM from New Bullards Bar Reservoir with LWM from orchard trees, if a suitable source and quantity can be identified.

2.1.1 LWM Selection Criteria

LWM is highly variable in size, texture, plant species, and degree of decomposition (SAFCA 1999). Not all the woody material entering New Bullards Bar Reservoir is expected to be suitable for meeting the goal of this LWMMP. In general, some LWM that enters reservoirs may not be removed from a reservoir such as wood that is habitat for snag and log dependent species and provide greater ecological benefit by remaining in place rather than being removed and stockpiled (Puget Sound Energy 2011). For example, large trees along a reservoir shoreline riparian zone that fall into the reservoir are not necessarily removed if their rootwad rests more than a couple of feet above the full pool surface elevation and prevents the wood from floating away. For the LWMMP, LWM selected for removal from the stockpiles located along the shoreline of New Bullards Bar Reservoir will be based on the size and type criteria identified below.

Size

A review of available literature indicates that LWM size criteria is highly variable, although two general size criteria methods were identified: (1) specific length and diameter dimensions of LWM irrespective of channel width; and (2) length and diameter criteria that are scaled to the width of the channel under consideration (PG&E 2008). Several studies that specify a minimum length and diameter define LWM as being wood with a diameter of at least 10 centimeters (cm) along 2 meters (m) of their length, or rootwads less than 2 m long with a minimum bole diameter of 20 cm, and may include whole trees with rootwad and limbs attached, pieces of trees with or without rootwads and limbs, and cut logs (Saldi-Caromile et al. 2004). USFWS (2010) identified large wood (conifers or hardwoods) as greater than or equal to 16 inches (in) in diameter and greater than or equal to 15 feet (ft) in length. Fox (2004, as cited in CRH 2007) specifies a mid-point diameter of 10 cm or greater, a length of 2 m or greater, and protruding into the bankfull channel is required for designation as LWM (CRH 2007). Additionally, a log with a rootwad is considered a “key piece” because it is likely to be stable during bankfull flows and influences many of the physical and ecological characteristics (CRH 2007). Similarly, the 1998 CDFG Stream Habitat Restoration Manual (Flosi et al. 1998) identifies a single piece of large wood greater than 12 inches in diameter and 6 ft long as LWM, and small woody material as any amount of small wood that is less than 12 in diameter. Other studies are less specific and focus on LWM that ranges between 10-20 cm in

diameter, 1-3 m in length, or both (e.g., Robison and Beschta 1990; Bilby and Ward 1991; Fausch and Northcote 1992; Crispin et al. 1993; Beechie and Sibley 1997, as cited in SAFCA 1999).

Other management plans suggest that the length of LWM selected for placement must be shorter than the bankfull width of the river, due to transport considerations and the potential for log jams to occur downstream following mobilizing flood events (Flanagan 2004 and Wohl 2000, as cited in Energy Northwest 2005). However, this LWM size criterion may not be relevant to the lower Yuba River in consideration that the river generally is much wider (e.g., 300-600 ft) than the rivers addressed in these other plans. LWM is defined in the USFS Region 5 Stream Condition Inventory (SCI) protocol as all pieces of wood lying within the bankfull width of the channel that measures one half bankfull width or longer (SMUD undated). Cramer et al. (2002) suggests size of trees and rootwads have a minimum trunk diameter 0.5 × bankfull discharge depth, and minimum tree length 0.25 × bankfull discharge width. Again, however, these types of criteria and considerations are generally most relevant to smaller streams.

Size criteria in this LWMMP are more inclusive to provide a greater range of options for future monitoring, and to facilitate comparison with other existing data sets on LWM load in streams. Therefore, based on a review of the literature, this LWMMP defines LWM as pieces of wood that are minimally 12 inches in diameter, and 6 ft long. The maximum length of LWM pieces will correspond to that length with is capable of being transported by truck.

Type

In addition to size of the LWM, the type influences stability of the LWM and is defined as the species, geometry, and presence versus absence of rootwad (Saldi-Caromile et al. 2004). Decay rates are climate dependent, due to the requirements of the fungi responsible for aerobic decomposition of wood. Differences in the durability between coniferous and hardwood species can be quite dramatic when not fully submerged. Several studies conducted in the northern hemisphere recommend coniferous species be used for all key pieces of wood that are critical to structure stability and function and may not be continuously submerged. Lacking tannins that slow decay, deciduous wood decays much more rapidly and may lose structural integrity within a decade, depending on its size and the degree of wetting and drying that occurs (Saldi-Caromile et al. 2004).

Widely spreading or multiple-stemmed hardwoods are more prone to forming snags than the more cylindrical conifers which are more readily transported and accumulate as racked members, and may beneficially enhance recruitment of other woody material (CRH 2007). Complex woody material structures that feature numerous branches and high stem density locally decrease flow velocity, inducing sediment deposition. Accordingly, materials should be selected that have numerous branches, being careful not to break or remove branches during wood placement (Corps 2007).

Hilderbrand et al. (1997) suggest using trees with branches or rootwads left intact because they are less likely to move when flow is high (SAFCA 1997). Root tissue is more resistant to decomposition and provides increased stability than trunks and stems (SAFCA 1999). The

Sacramento River Bank Protection Project (SAFCA et al. 2011) states that selected trees for LWM placement should have a structurally complex canopy and/or root mass containing many branches and roots of various sizes. Trees that provide optimal LWM have many fine- and medium-sized branches or roots. A dense network of smaller roots and branches provides optimal cover for target fish species. Emphasis should be placed on selecting those trees with the greatest volume, density, and complexity of branches or roots. For example, SAFCA et al. (2011) state that trees to be imported to the Sacramento River Bank Protection Project sites should have a minimum trunk diameter of 10 in diameter at breast height (DBH) and a minimum total length of 25 ft (including trunk, canopy, and/or root wad) (DBH is a standard measurement of trunk diameter as measured 4 ft above the ground). Therefore, for the LWMMP, pieces with rootwads will be preferentially selected from the materials stockpiled along the shoreline of New Bullards Bar Reservoir.

Quantity

Several different methods of identifying the appropriate loading levels of LWM have been used in various localities, including proportion of adjacent riparian, volume per stream channel area, emulation of natural loading, and pieces per length. Classifying and inventorying LWM within a stream is a key step in a LWM management plan. A LWM assessment provides a baseline on the amount and type of LWM and the locations along a stream. The assessment also helps to quantify the impact of LWM on the designated uses of the stream. Following a LWM assessment, management options should be evaluated. Any management action needs to fit within what is expected of the stream through its designated uses and what is feasible based on a stream's characteristics. Other key factors that determine management options include cost and the experience of the responsible parties designing and/or implementing management activities (CRH 2007).

As a part of the Corps' compliance with term and condition D.2. of the BiOp and as part of a conservation measure identified in the BA, the Corps will: (1) develop a plan or policy for management of LWM, consistent with recreation safety needs; (2) conduct a pilot program to identify suitable locations and evaluate the efficacy of placing large in-stream woody material to modify local flow dynamics to increase cover and diversity of instream habitat for the primary purpose of benefitting juvenile salmonid rearing, anticipated to occur no later than one year of NMFS issuance of a new biological opinion for this project; and (3) based upon the outcomes of the pilot program, develop and implement a long-term large woody material management plan for the lower Yuba River, anticipated to occur within one year following completion of the pilot program.

Under Agreement No. W912HZ-11-2-0004, the Corps is a federal agency partner in the University of California's Office of Research Cooperative Ecosystem Studies Unit (CESU). Through the CESU, the Corps coordinated with Dr. Greg Pasternack at UC Davis in the spring of 2011 regarding the potential development of a multi-disciplinary research study that would investigate ecologic, hydrologic, and geomorphologic considerations associated with large woody material adaptive management actions. In September 2011, a one-year study was approved. A contract will be awarded and the study implemented in spring 2012. It is anticipated that the results of this study

will provide the following information: (1) a streamwood budget for the Yuba River watershed above Englebright Dam; (2) a detailed accounting of large woody material distribution and abundance; and (3) potential design concepts for instream hydraulic structure placement in the Englebright Dam Reach of the lower Yuba River. The technical information provided by this research would be used to facilitate the development and implementation of a large woody material adaptive management plan for the lower Yuba River, including identifying the appropriate quantities of LWM to be placed in the lower Yuba River.

2.2 New Bullards Bar Reservoir Access Site

The Corps will coordinate with YCWA regarding access to, and availability of LWM at accessible shoreline sites around New Bullards Bar Reservoir prior to LWM collection activities. In their determination of suitable access locations related to the collection of LWM, the Corps and YCWA will consider equipment size, available space, as well as minimizing impacts to recreational facilities. Recreational facilities located along New Bullards Bar Reservoir include Emerald Cove Marina, Hornswoggle Group Camp, Schoolhouse Family Camp, Dark Day Campground, Dark Day Boat Ramp, Garden Point Campground, Madrone Cove Campground, and Cottage Creek Boat Ramp.

2.3 LWM Transportation Methods

LWM collected from the surface of New Bullards Bar Reservoir and placed in stockpiles along the shoreline that meets the suitable criteria stated above (see Section 2.1.1) will be transported downstream to placement sites identified below in Section 2.4. The equipment needed to move the LWM can include self-loading log trucks, excavators, end dumps, skidders and dump trucks (Saldi-Caromile et al. 2004). The LWM will be transported to downstream areas along the lower Yuba River via truck.

The Corps will identify a Licensed Timber Operator, who is licensed under the Forest Practice Act law and is authorized to conduct forest tree cutting and removal operations, for the loading, transporting and unloading of LWM collected from New Bullards Bar Reservoir.

2.4 LWM Placement

Placement of LWM in the lower Yuba River is anticipated to temporarily improve habitat for juvenile salmonids and other non-listed fish species in the lower Yuba River directly at the placement site, in addition to areas downstream as transport of LWM occurs during high flow conditions. The following factors will be considered in identifying potentially suitable LWM placement sites: (1) within the boundaries of the lower Yuba River frequently occurring inundation zone (approximately 880 to 5,000 cfs); (2) located at the downstream end of a meander bend, the head of a side channel, the apex of a bar, in backwatered reaches, pools, or relatively low energy

sites, consistent with LWM stability guidelines presented in Saldi-Caromile et al. (2004); (3) consistent with potential habitat rehabilitation sites identified in the *Rehabilitation Concepts for the Parks Bar to Hammon Bar Reach of the Lower Yuba River* by USFWS (2010) and *Potential Juvenile Rearing Habitat Expansion Actions in the Lower Yuba River, Appendix L to the Final Habitat Expansion Plan* by PG&E (2010); (4) provide access for heavy equipment; and (5) sites under federal land management or where the Corps can obtain necessary real estate rights. The Corps will conduct a real estate assessment for each of the potential sites as part of the Pilot Program (see Section 4.0).

Additionally, it is preferable to place appropriate LWM at bank locations where juvenile salmonids are most likely to occur so that they will benefit most from the LWM. The LWM placement sites identified in this LWMMP are approximate locations for improving juvenile salmonid rearing habitat on the lower Yuba River. Implementation ultimately relies on the experience and judgment of the equipment operators or supervisor to select the specific location and orientation of each individual log and the methods for placing LWM.

Factors influencing the structural stability of LWM clusters include magnitude, duration, and frequency of flooding, as well as natural geomorphic processes in the channel. Hydrologic assessment methods are useful in identifying the most appropriate bank position for placement of LWM (SAFCA 1999). According to Pasternack (2009), the lower Yuba River experiences floods capable of inducing geomorphic changes to the mainstem, which potentially would influence downstream transport of placed LWM complexes. Additionally, a review of 2D-hydrologic modeling developed by the Yuba Accord River Management Team (RMT) indicates that the frequently occurring inundation zone is defined by the inundated channel between the low flow (e.g., 880 cfs) and nearly annual high flow (e.g., 5,000 cfs) boundaries.

LWM stability guidelines presented in Saldi-Caromile et al. (2004) suggest that optimal placement locations for LWM include the downstream end of a meander bend, the head of a side channel, at the apex of a bar, in backwatered reaches, pools, or relatively low energy sites. The upper portions of the bars or inlets where LWM placement sites are identified would remain undisturbed in order to preserve natural hydrologic and geomorphic structure. LWM will be placed and allowed to potentially move under high flow conditions. In some locations, large wood would promote the geomorphic processes of scour and deposition, further enhancing a heterogeneous mosaic of aquatic habitat types. This LWMMP identifies suitable LWM placement sites, consistent with optimal placement locations identified by Saldi-Caromile et al. (2004) and within the boundaries of the lower Yuba River frequently occurring inundation zone (e.g., the floodplain between 880-5,000 cfs).

Two studies were primarily referenced in the identification of approximate LWM placement sites in this LWMMP, including *Rehabilitation Concepts for the Parks Bar to Hammon Bar Reach of the Lower Yuba River* by USFWS (2010) and *Potential Juvenile Rearing Habitat Expansion Actions in the Lower Yuba River, Appendix L to the Final Habitat Expansion Plan* by PG&E (2010). USFWS (2010) reports that the approximate 4-mile reach of the lower Yuba River downstream of the

Highway 20 Bridge, often referred to as the Parks Bar to Hammon Bar reach, is relatively dynamic because of the availability of sediment and the potential for the alignment of this sediment to be altered during large magnitude floods in the reach. Further, USFWS (2010) states that the entire reach between Parks Bar and Hammon Bar could be suitable for placing large wood along the margins of the active main channel, side channels and backwaters. The Parks Bar to Hammon Bar reach (**Figure 3**) is considered a focal reach for restoration because of its proximity to the primary spring-run Chinook salmon and steelhead spawning reaches, favorable rearing temperatures, and the limited current extent of off-channel habitat (PG&E 2010). Pending the results of the five factors considered in identifying potentially suitable LWM placement sites, additional sites upstream of the Highway 20 Bridge also may be considered.

Figure 3. Proposed LWM placement areas within the Parks Bar to Hammon Bar reach of the lower Yuba River (Modified from PG&E 2010).

At the upstream portion of the Parks Bar to Hammon Bar reach, the river is laterally confined by bedrock canyon walls; however, in the downstream portion of the reach, the river is laterally confined to approximately the same width by the remnant sediment (i.e., training walls) of historic gold dredging activities (USFWS 2010). The functional valley width in the reach ranges between approximately 310 ft to 1,420 ft, with a mean width of approximately 980 ft and a mean gradient of 0.19% (G. Pasternack unpublished data). LWM placement guidelines presented in Saldi-Caromile et al. (2004) indicates that constructed log jams work well in alluvial channels having less than a 2% slope and may not be appropriate in alluvial channels with high sediment loads that can cause frequent channel avulsions and lateral migrations that can abandon log jams shortly after

construction. In consideration of these criteria, the Parks Bar to Hammon Bar reach is identified in this LWMMP as suitable for placing LWM to improve the availability of juvenile salmonid rearing habitat.

Potential habitat enhancement actions proposed in PG&E (2010) include large wood placement. The general design concept for the rearing habitat enhancement actions proposed by PG&E (2010) were informed by aerial photography and extensive field surveys of off-channel habitats reportedly conducted beginning in 2007. PG&E (2010) reports that many of the surveyed floodplain habitats support fry for variable periods of time following winter flows, but do not provide suitable rearing habitat after flows recede because they become too shallow, too warm, or lack sufficient cover to protect fry from piscivorous birds and other predators. Locations identified by PG&E (2010) as suitable for juvenile salmonid rearing habitat expansion projects include Upper Gilt Edge Bar, Lower Gilt Edge Bar, Lost Island, and Hammon Bar (Figure 3). These habitat expansion projects generally consisted of provision of currently unavailable side-channel and/or backwater habitat areas, and not LWM placement *per se*. However, these locations may be appropriate as LWM placement sites in consideration of the selection criteria, particularly heavy equipment access and proximity to salmonid spawning and rearing areas.

Although USFWS (2010) stated that the entire stream margin along this 4-mile reach of the lower Yuba River is potentially suitable for LWM placement, specific locations have been identified for LWM placement, corresponding to sites identified in *Rehabilitation Concepts for the Parks Bar to Hammon Bar Reach of the Lower Yuba River (*USFWS 2010) and *Potential Juvenile Rearing Habitat Expansion Actions in the Lower Yuba River, Appendix L to the Final Habitat Expansion Plan* (PG&E 2010). Within the 4-mile reach of the lower Yuba River that has been identified for LWM placement, vehicular access to the river is limited, and the transport of LWM would require the Corps to use roads that traverse privately owned lands. Therefore, site selection, LWM stockpiling and placement within the frequently inundated floodplain will be dependent on whether or not the Corps is able to obtain permission from private landowners for an easement or right-of-way access.

Lower Gilt Edge Bar

Potential LWM placement sites are located along the southern edge of Lower Gilt Edge Bar, which is a stable point bar that starts near the low water elevation at the top of the bar and extends well above the low water elevation at the downstream end of the bar (USFWS 2010). Based on assessment of aerial photography, this location has been stable in recent years, and may be a suitable candidate for LWM placement, as long as there are no real estate constraints with this location.

Hidden Island (also referred to as Lost Island)

Hidden Island, which is also referred to as Lost Island, is located on the northern side of the lower Yuba River downstream of Lower Gilt Edge Bar, where a high flow side channel is present

(USFWS 2010). Inspection of historic aerial photography indicates that the side channel used to remain inundated and longitudinally connected at lower river discharges and has presumably become disconnected at lower discharges (USFWS 2010). Field observation indicates that at present the high flow side channel becomes longitudinally connected at mainstem flows >3,300 cfs (USFWS 2010). LWM would be placed along the banks and within the side channel, predominantly in the most upstream and downstream region where the side channel joins the lower Yuba River and backwater habitat may occur at lower flows. USFWS (2010) hypothesize that the historic side channel has converted into a high flow channel due to incision of the mainstem and/or deposition on the bar. It is uncertain how long this side channel will be maintained at this location, if the main channel is indeed incising in this area or a future flood deposits on the bar. In addition, access and cooperation the north bank land owner is unknown and will need to be pursued.

Hammon Bar

LWM placement could occur within and along the existing backwater on the southern edge of Hammon Bar. Along the upper portion and some edges of the existing backwater, woody riparian vegetation is well established. LWM would be placed throughout the length of Hammon Bar, along existing backwater and riparian vegetation, as well as along vegetation planted during recent riparian restoration activities. Additionally, the western end of Hammon Bar is characterized by a series of remnant channels that intersect the bar and lead to a large side channel sustained by groundwater flows from the river and the Yuba Goldfields. This side channel supports high densities of juvenile Chinook salmon, steelhead, and other native fishes during spring and summer. LWM placement could occur in the large side channel to provide additional cover. It should be noted that potential placement of LWM on Hammon Bar would need to avoid disruption of the recently implemented riparian vegetation enhancement pilot project being undertaken by USFWS.

2.4.1 Placement Configuration

Large wood in interaction with channel margins has been shown to create a variety of microhabitats and affect geomorphic processes in a way that supports natural riparian recruitment and diversity (Gerhard and Reich 2000 in USFWS 2010). Juvenile salmonids are known to show preference for habitats with cover and velocity refugia associated with large wood (Roni and Quinn 2001). Large wood has been found to locally improve spawning conditions (Merz 2001; Senter and Pasternack 2010).

LWM is found in many natural configurations. In general, placement of in-channel structures has had mixed results in providing sustained habitat improvement and one factor influencing the persistence or risk of such projects is the dynamics or flood potential of the stream. Placement of LWM should allow for potential transport under high flow conditions. LWM placement also can be configured to provide specific habitat benefit, such as provision of low velocity refuges during high flow conditions (**Figure 4**).

Corps (2007) suggests that combinations of woody materials with stone and living plant materials are common. Rootwads may be placed at spaced intervals or in an interlocking fashion so they may be considered either intermittent or continuous types. Intermittent structures provide greater aquatic habitat diversity than continuous protection. The configuration of LWM structures should consider the dominant erosion processes operating on the site (Shields and Aziz 1992 in Corps 2007), as well as key habitat deficiencies such a lack of pools, cover, and woody substrate. Intermittent structures could be built by stacking whole trees and logs in crisscross arrangements that emulate natural formations, creates diverse physical conditions, and traps additional debris. Alternatively, LWM may be placed as single logs and angled upstream. Large accumulations are frequently the result of a key log that is transported or falls into the stream at a low energy point, becomes anchored in that location, and collects additional debris that is transported from upstream (Saldi-Caromile et al. 2004; CRH 2007).

Figure 4. Example of large wood placed on the floodplain will provide low velocity refuge during high flows (Finney Creek in Skagit County, Washington, as shown in Saldi-Caromile et al. 2004).

The specific influence of woody debris on velocity and habitat formation is determined by LWD type and orientation within the channel. For example, a log with a root-wad in a stream will create a scour pool on the upstream end of the root-wad and a sediment bar on the downstream end (Saldi-Caromile et al. 2004). In larger streams, LWM creates scour pools, controls floodplain construction and side channel development (Saldi-Caromile et al. 2004; CRH 2007).

The stability of LWM once it enters a stream is determined by the interaction of the forces resisting its transport downstream and the forces driving its transport downstream. Examples of resisting forces would be the LWM's weight and friction on the streambed and channel banks. Driving forces would be the drag from the flowing water on the LWM and the buoyancy of the wood (Saldi-Caromile et al. 2004). Large wood debris is stable when the resistive forces are greater than the driving forces (CRH 2007). Often, the most stable LWM structure in a stream is a log with an attached rootwad (Fox 2001, as cited in CRH 2007). Channel constrictions and bends, or locations where the channel depth is less than the buoyant depth, tend to be the locations where mobilized LWM becomes trapped (Braudrick and Grant 2001, as cited in Energy Northwest 2005).

Moving a log that is perpendicular to the stream channel to a forty-degree angle to the bank, away from the flow will increase the capacity of the channel and maintain the local habitat (Rutherford et al. 2002 in CRH 2007). It is important to determine after changing the orientation of a LWM structure whether or not the structure will require anchoring, which should be done by estimating the net buoyancy force and drag force on the LWM (Shields et.al. 2004 in CRH 2007).

LWM can be anchored to the stream channel or bed by one of four basic techniques (Saldi-Caromile et al. 2004; Washington State Aquatic Habitat Guidelines Program 2003): (1) No anchors - existing and newly recruited wood is mobile and finds stable locations based on stream characteristics; (2) Passive - the weight and shape of the LWM structure provides resistance to downstream transport; (3) Flexible - LWM is tethered in by at least one point into the bank or bed, but allowed to float and rotate during high flows; (4) Rigid - LWM is tethered by two or more connection points to anchors such as standing trees, duckbill or deadman anchors or keyed into a bank and not allowed to move (CRH 2007). Not anchoring any existing or newly recruited LWM, but rather allowing LWM to find stable locations based on the stream characteristics, provides the greatest benefits to stream function (CRH 2007).

For this LWMMP, the LWM will be placed in the functional inundated floodplain, or deposited directly within the low flow channel, as access allows. The low flow channel is defined by the edge of the wetted channel top width which is generally occurs at about a 880 cfs baseflow. The upper extent of the frequently inundated floodplain is defined by 5,000 cfs. Because high flows have been reported to import LWM into the channel and recruit it downstream (Keller and Swanson 1979 in CRH 2007), it is anticipated that for this LWMMP, placement of LWM within the functional inundated floodplain will result in the transport and distribution of LWM to downstream reaches in the lower Yuba River and the creation of new habitat for aquatic species downstream.

2.4.2 Placement Equipment

Sites for stockpiling of LWM along the lower Yuba River need to provide sufficient space for operation of equipment used to transport LWM to and from the site. Equipment used to place individual LWM elements and/or complexes includes an excavator with a hydraulic thumb and/or a track log loader (Saldi-Caromile et al. 2004). A "spyder" excavator (**Figure 5**) is preferred because it is relatively low-impact, requires minimal disruption of the surrounding environment to maneuver, can operate on steep slopes, and can work in water up to 1.7 m depth. However, "spyder" excavators are relatively slow which can be a time/cost issue if they are used to transport materials very far. Dual fuel tanks allow the excavator to work for 4 days between refueling, which is important when working on remote, steep or environmentally sensitive sites. The telescopic extending boom provides long reach which reduces the number of times

Figure 5. "Spyder" excavator (Source: ArcRidge LTD Environmentally Responsible Forest Services 2011).

the machine must move thereby reducing ground disturbance. Panolin biodegradable hydraulic fluid is used to protect the environment in the event of a hose failure (ArcRidge LTD Environmentally Responsible Forest Services 2011). A loader, however, does not have the ability to dig or move rocks if required. Regardless of the specific equipment used, heavy machinery that is operated in the floodplain of the lower Yuba River will use biodegradable hydraulic fluid and will be steam cleaned of residual hydraulic fluid and oil prior to operating.

2.5 Timing and Frequency

Natural LWM recruitment is generally considered to be episodic due to variable frequency and magnitude of storm events which may result in few LWM pieces entering New Bullards Bar Reservoir in some years and large amounts of LWM entering in other years. Therefore, LWM collection and downstream placement activities are anticipated to be variable in the frequency of activity in response to the episodic nature of LWM recruitment. The long-term frequency of LWM collection in New Bullards Bar Reservoir, stockpiling and placement along the lower Yuba River will be informed by the results of the previously described CESU woody material investigations, particularly the large woody material adaptive management plan.

Collection will generally occur during early summer months (e.g., June and July) following the spring snow melt and rain events when LWM is most likely to be mobilized from the North Yuba River Basin, and transported to New Bullards Bar Reservoir. It is further anticipated that stockpiling along the reservoir will continue through the summer, and LWM will be transported to the lower Yuba River during fall. Stockpiling at the enhancement sites in the lower Yuba River will occur when river stage is low to ensure placement of LWM is within the boundaries of the active floodplain. The Corps will conduct the initial collection, transporting, and placement of LWM within one year upon acceptance of this LWMMP, pending funding and fulfillment of all regulatory compliance requirements.

Prior to implementation of the LWMMP Pilot Program (see Section 4.0, below), it is anticipated that the Corps would need to comply with applicable environmental and regulatory requirements such as National Environmental Policy Act (NEPA) and the Clean Water Act (CWA). As part of compliance with the CWA, it is anticipated that the Corps will coordinate with the Regional Water Quality Control Board. As part of the NEPA process, it is also anticipated that the Corps would coordinate with NMFS, as well as USFWS and CDFG regarding potential effects to botanical and terrestrial species that may be present in areas selected for LWM stockpiling and placement along the lower Yuba River.

3.0 Recreation and Public Safety Considerations

Safety issues for recreational use and public safety on New Bullards Bar Reservoir and on the lower Yuba River are important considerations in this LWMMP. Floating debris or LWM located near the water surface of New Bullards Bar Reservoir represents a hazard to other forms of water-based recreation such as water skiing and tubing. While associated with boating, these activities require participants to be outside of the boat. Participants travel at relatively high speeds without anything to protect them should an impact with any object occur. Generally, these activities are conducted away from areas with potential hazards; however, due to the transient nature of floating debris, hazards could be present in areas where they had previously been absent. It is important to note that potential boating hazards, including debris, exist in all waterways. It is impossible to identify or remove all potential boating hazards. However, removal of LWM from New Bullards Bar Reservoir is anticipated to reduce public risk posed by floating material.

Structures that protrude into a river channel, block the channel, or are designed to trap floating materials can be hazardous to recreational users and boaters (Saldi-Caromile et al. 2004). For this LWMMP, LWM will be placed along the shoreline of the frequently inundated channel and not transversing a significant portion of the cross-sectional length of the channel at any location, to minimize impediments to flow or navigation. Some concerns regarding LWM structures stem from the fact that materials used in anchoring often persist long beyond the functional life of the structure. Cables can pose significant public safety concerns as they can form traps for recreational users, and often have sharp ends (Saldi-Caromile et al. 2004). Thus, this threat will be avoided by placing LWM without the use of cables or anchoring structures. Potential safety hazards may be reduced by placing warning signs at public access points and upstream from the LWM placement reach to alert the public.

4.0 LWMMP Pilot Program

Upon acceptance of this LWMMP, the Corps in consultation with NMFS and CDFG will conduct field reconnaissance investigations of road access, site stockpiling and LWM placement locations for the LWMMP Pilot Program. For the Pilot Program, the Corps will use LWM available from the stockpiles located along New Bullards Bar Reservoir, which is anticipated to be dominated by coniferous species. However, the long-term LWMMP will consider augmentation of LWM from New Bullards Bar Reservoir with LWM from orchard trees, if a suitable source and quantity can be identified. According to SAFCA et al. (2011), trees appropriate for use as imported LWM include orchard trees being removed for urban development or agricultural conversion, native and non-native trees designated to be removed at project sites, and other native and non-native trees designated for removal from unrelated projects. Preferred species of trees to use as LWM include

almond (*Prunus dulcis*), because of the hardness, flexibility of limbs, durability of branches, and their resistance to decay. If almond trees are not available, other dense hardwood trees such as walnut (*Juglans regia*), pistachio (*Pistacia vera*), orange (*Citrus sp.*), lemon (*Citrus sp.*), olive trees (*Olea europaea*), and durable ornamental species such as redwood, cedar, other resinous trees can be used. Trees such as eucalyptus, pine species and trees of the pome fruit family (e.g., cherry, apricot, pear and apple) should be avoided (SAFCA et al. 2011).

For the LWMPP Pilot Program, wood will be placed in either LWM complexes, defined as being comprised of 10 or more pieces of LWM, or as individual pieces. The specific quantity and arrangement of LWM placement during the LWMPP Pilot Program will be determined through site-specific accessibility, and through Corps consultation with NMFS and CDFG. Preliminary considerations regarding the quantity of LWM included in the LWMMP Pilot Program include log truck capacity, end dump truck capacity, distance from New Bullards Bar Reservoir to sites identified along the lower Yuba River, individual LWM pieces or pieces with rootwads and multiple branches. These considerations indicate that, depending on the nature and availability of the LWM, quantities of LWM for the LWMMP Pilot Program could range from approximately 500 – 1,000 logs (1-2 ft in diameter) and from 1,000 – 3,000 yd^3 of rootwad material.

The Corps will take advantage of studies currently being undertaken by YCWA as part of the FERC Relicensing study plan process and by the Yuba Accord RMT to establish a baseline of LWM presence, location and abundance in the lower Yuba River. Field mapping efforts of LWM in select locations within the lower Yuba River was performed by the RMT, but the extensive amount of material present made the ground surveys unrealistically time consuming. RMT field methods were revised to largely substitute aerial photograph analyses.

Aerial photography and other remote sensing techniques can be used to obtain inventory data and can be valuable tools for making management decisions (USDOI 2001). Aerial photos have proven especially useful in the management of riparian-wetland areas. Aerial photography can also assist in assessing functionality, determining classification, and improving management planning processes. Aerial photos also link data geographically, allowing detailed vegetation maps to be transferred to a Geographic Information System (GIS) for spatial modeling purposes (USDOI 2001). Aerial photo baseline data, when carefully selected prior to a project, allows analysis of a large area of interest, at a minimum cost, in less time per hectare than conventional on-the-ground methods (Keating 1993 in USDOI 2001). Certainly tree canopy, herbaceous cover, and to some extent, age distribution of woody dominant species can also be identified using aerial photos at an adequate scale.

As part of the YCWA FERC Relicensing process and the RMT process, an analysis of historic aerial photographs and maps of the lower Yuba River dating from 1906 through 1998 will be undertaken as a joint project between YCWA and the RMT. This effort is anticipated to be completed prior to summer 2012. In addition, YCWA will conduct field measurement of LWM along study sites in the lower Yuba River during spring/summer of 2012. According to YCWA, LWM occurring within study sites will be counted as follows: all LWM greater than 3 ft in length within the active channel within four diameter classes (4-12 in, 12-24 in, 24-36 in, and greater than 36 in) and four length classes (3-25 ft, 25-50 ft, 50-75 ft, and greater than 75 ft).

More detailed measurements will be taken for key pieces located within riparian habitat study sites. Key pieces of LWM are defined as pieces either longer than 1/2 times the bankfull width, or of sufficient size and/or are deposited in a manner that alters channel morphology and aquatic habitat (e.g., trapping sediment or altering flow patterns). Key piece characteristics to be recorded will include:

- Piece location, either mapped onto aerial photos or documented with GPS
- Piece length
- Piece diameter
- Piece orientation
- Position relative to the channel
- Whether the piece has a rootwad
- Tree species or type (e.g., conifer or hardwood)
- Whether the LWM piece is associated with a jam or not (number of LWM pieces in the jam) recruitment source and mechanism function in the channel

These same key piece characteristics will be recorded for all LWM placed in the lower Yuba River as part of the LWMMP Pilot Program, in addition to photographs taken of all placed LWM. In addition to key pieces, measurements will be taken and data recorded for all LWM greater than 3 ft in length within the active channel within four diameter classes (4-12 in, 12-24 in, 24-36 in, and greater than 36 in) and four length classes (3-25 ft, 25-50 ft, 50-75 ft, and greater than 75 ft).

Because fish habitat creation is usually identified as one of the primary goals of an in-stream project utilizing LWM, project monitoring generally focuses on the physical expressions of this goal (Larson et al. 2001). However, structural habitat may be only one of numerous conditions that are a limiting factor for fish survival, as well as survival of other aquatic species (such as benthic invertebrates) that are critical links in the aquatic food web (Larson et al. 2001). Studies have shown that macroinvertebrate community structure changes and diversity increases when structures are added (Hilderbrand et al. 1997; Gortz 1998).

Effectiveness monitoring of LWM placed in the lower Yuba River is anticipated to be conducted by using: (1) aerial photography to visually detect wood movement into downstream reaches; and (2) field-based reconnaissance/verification using GPS tracking to detect and record wood movement.

The resultant effects of the Corps' LWMMP Pilot Program will be evaluated to assess the effectiveness of LWM placement in the lower Yuba River, including whether LWM placement at the locations selected has resulted in improved habitat conditions for anadromous salmonids. It is anticipated that a performance evaluation will be conducted, which will use the performance criteria described below. Performance evaluation considerations will include the size and quantities of LWM collected from New Bullards Bar Reservoir, and the spatial and temporal distribution of

LWM in the lower Yuba River. Components of the performance evaluation to be conducted include the following.

- Estimate the quantity of LWM collected that met the size, type, and density suitability criteria
- Evaluate the spatial and temporal distribution of LWM in the placement reaches and the downstream reaches of the lower Yuba River
- Estimate the proportion of LWM contributed to the lower Yuba River by introduction, relative to LWM contributed to the lower Yuba River by natural recruitment
- Evaluate the physical, geomorphic characteristics where LWM was deposited (e.g., landform, water velocity, geomorphologic unit)
- Characterize the extent and substrate size of spawning gravel recruitment in areas directly downstream of LWM
- Assess the potential for public safety to be affected given the distribution of LWM in the placement reaches and in the downstream reaches of the lower Yuba River

The effectiveness monitoring is anticipated to be conducted during the first low flow period (i.e., fall) occurring after initial placement of the LWM as part of the LWMMP Pilot Program. Thus: (1) baseline monitoring will be complete by end of September 2012; (2) initial LWM placement under the Pilot Program will occur during September 2012; and (3) Pilot Program monitoring will be conducted during September 2013. During winter 2012/2013, the Corps will prepare an interim report describing the results of the monitoring and analyses conducted as part of the LWMMP Pilot Program performance evaluation. The interim report will include:

- Summary description of the existing LWMMP, and proposed plan modifications (if any)
- Summary of efforts completed in the previous year relating to the plan requirements, including a tally of the LWM collected from the stockpiles along the shoreline of New Bullards Bar Reservoir and transported to the lower Yuba River
- Inventory of the number and size of LWM along the lower Yuba River
- Information regarding: (1) the sizes, types and locations of LWM mobilized during higher flow conditions; and (2) LWM movement patterns in the lower Yuba River, as observed via aerial photography and field reconnaissance efforts
- Description of any problems encountered and associated remedies

The interim report also may identify provisions addressing future LWM needs and the frequency of subsequent LWM reintroductions into the lower Yuba River, as well as recommended considerations for the integration of the LWMMP with other future or ongoing plans (e.g., Riparian Restoration Plan).

The Corps will submit a copy of the interim report to NMFS and CDFG for review, comment and identification of other potential LWMMP recommendations. During the performance evaluation, lower Yuba River site conditions or study findings also may warrant modifications to the approach that will be used in the long-term LWMMP, which will be described in the report.

If necessary, following completion of the performance evaluation and report review by NMFS and CDFG, recommended modifications to the LWMMP would be considered and incorporated into the Long-term Adaptive Monitoring and Evaluation Plan. LWM placement under the long-term LWMMP is anticipated to occur during September 2014.

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APPENDIX B

Section 404(b)(1) Analysis

Section 404(b) (1) Evaluation

Voluntary Conservation Measures – Habitat Enhancement in the Lower Yuba River Gravel Augmentation

I. Project Description

The proposed project is part of the U.S. Army Corps of Engineers, Sacramento District's (Corps) activities associated with Daguerre Point Dam (DPD) on the lower Yuba River. The activities include conservation measures to enhance habitat upstream of DPD for threatened and endangered salmonids. The habitat enhancement projects include implementing the Large Woody Material Management Plan (LWMMP) and the Gravel Augmentation Plan (GAIP), along with associated monitoring. The proposed pction would occur over the next 10 years (2014-2024), in the areas between 300-feet downstream of Englebright Dam and 0.25 miles downstream of DPD along the lower Yuba River.

This analysis will focus on the GAIP portion of the project.

a. Location

The Project area is located on the lower Yuba River starting at Englebright (Yuba River mile 23.9) downstream to Daguerre Point Dam (Yuba River mile 11.4), Yuba and Nevada Counties, California. The proposed gravel injection site is less than one acre and confined to the river channel located in the steep Narrows canyon off Highway 20, about 23 miles east of Marysville, California.

b. General Description

Specialized equipment called a "Habitat Builder" will be used to inject 150 to 300 tons of gravel per day directly into the water within the Lower Yuba River channel. The Habitat Builder is comprised of the following equipment: 2 water pumps, hopper, 8-inch flexible gravel sluice pipe, 8-inch PVC line, and floats.

Gravel transport dump trucks shall deliver gravel to the staging area from a local aggregate producer within the local watershed via paved public and private roads. Dump trucks with trailers shall unhitch the trailer at a pre-designated transfer area while the dump truck delivers and stockpiles materials adjacent to the hopper. The empty dump truck would return to the trailer, re-hitch, deliver, and dump the trailer load. The empty dump truck and trailer shall then be driven back to the aggregate producer and the process shall repeat until 5,000 to 15,000 tons of material are delivered and injected into the river. A front-end loader shall be used to feed the gravel into the hopper. Gravel from the hopper shall feed into an 8- inch flexible gravel sluice pipe. An operator will stand by the pumps to shut them off in the case of a clogged pipe, in order to prevent pipes from bursting. Two water pumps shall pump water from the reservoir and feed into the sluice pipe. The pipe shall run inside an existing dry drainage ditch for approximately 0.25 mile where it shall then turn and be directed towards the gravel placement site. The sluice pipe shall be converted to a PVC line at the water's surface where it

will be supported by floats. The sluice pipe shall be moved as needed to inject the gravel directly into the water within the river channel

c. Background

Englebright Dam has effectively cut off the supply of gravel delivered to the lower Yuba River from upstream sources and has greatly altered geomorphic processes and aquatic habitat conditions in the Lower Yuba River channel downstream of the dam. Without additional gravel delivery to the channel, the existing gravel supply in the bed and usable gravel stored in bars will decrease as it is gradually transported downstream, leading to a reduction of quality spawning gravel for the federally-listed Central Valley steelhead and spring-run Chinook salmon.

A pilot study was conducted in 2007 (Lower Yuba River Pilot Study) to determine the effectiveness of the gravel injection. Outflow released from Narrows II aided in transporting the gravel downstream to various sections of the Lower Yuba River that have been designated as critical habitat for the Central Valley spring-run Chinook salmon and the Central Valley steelhead. The University of California, Davis (UCD) tracked the fate of the gravel with the addition of approximately 360 uniquely identified tracer cobbles added to the gravel mix before injection of the gravel into the river channel. The results of the pilot gravel injection were then used to develop a long-term gravel augmentation program. This program has served to improve the overall function of the habitat by providing spawning gravel to key areas on the lower Yuba River since implementation began in 2010.

d. Authority and Purpose

On October 22, 2013, the Corps' submitted a Biological Assessment (2013 BA) to further define the potential effects of the Corps' limited discretionary activities at DPD. The Corps' 2013 BA included several conservation measures which included the activities identified by this EA.

The Section 7 ESA consultation process between the Corps and NMFS associated with operation and maintenance of fish passage facilities at DPD extends back to 2000. BOs were issued by NMFS in 2002, 2007, 2012, and 2014 (2). A gravel placement pilot program began in 2007 with the placement of 500 short tons of gravel. The augmentation program suggested the placement of suitable-sized spawning gravel along the banks of the lower Yuba River in the Englebright Dam Reach (EDR). The first large quantity of gravel (5,000 tons) occurred in the winter of 2010-2011.

The proposed action is a continuation of these activities and is needed to implement the proposed conservation measures that were included in the Corps 2013 Biological Assessment. The long-term program would serve to improve the overall function of the habitat by providing spawning gravel to key areas on the lower Yuba River.

e. General Description and Quantity of Dredged or Fill Material

(1) General Characteristics of Material. Gravel and cobble specifications would include 5,000 to 15,000 tons of uncrushed "natural river rock" from local aggregate producers within the local watershed that meet the gradations as follows:

Gravel Size (inches)	Percent Retained	Target % of Total Mix
3.5 to 5	30	30
1.25 to 3.5	80	50
¾ to 1.25	88	8
½ to ¾	96	8
¼ to ½	100	4

To ensure that the specifications meet cleanliness values as required under the Clean Water Act, all gravel would be washed before arriving at the injection site. Mixing of earth material with stockpiled or delivered gravel would not be allowed.

(2) Source of Material. Gravel and cobble would be sourced from local aggregate producers within the local watershed. Following is a list of potential sources for materials that meet the described specifications:

Silica Resources
6130 State Highway 20
Browns Valley, CA
(530) 742-2890

Silica Resources, Inc.
4553 Hammonton Rd
Marysville, CA
(530) 741-0290

f. Description of the Proposed Discharge Site(s)

(1) Location. The YCWA Narrows II powerhouse is located off Highway 20 about 23 miles east of Marysville, Yuba County, CA. Take Peoria Road off Highway 20 (2 miles downstream of Parks Bar Bridge). Peoria Road merges into Scott Forbes Road to Narrows II powerhouse. Total distance from Highway 20 to Narrows II powerhouse: 8 miles.

(2) Size. The proposed gravel injection site is less than one acre

(3) Type of Site. Confined bedrock-dominated river channel.

(4) Type(s) of Habitat.

The lower Yuba River channel at the project injection site is mostly devoid of vegetation. Small isolated clumps of shining willow, mulefat, and other riparian species are widely scattered along the otherwise barren rocky banks for approximately 2 miles downstream. The substrate is comprised primarily of bedrock with shock rock (sharp angled rock blasted off the canyon walls).

(5) Timing and Duration of Discharge. The gravel injection would occur annually for ten years beginning in 2014. The work would be conducted between July and December over a period of approximately six to eight weeks.

g. Description of Disposal Method (hydraulic, drag line, etc.)

All gravel would be washed before arriving at the injection site and all equipment including pipe lines would be removed by the contractor to be re-used in future ventures when the project is complete. Therefore, no disposal material would result from the proposed project.

II. Factual Determinations (Section 230.11)

a. Physical Substrate Determinations (consider items in Section 230.11(a# and 230.20 Substrate)

(1) Substrate Elevation and Slope.

The project injection site is 305 feet above sea level with a channel slope of 14 to 15 feet per mile.

(2) Sediment Type.

Soils of the site are river deposits which include silts, sands, gravel, and bedrock.

(3) Dredged/ Fill Material Movement.

The project injection site is within a hydraulically efficient stretch of lower Yuba River. The gravel would be flushed from the area under high flows downstream of the injection site to create salmonid spawning habitat.

(4) Physical Effects on Benthos (burial, changes in sediment type, etc.).

Higher invertebrate density and biomass are expected after the proposed gravel injection as compared to the existing site conditions. These benefits may only be temporary because of the transient nature of injected gravels within the hydraulically efficient stream channel.

(5) Other Effects.

The project would increase the amount of suspended sediment and thus turbidity within the project area. However, the increase would be temporary and localized.

(6) Actions Taken to Minimize Impacts.

To ensure that the specifications meet cleanliness values as required under the Clean Water Act, all gravel would be washed before arriving at the injection site. Mixing of earth material with stockpiled or delivered gravel would not be allowed.

b. Water Circulation, Fluctuation, and Salinity Determinations

(1) Water (refer to sections 230.11(b), 230.22 Water, and 230.25 Salinity Gradients; test specified in Subpart G may be required). Consider effects on:

The gravel for the proposed project would come from a local source to avoid changing the chemical composition or environmental characteristic of the water. All gravel would be cleaned prior to arriving at the injection site. No alteration of the environmental characteristic or value of the water is expected. Any turbidity would be due to temporary disturbance of the existing substrate, not from the injected gravel. The proposed project is in water that does not contain salt and salt water does not occur near that proposed project site. Therefore, salinity would not be affected.

(2) Current Patterns and Circulation (consider items in sections 230.11 (b), and 230.23), Current Flow and Water Circulation. Consider effects on:

(a) Current Patterns and Flow

The project injection site is within a hydraulically efficient stretch of the Lower Yuba River. The gravel might cause a temporary blockage that would force the water to flow around it, but would likely be flushed from the area under high flows into the Narrows Pool – a deep in-channel pool downstream of the proposed injection site. Some gravel injected in the same location during the pilot study in 2007 moved downstream at high flows. It is expected that the majority of the injected gravel would move downstream.

(b) Velocity

The injected gravel may cause temporary changes in water velocity. The water velocity is relatively fast at the proposed injection site and changes occur depending on rainfall and water released from Englebright Dam. It is expected that high flows would distribute the gravel downstream and water velocity would not be permanently affected.

(c) Stratification

The stratification of the water column could be temporarily changed due to the gravel injection. However, the project injection site is within a hydraulically efficient stretch of the Lower Yuba River and stratification changes naturally with changes in water velocity.

(d) Hydrologic Regime

The hydrologic regime is controlled by the Englebright Dam and natural storm events. The amount of gravel proposed to be injected into the Lower Yuba River is not sufficient enough to change or affect the hydrologic regime.

(3) Normal Water level Fluctuations.

The normal water level fluctuations are controlled by the Englebright Dam and natural storm events. The amount of gravel proposed to be injected into the LowerYuba River is not sufficient enough to change or affect the normal water level fluctuations.

(4) Salinity Gradients.

Not applicable

(5) Actions That Will Be Taken to Minimize Impacts.

Gravel would arrive pre-washed from a commercial source and would be injected directly into the river. No mechanized equipment will be entering the channel. The gravel injection site is minimized to less than one acre.

c. Suspended Particulate/ Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site.

Increases in turbidity would be localized where gravel is injected into the lower Yuba River channel. Increases in turbidity would be short-term and considered less than significant.

(2) Effects (degree and duration) on Chemical and Physical Properties of the Water Column.

(a) *Light Penetration.*

Increases in tubidity would be short-term and considered less than significant. Therefore light penetration would not be significantly impacted.

(b) *Dissolved Oxygen.* No significant effect.

Gravel would arrive pre-washed from a local commercial source. It is not expected to react with the dissolved oxygen in the water or cause oxygen depletion.

(c) *Toxic Metals and Organics.*

Gravel would arrive pre-washed from a commercial aggregate source to remove sediments that may contain mercury. Any mercury levels remaining in residual gravel sediments would be considered low and its release would not be expected to pose any environmental or health risk

(d) *Pathogens*.

Gravel would arrive pre-washed from a local commercial source. It is expected that any pathogens adhering to fine particulate matter would be removed during the washing process and would therefore not adversely affect the Lower Yuba River.

(e) *Aesthetics*.

Gravel would arrive pre-washed from a local commercial source. Any turbidity would be the result of disturbing the existing substrate, would be localized, and temporary. No significant change is anticipated.

(f) *Others as Appropriate*.

There would be no other significant adverse effects to the chemical and physical properties of the water column.

(3) Effects on Biota

(a) *Primary Production, Photosynthesis*.

Gravel injection activities would result in localized and temporary increases in turbidity. Increases in turbidity would be minimal and would not inhibit photosynthesis in the channel.

(b) *Suspension/ Filter Feeders*.

The project may temporarily affect suspension and filter feeders on a localized scale. However, the effect would be temporary and less than significant for the area.

(c) *Sight Feeders*.

The project would temporarily affect sight feeders on a localized scale. However, the effect would be temporary and less than significant for the area.

(4) Actions Taken to Minimize Impacts.

Gravel would arrive pre-washed from a commercial source and would be injected directly into the river. No mechanized equipment will be entering the channel. The gravel injection site is minimized to less than one acre. Effects to the aquatic biota would be temporary and not significant in the area downstream of the gravel injection ite. Therefore, no additional measures to minimize effects are necessary.

d. Contaminant Determinations

The proposed project would not add contaminants to any nearby body of water. Best management practices to reduce the potential of accidental spills during gravel injection would follow all regulatory requirements in conjunction with the National Pollution Discharge Elimination System permitting process.

e. Aquatic Ecosystem and Organism Determinations

(1) Effects on Plankton.

Effects to plankton would be temporary and not significant, no additional measures to minimize effects are needed for placement of gravel in the site.

(2) Effects on Benthos.

Effects to the benthos would be temporary and not significant, no additional measures to minimize effects are needed for placement of gravel in the site.

(3) Effects on Nekton.

Effects to nekton would be temporary and not significant, no additional measures to minimize effects are needed for placement of gravel in the site.

(4) Effects on aquatic Food Web.

There would be no adverse effects to the aquatic food web, or the plankton, benthic and nekton communities with the proposed project

(5) Effects on Special Aquatic Sites (discuss only those found in project area or disposal site)

(a) *Sanctuaries and Refuges*. None exist in project area.

(b) *Wetlands*. None exist in project area.

(c) *Mud Flats*. None exist in project area.

(d) *Vegetated Shallows*. None exist in project area.

(e) *Coral Reefs*. None exist in project area.

(f) *Riffle and Pool Complexes*.

A potential short-term localized effect to the geomorphologic process would be expected in response to the gravel injection. The geomorphic stability of the river would reach dynamic equilibrium with the redistribution of injected gravel into hydraulically shielded areas that allow coarse sediment deposition to occur. Because the proposed injection site is within a hydraulically efficient stretch of lower Yuba River, the gravel would likely eventually be flushed from the area under high flows downstream to create spawning habitat. Some beneficial effects (for anadromous fish) on geomorphic conditions are expected to result from the gravel injection. The pilot study conducted in 2007 found that of the 327 cubic yards injected in the fall of 2007, 75 cubic yards of gravel had moved downstream by June of 2009. The anticipated changes in geomorphic conditions of the site resulting from gravel injection are expected to benefit anadromous fish.

(6) Threatened and Endangered Species.

The proposed project may affect, but not likely adversely affect, the following Federally listed and candidate species: Central Valley fall/late fall-run chinook salmon, Central Valley spring-run chinook salmon, Central Valley steelhead, and green sturgeon. The propose action will also not adversely affect designated critical habitat of the spring-run Chinook salmon and steelhead.

The proposed project short-term effects may include localized and temporary disturbance, displacement, or impairment of feeding, migration, or other essential behaviors by adult and juvenile salmon and steelhead from noise, suspended sediment, turbidity, and sediment deposition generated during gravel injection activities. Gravel injected into the river would cause short-term increases in turbidity and temporarily disturb salmonids within the stream channel. Short-term increases in turbidity and suspended sediment may disrupt feeding activities of salmonids or result in temporary displacement from preferred habitats. Gravel injected into the river bed can also bury stream substrates that provide habitat for aquatic invertebrates, an important food source for salmonids. Consequently, growth rates of salmonids could be reduced if suspended sediment and turbidity levels substantially exceeded ambient levels for prolonged periods.

Long-term effects of the proposed pilot gravel injection on the critical habitat of salmonids include alteration of river hydraulics and substrate conditions within the river channel. The total aquatic volume of the Narrows II pool may be initially decreased by deposition of injected gravel. However, it is expected that a substantial portion of the introduced substrate would eventually be transported downstream to hydraulically shielded areas during periods of greater discharge.

Whether the modified channel offers more favorable habitat for spawning and rearing, and whether more favorable fish habitat translates to increased biological production remains uncertain. The proposed gravel injection site within the Narrows reach may have primarily served as a pathway for fish traveling to and from spawning habitat farther upstream in the drainage network. With upstream migration blocked by Englebright, this mainstream channel becomes the upstream-most available location to create alluvial habitat.

The key challenge is to balance the need for reduced gravel mobility with the biological requirement of preferred substrate, depth, and flow velocity for spawning and redd survival. Achieving this balance is particularly difficult because of the wide range of flow magnitudes that must be accounted for. Implementation of the proposed gravel injection project would improve the understanding of how gravel resources (spawning habitat) respond to changes in flow. It is the hope that this gravel injection project would successfully distribute gravel to appropriate areas to create good spawning habitat.

(7) Other Wildlife.

The proposed project action would have no significant adverse effect on wildlife because of the limited scope and duration of the action. Gravel will be injected directly into the river channel for one to two days. Any displaced wildlife would be expected to return to the area after the action is completed.

(8) Actions to Minimize Impacts.

There would be no significant adverse effects to wildlife due to proposed project action. Therefore, there would be no minimization measures needed.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination.

Not applicable.

(2) Determination of Compliance with Applicable Water Quality Standards.

No water quality or effluent standards would be violated during proposed project action. All gravel would be washed before arriving at the injection site and all equipment including pipe lines would be removed by the contractor to be re-used in future ventures when the project is complete.

(3) Potential Effects on Human Use Characteristics.

The proposed project would not have any significant adverse effects to municipal and private water supply, recreational and commercial fisheries, or water-

related recreation. There would be no national and historic monuments, parks, seashores, wilderness areas, research sites or similar preserves affected by the proposed project.

g. Determination of Cumulative Effects on the Aquatic Ecosystem

The proposed project would not have any significant cumulative effects on the aquatic ecosystem. The proposed project would benefit, rather than adversely impact, the fluvial geomorphologic characteristics of the Lower Yuba River by replenishing gravel to the starved lower reaches of the Lower Yuba River below Englebright Dam.

h. Determination of Secondary Effects on the Aquatic Ecosystem

Local physical habitat changes, such as improved availability and quality of spawning gravel, are to be expected. Behavioral and biological benefits for salmonids can also be expected downstream of the proposed gravel injection site, including reduced redd superimposition, improved spawner distribution, and improved invertebrate production.

III. Findings of Compliance or Non-Compliance with the Restrictions on Discharge

a. Adaptation of the Section 404(b)(1) Guidelines to this Evaluation

No significant adaptations of the guidelines were made relative to this evaluation.

b. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Impact on the Aquatic Ecosystem

The proposed project is to inject gravel into the Lower Yuba River just below Englebright Dam. Due to the nature of this project, it is not possible to avoid placing fill in the river. Therefore, the only possible project alternative is to inject the gravel at a different location further downstream. Injecting gravel at a different location downstream would be difficult due to inadequate access. All possible locations would have a similar effect as the current proposed project location. The preferred alternative is within a hydraulically efficient stretch of the Lower Yuba River which would serve to distribute the gravel downstream to desired spawning areas.

c. Compliance with Applicable State Water Quality Standards, and;
d. Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307 of the Clean Water Act

State water quality standards would not be violated. The proposed project would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act. A 401 certification would be obtained prior to project implementation. No disposal material would result from the proposed project. All gravel would be washed before arriving at the injection site and all equipment including pipe lines would be removed by the contractor to be re-used in future ventures when the project is complete.

e. Compliance with Endangered Species Act (ESA) of 1973

The Corps has initiated consultation with USFWS and NOAA Fisheries under Section 7 of the Endangered Species Act for potential effects to listed species.

f. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972

Not applicable.

g. Evaluation of Extent of Degradation of the Waters of the United States

The proposed project would not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic life and other wildlife would not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values would not occur.

h. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem

To minimize potential adverse impacts of the discharge on aquatic systems all specifications would meet cleanliness values as required under the Clean Water Act, and all gravel would be washed before arriving at the injection site. Mixing of earth material with stockpiled or delivered gravel would not be allowed.

APPENDIX C

401 Certification

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

SECTION 401 WATER QUALITY CERTIFICATION
APPLICATION FORM

A minimum of $1,201.00 processing fee is required; however, additional fees in accordance with Title 23 CCR § 2200 (a)(2) may also be required. Please use the fee calculator at http://www.waterboards.ca.gov/water_issues/programs/cwa401/docs/dredgefillfeecalculator.xlsm to determine the total fee. Please include a check payable to the **State Water Resources Control Board.** Attach additional sheets as necessary. If any information is not applicable to the proposed project please indicate that as N/A. Submit the complete form to the appropriate Regional Board office.

1. APPLICANT INFORMATION

Applicant: U.S. Army Corps of Engineers
Contact Name: Natalie McNair
Address: 1325 J Street
Sacramento, CA 95814
Phone No: 916-557-7449
Fax No: 916-557-7856
E-mail Address: Natalie.N.Houghton-McNair@usace.army.mil

2. AGENT INFORMATION*

Agent*
Contact Name:
Address:
Phone No:
Fax No:
E-mail Address:

*Complete only if applicable

3. PROJECT DESCRIPTION

a) Project Title: Voluntary Conservation Measures - Habitat Enhancement on the Lower Yuba River

b) Project Location:
Lower Yuba River, between Englebright Dam to downstream of Daguerre Point Dam, near Smartsville, CA

Gravel Augmentation

County: Nevada Section: 23 Township: 16N Range: 6E
Quadrangle Name: Smartsville Latitude: 39.236042 Longitude: -121.272714

Large Woody Material
County: Yuba Section: 25 Township: 16N Range: 5E
Quadrangle Name: Smartsville Latitude: 39.221621 Longitude: -121.353147

*Attach site map with "waters" clearly indicated (e.g. USGS 7 ½ quadrangle map)

c) Project Description (Please provide a detailed explanation of all project activities. Include applicable information such as: avoidance and minimization measures for project impacts; alternatives analysis; project activity impacts to water bodies and/or water quality; and implementation of Low Impact Development (LID) strategies. Attach additional pages as necessary):

The proposed action will implement Corps' voluntary conservation measures along the lower Yuba River. It will improve juvenile salmonid spawning and rearing habitat in the lower Yuba River and complies with the NMFS 2014 Biological Opinion (2014 BiOp) for Daguerre Point Dam operation and maintenance activities. These measures include placing large woody material (LWM) to provide escape cover and relief from high current velocities for juvenile salmonids and other fish species. Limited quantities of large wood pieces are reportedly found along the reach of the lower Yuba River

extending west of Highway 20 bridge to Hammon Bar, presumably due to upstream dams disrupting downstream transport from the upper watershed and to the overall lack of supply and available inventory along the riparian corridor of the river downstream of Englebright Dam (Corps, 2012).

The purpose of the proposed gravel augmentation component is to place suitable-sized spawning gravel within Englebright Dam Reach (EDR) of the lower Yuba River. River-rounded gravel and cobble necessary for salmon spawning has been depleted in the reach of the lower Yuba River between Englebright Dam and the confluence with Deer Creek over the years. In particular, spring-run Chinook salmon that historically went far upstream would substantially benefit from a gravel augmentation program below Englebright Dam. However, the critical reach is in a narrow canyon that is difficult to access and manage, let alone place thousands of tons of coarse sediment into (Pasternack 2010).

The proposed action would occur annually over the next 10 years, in the areas between 300-feet downstream of Englebright Dam and .25 miles downstream of DPD along the lower Yuba River. Below are the detailed descriptions of the individual components of the program.

Large Woody Material Placement

The Corps proposes to place LWM into the lower Yuba River. LWM from existing stockpiles at New Bullards Bar Reservoir will be placed at selected sites along the lower Yuba River. Orchard trees may also be used if additional supply of wood is needed. A pilot study is currently underway and the results of this pilot study will be used to adapt placement methodology and determine the best locations for subsequent LWM placement.

Gravel Augmentation

In accordance with the existing Gravel Augmentation Injection Project, the Corps placed 5,000 short tons of a heterogeneous mix of gravel and cobble (0.25 to 5.0 inches in diameter) approximately .25 miles downstream of Englebright Dam in the lower Yuba River in the summer of 2011, 2012, and 2013. The material will be monitored after the placement, adding to the understanding of the lower Yuba River geomorphic processes. The information gathered from the monitoring of the placed gravel will allow the Corps to determine the quantity of additional gravel to be placed within the EDR below Englebright Dam in future years. The action described herein is identical to that described in the environmental assessment (EA) prepared in 2010 and Supplemental EA's prepared in 2012 and 2013 with the exception of the dates of implementation, and the gravel mix specifications, which were changed slightly in the 2012 and 2013 Supplemental EA's.

d) Proposed Schedule (start date, and completion date):
LWM and gravel augmentation would take place between July and December, starting in 2014 and continuing through 2024.

e) Total Project Size (clearing, grading, other construction activities):
<1 acres _____ linear feet (if appropriate)

4. IMPACTED WATER BODIES

a) Name(s) of Receiving Water Body(ies):
Lower Yuba River

b) Anticipated potential stream flow during project activity:
Data from the Yuba River's Smartsville station indicate that flows average 2,600 cfs annually.

c) Describe potential impacts to water quality:

Large Woody Material

The placement of LWM into the lower Yuba River would occur in areas that are dry and would not enter or disturb the 'wet' river channel. The material being placed will be free of debris and therefore, would not increase turbidity in the river once river levels rise. The placement will occur in gravel areas and not likely include disturbance of soil. Any potential turbidity associated with the placement process would be insignificant.

Gravel Augmentation

Approximately 2,000 to 5,000 short tons of a heterogeneous mix of gravel and cobble (0.25 to 5.0 inches in diameter) would be placed directly within the lower Yuba River channel at the proposed placement site (less than one acre) over a period of six to eight weeks. No ground-breaking activities are associated with the gravel augmentation. No mechanized equipment would be entering the channel or operating within the 100-year floodplain. The placement of this gravel within the channel would increase the amount of suspended sediment and thus turbidity in the immediate vicinity of the placement site and for an unknown distance downstream. The proposed placement site is located within a hydraulically efficient stretch of the lower Yuba River. Therefore, the source of any increased turbidity would be attributed to the introduction of sediment particles adhering to the placed gravel and not from sediments disturbed and suspended from the channel bottom and sides. Turbidity associated with the gravel placement would not exceed the CRWQCB objectives for turbidity in the Sacramento River Basin. The CRWCQB turbidity limits are as follows:

a. Where natural turbidity is less than 1 Nephelometric Turbidity Units (NTUs), controllable factors shall not cause downstream turbidity to exceed 2 NTU;
b. Where natural turbidity is between 1 and 5 NTUs, increase shall not exceed 1 NTU;
c. Where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent;
d. Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs;
e. Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent.

Turbidity would not be expected to increase more than 15 percent above naturally occurring background levels during the placement process. The Smartsville USGS Stream Gage would be adversely affected if high flows flush gravel downstream in mass, causing stream gage inaccuracies as a result of coarse sediment deposition near the gage. This would require stream gage rating work to be performed.

d) **Waters of the United States:** Indicate in ACRES and LINEAR FEET (where appropriate) the proposed waters of the United States to be impacted by any discharge other than dredging, and identify the impacts(s) as permanent and/or temporary for each water body type listed below:

Water Body Type	Permanent Impacts		Temporary Impacts	
	(acres)	(linear feet)	(acres)	(linear feet)
Jurisdictional Wetland				
Riparian				
Streambed un-vegetated			<1 acre	4,700
Lake/Reservoir				

e) **Non-Federal Waters**: This section is **only** for waters that the U.S. Army Corps of Engineers does **not** consider federally jurisdictional. Indicate in ACRES and LINEAR FEET (where appropriate) the proposed **waters of the State** to be impacted by any discharge other than dredging, and identify the impacts(s) as permanent and/or temporary for each water body type listed below:

Water Body Type	Permanent Impacts		Temporary Impacts	
	(acres)	(linear feet)	(acres)	(linear feet)
Isolated Wetland				
Ditch/Canal				
Other				

f) **Fill:** Indicate the amount (cubic yards) and type of fill material to be discharged/installed in waters of the State/United States:

Up to 5,000 tons (3,333 cubic yards) of a heterogeneous mix of gravel and cobble (0.25 to 5.0 inches in diameter) would be injected directly into the lower Yuba River channel at the proposed injection site (less than 1 acre). Uncrushed "natural river rock" from local aggregate producers within the local watershed that meet the gradations as follows:

Type of Material (Soil, concrete, steel, rock…….)	**Amount** (cubic yards)	**What type of water body?** (Wetland, riparian, streambed, lake……)	**Indicate if fill is in federal or non-federal waters**
Gravel	3,333	Streambed	Federal

g) **Dredge/Removal:** Indicate the amount (cubic yards) and type of material to be dredged and/or removed from waters of the State/United States:

Type of Material (Soil, concrete, steel, rock…….)	**Amount** (cubic yards)	**What type of water body?** (Wetland, riparian, streambed, lake……)	**Indicate if dredge or removal is in federal or non-federal waters**

5. COMPENSATORY MITIGATION

a) Indicate in ACRES and LINEAR FEET (where appropriate) the total quantity of **waters of the United States** proposed to be Created, Restored and/or Enhanced for purposes of providing Compensatory Mitigation If mitigating for state waters that were not considered federally jurisdictional then attach a description of the proposed mitigation:

Water Body Type	Created		Restored		Enhanced	
	(acres)	(linear ft)	(acres)	(linear ft)	(acres)	(linear ft)
Jurisdictional Wetland						
Riparian						
Streambed						
Lake/Reservoir						

b) If contributing to a Mitigation or Conservation Bank, indicate the agency, dollar amount, acreage, and water body type (if applicable):
Mitigation Bank or Conservation Agency_____
$_____ for_____ acres of _____ (water body type)
How many acres of this mitigation area qualify as waters of the United States?_____

c) Other Mitigation (omit if not applicable):

How many acres of this mitigation area qualify as waters of the United States?_____

d) Location of Compensatory Mitigation Site(s) (attach map of suitable quality and detail):

City of Area _____ County _____

Longitude/Latitude _____ Township/Range _____

6. OTHER ACTIONS/BEST MANAGEMENT PRACTICES (BMPs)

Briefly describe other actions/BMPs to be implemented to Avoid and/or Minimize impacts to waters of the United States, including preservations of habitats, erosion control measures, project scheduling, flow diversions, etc.

At a minimum, the following best management practices will be included with the implementation contract specifications:

- A practicable condition requiring all woody material and gravel arrive pre-washed and clean to the placement site if material is not already clean.
- YCWA and downstream water districts would be notified of potential short-term turbidity increases during the LWM placement activity.
- Standard pollution prevention measures, including the monitoring of turbidity levels during placement.
- Turbidity associated with the gravel placement would not exceed the CRWQCB objectives for turbidity in the Sacramento River Basin.
- Erosion and sediment control measures, proper control of non-stormwater discharges.

7. OTHER PERMITS/AGREEMENTS/ETC

a) U.S. Army Corps of Engineers Permit: Indicate the type of ACOE permit *(check one)*

Nationwide Permit No(s)_____ Individual Permit No(s):_____ Regional Permit No(s):____

Letter(s) of Permission_____ ACOE Permit Reference Number_____

Have you notified ACOE of project? This is an ACOE project. The Corps does not permit itself. Activity would be considered a Nationwide.

Have you reviewed the General Conditions for your ACOE permit? N/A

Have you attached a copy of the application/notification to ACOE? N/A

b) California Department of Fish and Game Lake or Streambed Alteration Agreement:

The Corps is not required to obtain a Streambed Alteration Agreement

Date of Application:_____

Have you attached a copy of the application?

Has the Agreement been issued? _____ if so, list Agreement number:_____

c) Water Rights:

If the project is directly related to any diversion, obstruction, extraction, or impoundment of the natural flow of a river, stream, lake or underground source then provide the Water Right Application ID Number_____ or Permit ID Number_____

8. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

a) Indicate the type of CEQA Document required for this project:

This project is exempt from CEQA under section 15333. It is a small restoration project designed to enhance habitat for listed fish species and it is less than 1 acre in size. Additionally, there are no hazardous materials in the project areas and it will not result in any significant impacts.

Categorical Exemption ___ Negative Declaration ___ Environmental Impact Report ___

Has the document been certified/approved, or has a Notice of Exemption been filed? _____

If yes date of approval/filing _____ If no, expected approval/filing date:_____

Lead Agency _____

Have you attached a copy of the draft/final CEQA documentation*? _____

* A final copy of valid CEQA documentation must be provided before a project can be certified

b) List State and Federal Threatened/Endangered Species that could potentially be impacted by this project:

- Central Valley fall/late fall-run Chinook salmon (*Oncorhynchus tshawytscha*)
- Central Valley spring-run Chinook salmon and critical habitat(*Oncorhynchus tshawytscha*)
- Central Valley steelhead and critical habitat (*Oncorhynchus mykiss*)
- Green sturgeon (*Acipenser medirostris*)

9. PAST/FUTURE PROPOSALS BY THE APPLICANT

Briefly list/describe any projects carried out in the last 5 years or planned for implementation in the next 5 years that are in any way related to the proposed activity or may impact the same receiving body of water. Include the estimated adverse impacts from the past or future projects.

This is an ongoing project that had been occurring over the last 5 years and previous 401 Certifications have been obtained.

Pilot Study for Lower Yuba River Pilot Gravel Injection Project , 2007 (ref. WDID#5A58CR00047).
Lower Yuba River Gravel Augmentation Project, 2010 (WDID#5A58CR00081)
Lower Yuba River Gravel Augmentation Project, 2012 (WDID#5A58CR00081A1)
Lower Yuba River Gravel Augmentation Project, 2013 (WDID#5A58CR00081A2)
Large Woody Material Management Plan Pilot Study - Notice of Intent filed in 2012

The current documentation will cover similar activities for the next 5 years, after which the Corps will apply for an additional permit to cover 5 more years.

SIGNATORY REQUIREMENTS

All reports, notices, or other documents required by the Water Quality Certification or requested by the Central Valley Regional Water Quality Control Board (Central Valley Water Board) shall be signed by a person described below or by a duly authorized representative of that person.

a. For a corporation: by a responsible corporate officer such as (1) a president, secretary, treasurer, or vice president of the corporation in charge of a principal business function; (2) any other person who performs similar policy or decision-making functions for the corporation; or (3) the manager of one or more manufacturing, production, or operating facilities if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
b. For a partnership or sole proprietorship: by a general partner or the proprietor.
c. For a municipality, State, federal, or other public agency: by either a principal executive officer or ranking elected official.

10. CERTIFICATION [Any person signing or submitting a document, e.g. an application, a monitoring report, etc., to demonstrate compliance with the Water Quality Certification regulations shall make the following certification, whether written or implied]

"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel property gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Print Name:_____ Title:_____

Signature:_____ Date: _____

STATEMENT OF AUTHORIZATION (if designating a specific agent)

I hereby authorize _____to act on my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

X_____ DATE_____
APPLICANT'S SIGNATURE (not the authorized agent)

All information on this application becomes part of the public record, and as such is subject to public records requests disclosure. In addition, the application will be posted for public review on the Regional Board's web site in accordance with California Code of Regulations Title 23 Section 3858.

Attachment 1 – 2007 Water Quality Certification (WDID#5A58CR00047)
Attachment 2 – 2010 Water Quality Certification (WDID#5A58CR00081)
Attachment 3 – 2012 Water Quality Certification (WDID#5A58CR00081A1)
Attachment 4 – 2013 Water Quality Certification (WDID#5A58CR00081A2)
Attachment 5 – 2012 Notice of Intent
Attachment 6 – USGS 7 ½ quadrangle map
Attachment 7 – Project Area Maps
Attachment 8 – Draft EA for Habitat Enhancement Projects on the Lower Yuba River

APPENDIX D

Special State Species Lists and Coordination

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

July 3, 2014

Document Number: 140703031646

Alicia Kirchner
U.S. Army Corps of Engineers
1325 J Street
Sacramento, CA 95814

Subject: Species List for Yuba County

Dear: Ms. Alicia Kirchner

We are sending this official species list in response to your July 3, 2014 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be October 01, 2014.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found http://www.fws.gov/sacramento/es/Branch-Contacts/es_branch-contacts.htm.

Endangered Species Division

U.S. Fish & Wildlife Service

Sacramento Fish & Wildlife Office

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 140703031646

Current as of: July 3, 2014

No quad species lists requested.

County Lists

Yuba County

Listed Species

Invertebrates

- Branchinecta conservatio
  - Conservancy fairy shrimp (E)

- Branchinecta lynchi
  - Critical habitat, vernal pool fairy shrimp (X)
  - vernal pool fairy shrimp (T)

- Desmocerus californicus dimorphus
  - valley elderberry longhorn beetle (T)

- Lepidurus packardi
  - Critical habitat, vernal pool tadpole shrimp (X)
  - vernal pool tadpole shrimp (E)

Fish

- Acipenser medirostris
  - green sturgeon (T) (NMFS)

- Hypomesus transpacificus
  - delta smelt (T)

- Oncorhynchus mykiss
  - Central Valley steelhead (T) (NMFS)
  - Critical habitat, Central Valley steelhead (X) (NMFS)

- Oncorhynchus tshawytscha
  - Central Valley spring-run chinook salmon (T) (NMFS)
  - Critical Habitat, Central Valley spring-run chinook (X) (NMFS)
  - winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

- Ambystoma californiense
  - California tiger salamander, central population (T)

- Rana draytonii
  - California red-legged frog (T)
  - Critical habitat, California red-legged frog (X)

Reptiles

- Thamnophis gigas
  - giant garter snake (T)

Plants

- Pseudobahia bahiifolia
    - Hartweg's golden sunburst (E)

- Senecio layneae
    - Layne's butterweed (=ragwort) (T)

Candidate Species

Amphibians

- Rana muscosa
    - mountain yellow-legged frog (C)

Birds

- Coccyzus americanus occidentalis
    - Western yellow-billed cuckoo (C)

Mammals

- Martes pennanti
    - fisher (C)

Key:

- (E) Endangered - Listed as being in danger of extinction.
- (T) Threatened - Listed as likely to become endangered within the foreseeable future.
- (P) Proposed - Officially proposed in the Federal Register for listing as endangered or threatened.
- (NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.
- Critical Habitat - Area essential to the conservation of a species.
- (PX) Proposed Critical Habitat - The species is already listed. Critical habitat

is being proposed for it.
- (C) Candidate - Candidate to become a proposed species.
- (V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
- (X) Critical Habitat designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, or may be affected by projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list.
See our Protocol and Recovery Permits pages.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.
- During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.
- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.
- Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our Map Room page.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. More info

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6520.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be October 01, 2014.

Summary Table Report

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad is (Smartville (3912123) or Browns Valley (3912124))

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Agelaius tricolor tricolored blackbird	G2G3 S1S2	None None	ABC_WLBCC-Watch List of Birds of Conservation Concern BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_EN-Endangered USFWS_BCC-Birds of Conservation Concern	75 125	429 S:4	0	0	0	0	3	1	4	0	1	3	0
Asio otus long-eared owl	G5 S3?	None None	CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern	480 480	41 S:1	1	0	0	0	0	0	1	0	1	0	0
Athene cunicularia burrowing owl	G4 S3	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern USFWS_BCC-Birds of Conservation Concern	150 150	1858 S:1	0	0	0	0	0	1	1	0	1	0	0
Branchinecta lynchi vernal pool fairy shrimp	G3 S2S3	Threatened None	IUCN_VU-Vulnerable	90 90	611 S:1	0	0	0	0	0	1	1	0	1	0	0
Buteo swainsoni Swainson's hawk	G5 S3	None Threatened	ABC_WLBCC-Watch List of Birds of Conservation Concern BLM_S-Sensitive IUCN_LC-Least Concern USFS_S-Sensitive USFWS_BCC-Birds of Conservation Concern	83 130	2394 S:2	0	0	0	0	0	2	1	1	2	0	0
Clarkia biloba ssp. brandegeeae Brandegee's clarkia	G4G5T4 S4	None None	Rare Plant Rank - 4.2 BLM_S-Sensitive		89 S:1	0	0	0	0	0	1	1	0	1	0	0
Desmocerus californicus dimorphus valley elderberry longhorn beetle	G3T2 S2	Threatened None		94 103	201 S:7	0	0	0	0	0	7	0	7	7	0	0
Downingia pusilla dwarf downingia	GU S2	None None	Rare Plant Rank - 2B.2	250 250	127 S:2	0	0	0	0	0	2	1	1	2	0	0

Summary Table Report

California Department of Fish and Wildlife

California Natural Diversity Database

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Emys marmorata western pond turtle	G3G4 S3	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_VU-Vulnerable USFS_S-Sensitive	90 475	1136 S:4	0	0	1	0	0	3	2	2	4	0	0
Lasiurus blossevillii western red bat	G5 S3?	None None	CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern USFS_S-Sensitive WBWG_H-High Priority	580 580	119 S:1	0	1	0	0	0	0	0	1	1	0	0
Lasiurus cinereus hoary bat	G5 S4?	None None	IUCN_LC-Least Concern WBWG_M-Medium Priority	580 580	235 S:1	0	1	0	0	0	0	0	1	1	0	0
Laterallus jamaicensis coturniculus California black rail	G4T1 S1	None Threatened	ABC_WLBCC-Watch List of Birds of Conservation Concern BLM_S-Sensitive CDFW_FP-Fully Protected IUCN_NT-Near Threatened USFWS_BCC-Birds of Conservation Concern	110 862	241 S:28	0	0	0	0	0	28	11	17	28	0	0
Legenere limosa legenere	G2 S2	None None	Rare Plant Rank - 1B.1 BLM_S-Sensitive	80 80	78 S:3	3	0	0	0	0	0	0	3	3	0	0
Lepidurus packardi vernal pool tadpole shrimp	G3 S2S3	Endangered None	IUCN_EN-Endangered	85 110	273 S:4	0	0	0	0	0	4	3	1	4	0	0
Linderiella occidentalis California linderiella	G3 S2S3	None None	IUCN_NT-Near Threatened	85 99	384 S:12	0	0	0	0	0	12	12	0	12	0	0
Myotis yumanensis Yuma myotis	G5 S4?	None None	BLM_S-Sensitive IUCN_LC-Least Concern WBWG_LM-Low-Medium Priority	580 580	256 S:1	0	1	0	0	0	0	0	1	1	0	0
Northern Hardpan Vernal Pool Northern Hardpan Vernal Pool	G3 S3.1	None None		90 95	126 S:3	0	0	0	0	0	3	3	0	3	0	0

Summary Table Report

California Department of Fish and Wildlife

California Natural Diversity Database

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Oncorhynchus mykiss irideus steelhead - Central Valley DPS	G5T2 S2	Threatened None	AFS_TH-Threatened		31 S:1	0	0	0	0	0	1	0	1	1	0	0
Oncorhynchus tshawytscha chinook salmon - Central Valley spring-run ESU	G5 S1	Threatened Threatened	AFS_TH-Threatened	260 260	13 S:1	0	0	0	1	0	0	0	1	1	0	0

APPENDIX E

Mailing List

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