

**FINAL**  
**Environmental Assessment / Initial Study**  
**and**  
**Finding of No Significant Impact /**  
**Mitigated Negative Declaration**  
**Hammer Diversion on South Fork Cottonwood Creek**  
**Fish Passage Improvement Project**  
**(State Clearinghouse # 2014042011)**



Tehama County, California

June 2014

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Red Bluff Fish and Wildlife Office  
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Red Bluff, CA 96080

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## List of Acronyms and Abbreviations

AC	Alternating Current
AFRP	Anadromous Fish Restoration Program
AG-1	Agriculture / Upland District
BA	Biological Assessment
BLM	U.S. Department of the Interior, Bureau of Land Management
BMP	Best Management Practice
BRE	Biological Resources Evaluation
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CALFED	CALFED Bay-Delta Program
CARB	California Air Resources Board
CBDA	California Bay Delta Authority
CCAA	California Clean Air Act
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CDWR	California Department of Water Resources
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulation
cfs	Cubic Feet per Second
CH	Critical Habitat
CH <sub>4</sub>	Methane
CHP	California Highway Patrol
CNDDB	California Natural Diversity Data Base
CNPS	California Native Plant Society
CO <sub>2</sub>	Carbon Dioxide
CVPIA	Central Valley Project Improvement Act
RWQCB	Central Valley Regional Water Quality Control Board
cy	Cubic Yard
DOORS	Diesel Off-Road On-Line Reporting System
DPS	Distinct Population Segment
EA / IS	Environmental Assessment / Initial Study
EFH	Essential Fish Habitat
EIR	Environmental Impact Report
EIS	Environmental Impact Study
EPA	U.S. Environmental Protection Agency
ERP	Ecosystem Restoration Program
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
fps	Feet per Second
FONSI	Finding of No Significant Impact
ft	Feet
GHG	Greenhouse Gas

gpm	Gallons per Minute
GPS	Global Positioning System
HAP	Hazardous Air Pollutant
HVAC	Heating, Ventilation and Air Conditioning
i/s	Inches per Second
kW	Kilowatt
MMRP	Mitigation Monitoring and Reporting Program
MND	Mitigated Negative Declaration
N <sub>2</sub> O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAHC	Native American Heritage Commission
NEPA	National Environmental Policy Act
NHC	Northwest Hydraulic Consultants, Inc.
NMFS	National Marine Fisheries Service
NSVAB	Northern Sacramento Valley Air Basin
PCE	Primary Constituent Element
PEIS	Programmatic Environmental Impact Statement
PERP	Portable Equipment Registration Program
PM <sub>10</sub>	Particulate Matter less than 10 Microns in Diameter
psi	Pounds Per Square Inch
PV	Photovoltaic
PVC	Polyvinyl Chloride
RPM	Resource Protection Measure
sf	Square Foot
SVAQEPP	Sacramento Valley Air Quality Engineering and Enforcement Professionals
TAC	Toxic Air Contaminant
TCAPCD	Tehama County Air Pollution Control District
TES	Tehama Environmental Solutions, Inc.
UA	Upland Agriculture
USDA-SCS	U.S. Department of Agriculture - Soil Conservation Service
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
v	Volt
w	Watt
WHR	California Wildlife-Habitat Relationships
WY	Water Year

## Finding of No Significant Impact

# HAMMER DIVERSION ON SOUTH FORK COTTONWOOD CREEK FISH PASSAGE IMPROVEMENT PROJECT

Lead Federal Agency:  
U.S. Fish and Wildlife Service  
2800 Cottage Way, Room W-2605  
Sacramento, CA 95825

The U.S. Fish and Wildlife Service (USFWS) proposes to grant funds, under the authority of the Central Valley Project Improvement Act's (CVPIA) Anadromous Fish Restoration Program (AFRP) to implement a fish passage improvement project on the South Fork of Cottonwood Creek at a site known as the Hammer Diversion. Improving fish passage at this site would restore anadromous fish access to an additional five miles of historic holding, spawning and rearing stream habitat. The proposed action would remove the diversion dam and implement site improvements to meet the water and power needs of the landowner. The California Department of Fish and Wildlife (CDFW) is providing equipment, supplies and agency personnel to implement the dam demolition portion of the project. The Central Valley Regional Water Control Board (RWQCB) is the lead agency for the project under the California Environmental Quality Act (CEQA). The proposed action supports objectives of the AFRP Final Restoration Plan, complements other ongoing efforts to improve important aquatic habitats for the benefit of naturally-producing anadromous salmonids in the Central Valley, and may assist in the recovery of Central Valley steelhead and Central Valley spring-run Chinook salmon which are listed as threatened under the Endangered Species Act.

Documents reviewed in the preparation of this Finding of No Significant Impact (FONSI) include:

- CVPIA Programmatic Environmental Impact Statement (PEIS)
- AFRP Final Restoration Plan
- Environmental Assessment / Initial Study (EA / IS): Hammer Diversion on South Fork Cottonwood Creek Fish Passage Improvement Project
- Intra-USFWS Section 7 Evaluation Form
- Section 7 Biological Opinion from National Marine Fisheries Service
- Intra-USFWS Section 106 Consultation Compliance Memo

These documents are incorporated by reference, as described in 40 CFR 1508.13.

## Alternatives

In January and February of 2013, an Alternatives Analysis Report was prepared by Northwest Hydraulic Consultants that discussed four potential project alternatives:

1. No action
2. Fish ladder and screen at diversion dam
3. Removal of the dam and moving the diversion upstream
4. Removal of dam with alternative energy sources

The No Action alternative was not chosen because a lack of action would continue to restrict and/or block upstream access to five miles of historic habitat for anadromous salmonid fish species. Under this alternative, downstream passage of adult and juvenile anadromous salmonid fish species would continue to be restricted and juvenile downstream migrant fish would be at risk of entrainment into the diversion. No power or water system modifications would be necessary because the current diversion structure would continue to meet the power and water needs of the landowner.

The Proposed Action alternative was selected over other alternatives for best meeting the following project goals:

- Improve fish passage at the Hammer Diversion
- Meet the landowner's power and water needs
- Minimize maintenance needs for public agencies and the landowner

Fish passage improvement has been identified as priority actions in the CVPIA PEIS, AFRP Final Restoration Plan and CALFED's Ecosystem Restoration Plan, as well as several CDFW publications and plans.

## Environmental Impacts

Based upon information contained in the EA / IS, we have determined this Federal action would not significantly affect the quality of the human environment. The basis for a Finding of No Significant Impact is as follows:

1. As a result of formal consultation under the Endangered Species Act and inclusion of project design features / resource protection measures into the proposed action, short-term adverse impacts to federally-listed or special-status species may occur; however long-term benefits would be realized. The short-term adverse effects would not significantly affect the recovery of Central Valley spring-run Chinook salmon or Central Valley steelhead. No adverse impacts to designated critical habitats are expected. The short-term negative impacts are minimal compared to the potential net increase in production due to:
  - a. Unimpeded access to five additional upstream miles of the South Fork of Cottonwood Creek
  - b. Improved downstream passage
  - c. Elimination of the risk of entrainment into the diversion system
  - d. Additional in-stream flows due to the reduction in diversion flows
  - e. Potentially reduced stream temperatures due to the elimination of the shallow reservoir
2. Short-term, minor impacts to wildlife and fisheries may occur from implementing activities related to the fish passage improvement. However, resource protection measures have been incorporated into the proposed action to minimize effects. The intent of this project is to provide unimpeded salmonid fish passage during all flows. The proposed activities would remediate the current passage impediment by removing the existing diversion dam. The dam removal would allow salmonids to reach five additional miles of upstream holding, spawning, and rearing habitat.
3. The proposed action is not expected to have long-term adverse effects on wildlife or fisheries, and most effects are expected to be beneficial. The passage impediment will be removed and the planting of riparian vegetation will ensure that the action does not result in a net loss of wetlands or riparian habitat.
4. Resource protection measures have been incorporated into the project as project design features to minimize adverse effects on air quality, biological resources, cultural resources, hazardous waste materials, hydrology and water quality, and soils and geology. The proposed action is expected to have no negative impact on flooding potential.
5. The proposed action is not expected to have adverse effects on wetlands or floodplains pursuant to Executive Orders 11990 and 11988.
6. Neither short- nor long-term adverse effects on human health or the environment, nor disproportionate adverse effects to low-income or minority populations are expected, pursuant to Executive Order 12898.
7. Based on field surveys and a cultural resources evaluation, the project would not significantly affect

cultural resources. However, unknown subsurface cultural resources could be impacted during ground-disturbing activities associated with the proposed project. An individual knowledgeable in identifying cultural resource will be present during any ground-disturbing activities. In the event subsurface cultural remains over 45 years of age are encountered, the project will cease work at the general area of discovery and the contractor will consult with a professional archaeologist on staff with the USFWS.

In addition to analyzing effects on biological and cultural resources, the EA / IS evaluated the following aspects of the physical and human environment for potential significant effects as a result of the proposed action alternative:

- Air Quality
- Aesthetics
- Agricultural Resources
- Cumulative Impacts
- Environmental Justice
- Hazardous Waste Materials
- Hydrology and Water Quality
- Land Use / Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Public Utilities
- Recreation
- Soils and Geology
- Transportation

Project design features to minimize environmental effects were incorporated into the proposed action alternative to reduce impacts to a level below significance for those issues for which potentially negative impacts were anticipated.

## Public Review and Comment

An initial public scoping notice was published in the legal section of the Red Bluff Daily News on February 15, 2014. A second public notice was published in the Red Bluff Daily News on April 2, 2014. RWQCB, the lead agency for the project under CEQA, distributed the draft EA / IS for a 30-day public review period.

## Conclusion

Therefore, the USFWS, as lead Federal agency for the proposed AFRP funding of The Hammer Diversion on South Fork Cottonwood Creek Fish Passage Improvement Project, has determined that the proposal does not constitute a major Federal action significantly affecting the quality of the human environment under the meaning of section 102(2)(c) of the National Environmental Policy Act of 1969 (as amended). As such, an Environmental Impact Statement is not required. An EA / IS has been prepared in support of this finding and is available upon request to the U.S. Fish and Wildlife Service, Red Bluff Fish and Wildlife Office, 10950 Tyler Road, Red Bluff, CA 96080.

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Assistant Regional Director, Fisheries and Aquatic Conservation

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Date

# MITIGATED NEGATIVE DECLARATION

## PROJECT TITLE:

### HAMMER DIVERSION ON SOUTH FORK COTTONWOOD CREEK FISH PASSAGE IMPROVEMENT PROJECT

#### Project Description

The U.S. Fish and Wildlife Service (USFWS) has proposed a fish passage improvement project on the South Fork of Cottonwood Creek at a site known as the Hammer Diversion. The project includes removal of the existing diversion dam and implementing improvements to meet the landowner's water and power needs. Improving fish passage at this site will restore anadromous fish access to an additional five miles of historic spawning, rearing and holding stream habitat. The project is being funded by the USFWS through the Anadromous Fish Restoration Program (AFRP). The California Department of Fish and Wildlife (CDFW) is providing equipment, supplies and agency personnel to implement the dam demolition portion of the project. The Central Valley Regional Water Control Board (RWQCB) is the lead agency for the project under the California Environmental Quality Act.

#### Findings

The USFWS and RWQCB have prepared an Environmental Assessment / Initial Study for this project, and the RWQCB has determined from this study that the proposed project would not have a significant effect on the environment for the following reasons:

- The project will result in a net benefit to Chinook salmon, steelhead and other aquatic fish and wildlife species by improving upstream and downstream passage conditions and providing access to five miles of historic upstream anadromous fish holding, spawning and rearing habitat.
- Project impacts will be temporary in nature.
- The project will restore the altered streambed, increase in-stream flows and may reduce stream temperatures.

The proposed project will have a less-than-significant impact or no impact as related to aesthetics, agricultural resources, cumulative impacts, environmental justice, land use/planning, mineral resources, noise, population and housing, public services, public utilities, recreation, and transportation.

Potential project impacts will be reduced to a level of less-than-significant through adherence to established best management practices (BMPs) and implementation of mitigation measures related to air quality, biological resources, cultural resources, hazardous waste materials, hydrology and water quality and soils and geology.

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Chief

---

Date

Storm Water & Water Quality Certification Unit  
Central Valley Regional Water Quality Control Board

## **Project Title:**

Hammer Diversion on South Fork Cottonwood Creek Fish Passage Improvement Project

## **Lead Agencies Name and Address:**

The project applicant is the U.S. Fish and Wildlife Service (USFWS). USFWS is the lead agency under the National Environmental Policy Act (NEPA). The Central Valley Regional Water Control Board (RWQCB) is the lead agency under the California Environmental Quality Act (CEQA). Contact information for the lead agencies are listed below:

### **U.S. Fish and Wildlife Service**

Ms. Patricia Parker Hamelberg  
Red Bluff Fish and Wildlife Office  
10950 Tyler Road  
Red Bluff, CA 96080  
(530) 527-3043, ext. 248  
Tricia\_Parker@fws.gov

### **Central Valley Regional Water Quality Control Board**

Mr. Guy Chetelat  
Central Valley Regional Water Quality Control Board  
364 Knollcrest Drive, Suite 205  
Redding, CA 96002  
(530) 224-4997  
Guy.Chetelat@waterboards.ca.gov

## **Project Location:**

The proposed project is located in the foothills at the eastern base of the North Coast Range, approximately 35 miles west of Red Bluff, in Tehama County, California. The project site is located on private property in the canyon of South Fork Cottonwood Creek, in Section 12, Township 26 North, Range 8 West.

## **General Plan Designation:**

The Tehama County General Plan designation for the site is Upland Agriculture (UA).

## **Zoning:**

The Tehama County zoning designation for the project site is zoned Agriculture/Upland District (AG-1).

## 1.0 Introduction

### 1.1 Overview

Under the authority of the Central Valley Project Improvement Act (CVPIA), the U.S. Fish and Wildlife Service (USFWS) has developed an Anadromous Fish Restoration Program (AFRP) with the broad goal of doubling natural production of anadromous fish (those that spawn in fresh water but spend their adult life in salt water) in the rivers and streams of the Central Valley. The AFRP and other ecosystem restoration programs have recommended improving fish passage conditions in the Cottonwood Creek watershed as a priority for the CVPIA, because Cottonwood Creek supports three runs of Chinook salmon (*Oncorhynchus tshawytscha*), as well as Central Valley steelhead (*Oncorhynchus mykiss*).

The USFWS has proposed a fish passage improvement project (hereafter referred to as project, proposed project or proposed action) on the South Fork of Cottonwood Creek at a site known as the Hammer Diversion. Improving fish passage at this site will restore anadromous fish access to an additional five miles of historic spawning, rearing and holding stream habitat. The project is being funded by the USFWS through the AFRP. The California Department of Fish and Wildlife (CDFW), formerly known as the California Department of Fish and Game, is providing equipment, supplies and agency personnel to implement the dam demolition portion of the project.

### 1.2 Purpose of This Document

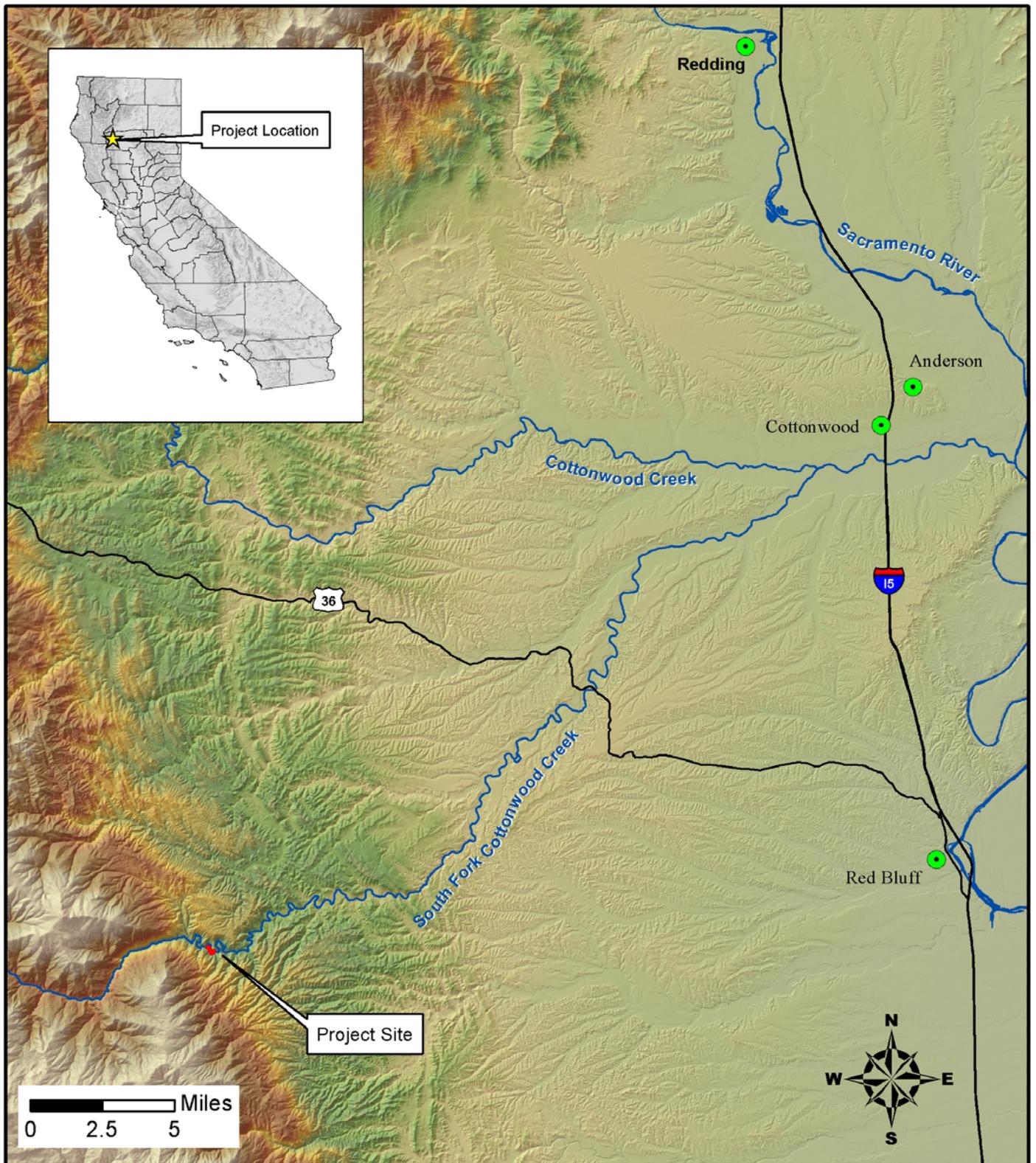
This Joint Environmental Assessment / Initial Study (EA / IS) was prepared by Tehama Environmental Solutions, Inc. (TES) under subcontract to Northwest Hydraulic Consultants, Inc. (NHC) under agreement number F12AC00651 with the USFWS. The EA / IS has been prepared to comply with both NEPA (42 U.S.C. 4331 *et seq.*) and CEQA (California Pub. Res. Code, Sections 21000 *et seq.*). The USFWS is the lead agency under NEPA and the RWQCB is the lead agency under CEQA.

The purpose of this EA / IS is twofold. Under NEPA, the purpose is to determine whether the proposed action would result in significant effects on the environment which would then require the preparation of an Environmental Impact Statement (EIS), or alternatively, whether the level of effects on the environment are such that a Finding of No Significant Impact (FONSI) can be supported by the federal lead agency. Similarly, under CEQA, the purpose is to determine whether the proposed project would result in significant effects on the environment which would require the preparation of an Environmental Impact Report (EIR), or alternatively, whether the level of effects on the environment are such that a Negative Declaration or a Mitigated Negative Declaration can be supported by the state lead agency.

This EA / IS describes the environmental resources in the project area, analyzes the effects of the proposed action and a No Action alternative on the environment, and proposes avoidance, minimization and/or mitigation measures to reduce any effects to less than significant levels.

### 1.3 Project Location

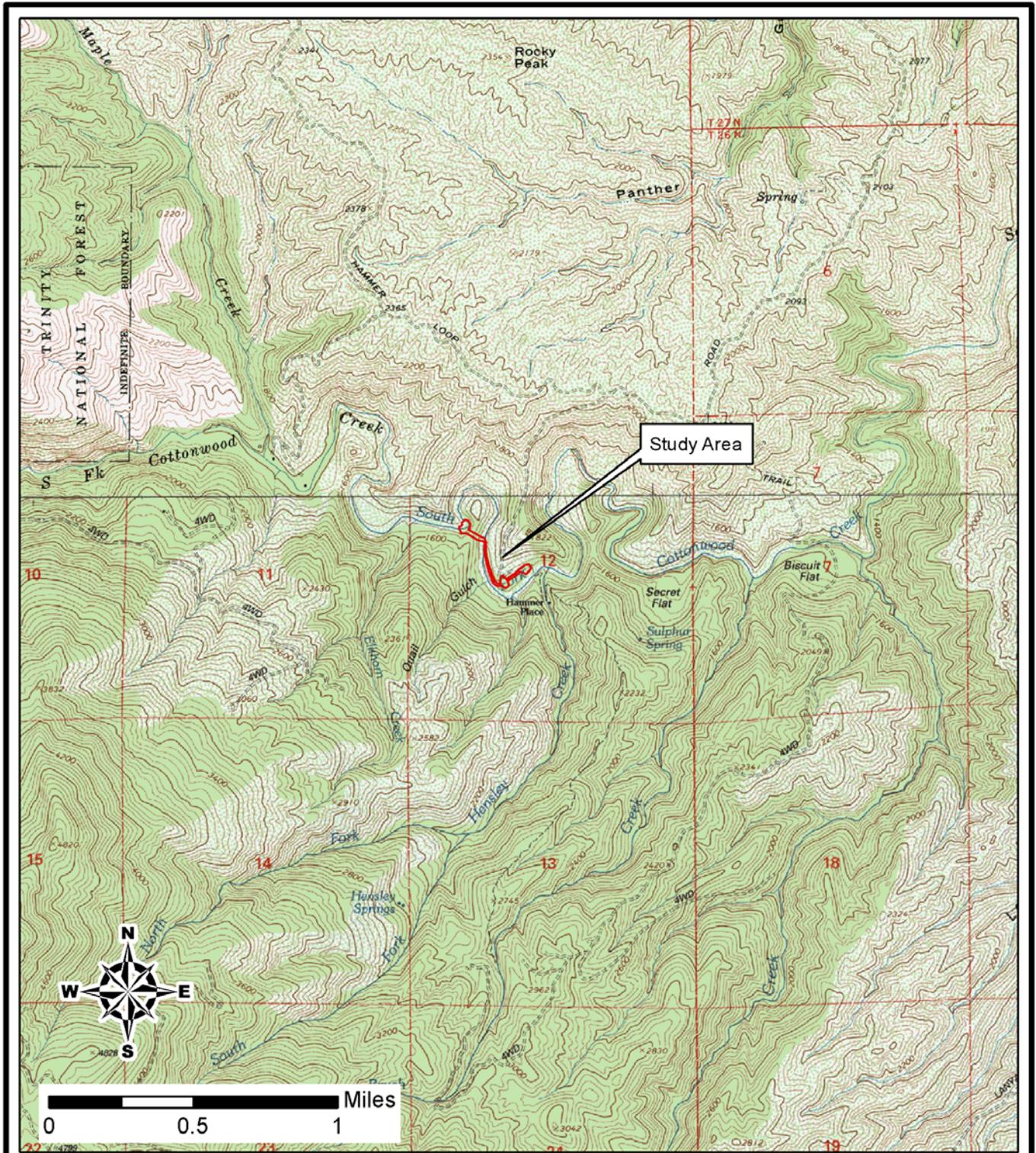
The proposed Hammer Diversion on South Fork Cottonwood Creek Fish Passage Improvement Project is located in the foothills at the eastern base of the North Coast Range, approximately 35 miles west of Red Bluff, in Tehama County, California (Figure 1). Specifically, the proposed project is located in Section 12, Township 26 North, Range 8 West MDBM, within the 7.5-minute U.S. Geological Survey (USGS) Raglin Ridge quadrangle map (Figure 2). The Hammer Diversion is located in the canyon of South Fork Cottonwood Creek, 43.85 stream miles upstream of the confluence with the mainstem of Cottonwood Creek (Figure 3).



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**Hammer Diversion on  
 South Fork Cottonwood Creek  
 Fish Passage Improvement Project**  
 Tehama County, California  
 January, 2014

**FIGURE 1**  
 Site Vicinity Map

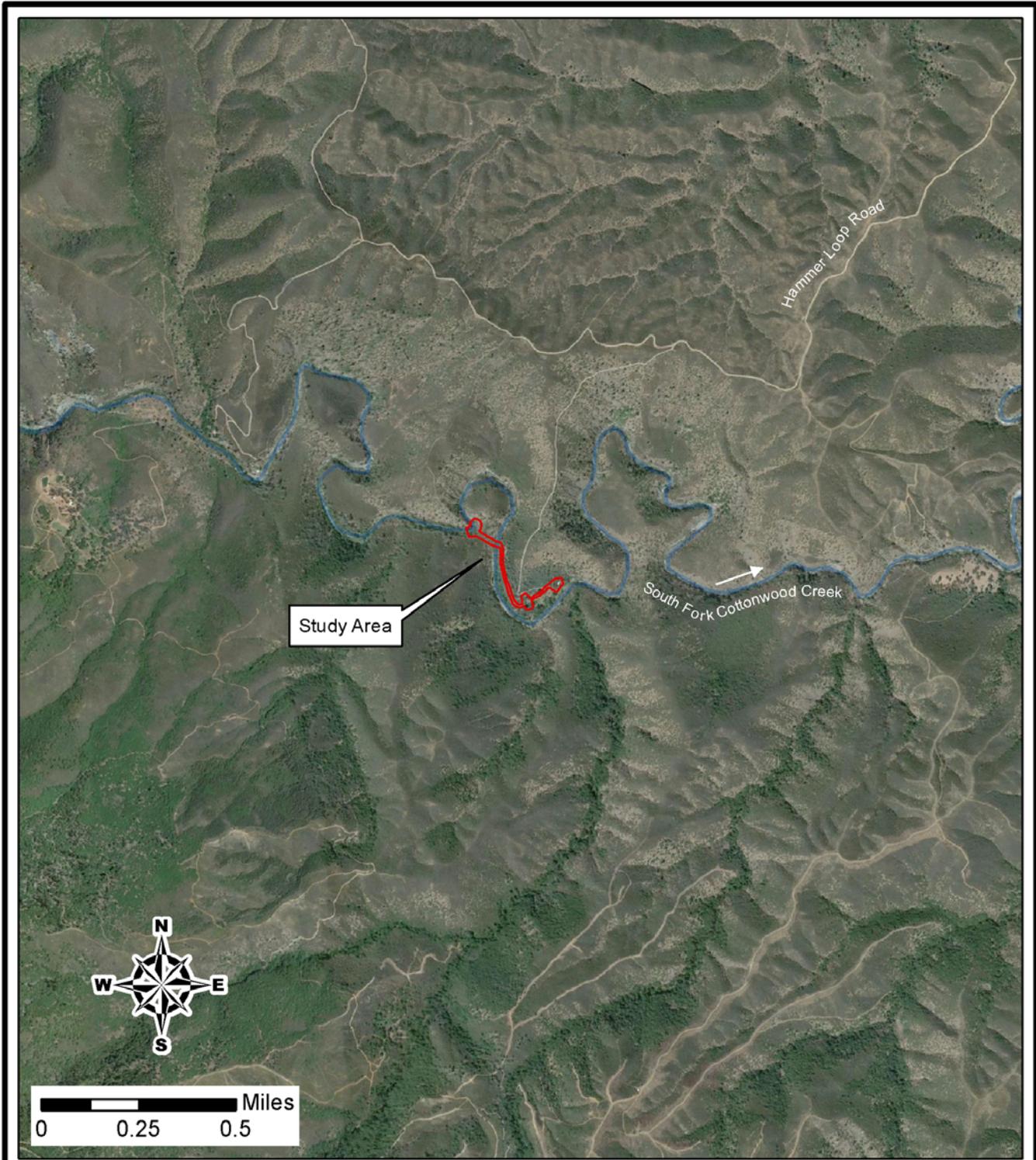


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**Hammer Diversion on  
 South Fork Cottonwood Creek  
 Fish Passage Improvement Project**  
 Tehama County, California

January, 2014

**FIGURE 2**  
 Site Location Map



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**Hammer Diversion on  
 South Fork Cottonwood Creek  
 Fish Passage Improvement Project**

Tehama County, California

January, 2014

**FIGURE 3**

Site Aerial Photo

The proposed project is located within a 160-acre private parcel owned by the Hammer family. The parcel address is 8855 Hammer Loop Road, Platina, CA 96076. The Tehama County Assessor's Parcel Number is 019-200-11.

## 1.4 Purpose and Need for Action

NEPA regulations require the federal lead agency to describe the underlying purpose and need to which the agency is responding, when considering a project, while the CEQA Guidelines require that the state lead agency provide a "statement of objectives sought by the proposed project" [Council on Environmental Quality (CEQ) and Governor's Office of Planning and Research 2013]. The information in this section addresses both of these requirements by providing information as to why the USFWS and RWQCB are considering the proposed project.

The purpose of the proposed action is to improve anadromous fish passage conditions at the Hammer Diversion site, while continuing to meet the landowner's power and water needs. The AFRP and other ecosystem restoration programs have recommended improving fish passage in Central Valley streams as a high priority for the CVPIA. One of the High Priority Actions in the *Final Restoration Plan for the Anadromous Fish Restoration Plan* (USFWS 2001) included "Encourage the restoration of small tributaries by evaluating the feasibility of screening or relocating diversions, switching to alternative sources of water for upstream diversions, replacing bridge and ford combinations with bridges or larger culverts and installing siphons to prevent truncation of small streams at irrigation canals." The USFWS has identified the Hammer Diversion as a potential site for improving passage conditions for several species of anadromous fish.

The Hammer Diversion was constructed in the 1930s and had a fish ladder installed by CDFW in the 1970s. The ladder is currently non-functional and the diversion has been determined to be a passage barrier to Chinook salmon and steelhead. Improving fish passage at this site is needed to enable anadromous fish to access an additional five stream miles of historic upstream spawning, rearing and holding habitat, as well as to enable unimpeded passage for juvenile salmon and adult and juvenile steelhead during downstream migrations.

The diversion dam currently provides hydropower and irrigation water for the landowner. There is a continued need by the landowner for power and water, so the project must be designed to meet this need.

As a result of the needs identified above, the objectives for this proposed project are as follows:

- Improve fish passage at the Hammer Diversion,
- Meet the landowner's power and water needs, and
- Minimize maintenance needs for public agencies and the landowner.

## 1.5 Hammer Technical Team

The proposed project was developed through a collaborative process by the Hammer Technical Team (Technical Team). This team is composed of representatives from the USFWS, CDFW, California Department of Water Resources (CDWR), U.S. Bureau of Reclamation (Reclamation), National Marine Fisheries Service (NMFS) and the landowner. Technical support for the team is provided by several private consulting firms including NHC, Cascade Stream Solutions, LLC and TES.

## 1.6 Regulatory Framework

In addition to CEQA and NEPA, the proposed project is subject to a variety of federal, state, and local laws, regulations and policies as identified in Section 5 of this document. The proposed project will require several federal, state, and local agency permits and approvals prior to implementation (Table 1).

Table 1. Required Permits and Approvals	
PERMITS AND APPROVALS	AGENCY
FEDERAL	
Clean Water Act Section 404 Permit	U.S. Army Corps of Engineers
Endangered Species Act Section 7 Consultation	National Marine Fisheries Service & U.S. Fish and Wildlife Service
STATE	
Letter of Authorization	Central Valley Flood Protection Board
Clean Water Act Section 401 Water Quality Certification	Central Valley Region Water Quality Control Board
National Historic Preservation Act Section 106 Consultation	California State Historic Preservation Office
LOCAL	
Explosives Permit	Tehama County Sheriff's Department
Building Permit	Tehama County Building Department

## 2.0 Proposed Action and Alternatives

### 2.1 Alternative Development

In September 2012, a kick-off meeting with the consulting firm NHC and the Technical Team was held to introduce themselves and become familiar with the project steps and objectives. NHC staff coordinated with the landowner to perform site visits. NHC staff then gathered information for the engineering alternatives analysis to provide fish passage improvements at the Hammer Diversion site. The first step included the performance of a hydrologic analysis of fish passage and flood flows at the site. NHC staff also conducted field surveys of the project site that included topographic surveys including a longitudinal profile of the creek, cross section surveys, a longitudinal profile of the ditch and other associated project areas. A geotechnical investigation, fish passage assessment and energy systems analysis were also performed and incorporated into the Alternatives Analysis Report (NHC 2013a). In January and February of 2013, drafts of the Alternatives Analysis Report were shared with the Technical Team. The landowner joined the Technical Team to discuss the analysis and the energy audit of his property, and investigation

of energy generation options. The report alternatives that were described and discussed by the Technical Team included:

1. No action
2. Fish ladder and screen at diversion dam
3. Removal of the dam and moving the diversion upstream
4. Removal of dam with alternative energy sources

## **2.2 Alternative 1 – No Action**

Under this alternative, no changes would occur to the existing diversion and diversion practices. Flows would continue to be diverted between spring and late fall/early winter, and provisions for protection of fishes would not be implemented. The hydraulic characteristics of the flows over the dam would not exceed the leaping and swimming capabilities of adult steelhead in bright condition during winter non-diversion periods when the dam weir boards are removed. However, the dam would continue to act as a complete barrier to adult steelhead in less than bright condition (due to the energy demands of migration to the site) and adult Chinook salmon except for very high flows when fish may be able to swim around the dam. Adult and juvenile downstream migrant fish would be at risk of entrainment into the diversion. No power or water system modifications would be necessary because the current diversion structure would continue to meet the power and water needs of the landowner.

## **2.3 Alternative 2 – Proposed Action**

Technical Team members agreed that the alternative involving removal of the dam with alternative energy sources was the preferred alternative. This alternative was then further developed through a design process (NHC 2013b, 2013c). An agreement has been prepared between the USFWS and the landowner that memorializes that the landowner is responsible for maintaining the condition of the fish screen and for keeping the diversion in a fish-friendly operational state.

Below is a bulleted list of the proposed action design features followed by a more detailed description of each aspect of the action. The Design Plans are included in Appendix A. See Figures 4-11 (Courtesy of NHC).

- Demolish existing dam;
- Construct an intake and pump facility that meets NMFS and CDFW fish screening standards;
- Install water conveyance facilities;
- Improve temporary water storage capacity;
- Upgrade residential photovoltaic (PV) system and emergency power generation;
- Upgrade electrical service for the Hensley hydropower plant;
- Install energy efficiency measures at residence;
- Upgrade existing residential structure to meet Tehama County standards;
- Plant riparian vegetation; and
- Conduct project monitoring.



Figure 4. Access Route



Figure 5. Diversion Dam



Figure 6. Intake and Headgate



Figure 7. Cottonwood Hydroelectric Facility



Figure 8. Diversion Tunnel Outlet



Figure 9. Bridge and Pipe Crossing



Figure 10. Conveyance Ditch



Figure 11. Storage Pond

Photos courtesy of NHC

## Dam Demolition

The existing diversion dam would be removed by CDFW under a separate agreement with USFWS (Appendix B). Dam removal would occur using explosives, specifically a binary explosive (two-part) called Helix. The use of time delays would minimize the level of noise and ground vibration thus reducing the risk of damage to the nearby tunnel and injury or mortality to fish and wildlife. A series of holes would be drilled into the dam and the existing fish ladder steps with air-powered drills. These holes would be deck-loaded with 1/3-pound sticks of Helix (the number would vary with the depth of each hole but not to exceed three sticks per hole) which would have detonating cord attached to the stick and to one of three detonating cord trunk lines. Each trunk line would be initiated with a time delay cap. Nonel shock tube would be used with a starter to initiate the shots from a safe location by a licensed blaster. The drilling operation would take approximately two days. The loading, blasting and cleanup would take one additional day on the following day.

Due to the extremely remote location of the dam (there is no vehicle access to the site), concrete rubble from the demolished dam would be broken into small pieces by the blast and left in place, after any exposed metal is removed. The dam is composed of cement and aggregate materials from onsite. Equipment and materials for the demolition would be mobilized to the project site using a helicopter. The explosives would be manually mobilized to the site. A generator /compressor would be used to power the drill(s).

Shot guards (personnel) would be placed up and down the canyon and blasting signs on the road leading into the residence. Shot guards would ensure that all personnel and the public are excluded from the blast site. Only personnel needed for the shot would be allowed at the site while it is being loaded. Once loaded, no one would be allowed back into the site until the "all clear" signal is given by the blaster in charge.

A temporary air blast is expected, but due to the canyon wall confinement, minimal noise would escape from the immediate area. In addition to personnel safeguards, all requirements from a Tehama County issued Blasting Permit would be implemented to insure a less that significant impact on any potential sensitive receptors within the project area. A shot plan for the dam demolition is included in Appendix B.

## Intake and Pump Station

The new pump station would be located at the current point of diversion. The primary reason for maintaining the diversion in its current location is to limit the total dynamic head to approximately eight feet and reduce the required pump size. The landowner has also expressed a strong desire to continue to use the diversion tunnel that his father and grandfather constructed. A disadvantage to maintaining the diversion in the current location is that access to the site is difficult and the pump and screen would need to be removed at the end of the diversion season and re-installed the following spring. Access to the site from the landowner's residence involves hiking across a suspension bridge and over a ridge with very steep terrain to the diversion site (see Appendix A).

Under existing conditions, approximately three cubic feet per second (cfs) is continually diverted under an existing water right through an unscreened headgate structure located upstream of the dam. In the interest of accomplishing the project goals, the landowner has decided that a minimum of 30 gallons per minute (gpm) (0.07 cfs) would meet his irrigation and fire suppression needs. Flows would be used to irrigate vegetation downslope from his diversion ditch, an orchard, and a garden.

The proposed PV pump facility would divert a maximum of approximately 40 gpm during daylight hours. Average pump rates would likely range from about 25 to 40 gpm during peak daylight hours. The pump

would be powered directly from the PV array and operate only during daylight hours. A pre-fabricated Pump-Rite screen designed to meet NMFS passive screen criteria at 130 gpm flow would serve as the solar pump intake. The NMFS Fish Passage Design Criteria (NMFS Northwest 2011) states that the passive screen approach velocity should be 0.2 feet per second (fps) or less. The CDFW criterion states that the maximum approach velocity should be one-fourth of active screen approach velocity (0.4 fps) or 0.1 fps. Therefore, a screen rated to meet NMFS criteria at 80 gpm was selected. The Pump-Rite M-L130 model was selected because it meets these criteria, will greatly minimize maintenance requirements and can be moved seasonally with relatively minimal effort as stream flows change. The screen would be placed on angle support such that the minimum clearance of 2.5 inches from streambed is met. The screen would be removed at the end of each diversion season for storage. The chosen screen model is extremely lightweight and the landowner sees no problems with seasonal installation.

The pump station includes a Dankoff Solar SunCentric Model 7446 pump placed on a pedestal. A two-inch suction hose would extend from the screen to the pump. A one-inch discharge line would extend from the pump outlet to the existing intake structure at the tunnel entrance. The pump would be powered by two PV modules, which would be mounted on supports above the 100-year water level or above an elevation of 1,505.0 feet. The location of bedrock below the surface sediments at the diversion site and the elevation of the water surface at low flows following dam removal are not known. However, the screen location can be adjusted easily in the future to changes in streambed after dam removal.

#### Water Conveyance and Temporary Storage Upgrades

The water conveyance and temporary storage system would convey water from the existing suspension bridge pipe crossing to the existing pond, orchard and garden. Water would be conveyed from the existing pipe outlet at the suspension bridge to the pond in four-inch diameter polyvinyl chloride (PVC) pipe. The pipe would be buried beneath the existing irrigation ditch. Turnouts would be installed at a spacing of about 250 feet, consisting of a valve and stub that would allow for water to be diverted into the ditch for subsurface irrigation of the vegetation on the downslope side of the ditch. The temporary storage system would be upgraded by adding a pump to convey water from the existing pond to a 2,500-gallon storage tank that would be used for low pressure irrigation of the garden and orchard and for fire suppression. The pump would be powered by the PV system at the residence, would have a maximum rate of 10 gpm, and would be capable of filling the storage tank in approximately four hours. A two-inch diameter PVC pipe would connect the tank to the existing ditch.

#### Residential PV and Emergency Power Upgrades

The existing PV / battery system at the residence would be expanded to allow more solar energy production and increase energy holding capacity. The PV system is expected to meet the electrical needs of the residence and keep the battery bank charged during most of the year, with the Hensley hydropower power plant providing needed electricity to the residence and battery bank when solar exposure is reduced in the winter. It is expected that this overall system would maintain the current level of electricity availability for the residence year-round. The upgrades would include:

- Addition of twenty-four new PV modules, two 4-circuit combiners, and lightning arrestors added to the existing twelve modules and combiner mounted directly on the residence's southeast sloped roof. These improvements add 6-kilowatt (kW) capacity to the current 2.2 kW system.
- Addition of two new charge controllers to the existing controller, direct current interfaces, breakers and control panel.
- Addition of four new lead-acid 12 volt (v) batteries; removal of existing battery bank from the site; and installation of a vented battery box.

- Reuse two inverter units.
- Removal or topping several trees that shade the present system in June and July.
- Because there may be times when both the PV system and Hensley hydropower plant are out of service at the same time, a propane generator would be installed to recharge the batteries, if needed to maintain electric power for the residence. This generator would utilize two 25-gallon propane bottles that can be transported for filling in a private vehicle, and is expected to be used very infrequently. System components include:
  - An 8.5 kW backup generator, sound-attenuated, direct inverter feed tied to expanded residence PV system, and remote two-wire start.
  - Two 14-inch diameter, 25-gallon vertical propane bottles and manifold.

### Hensley Power Plant Upgrades

The residence receives power intermittently from the seasonal Hensley Creek hydropower plant, reference Appendix B. The electrical interface from this plant is to be upgraded at the house, and it is anticipated to be the primary source of electricity during the winter months.

### Residential Shell and HVAC Upgrades

The residence would receive two energy efficiency measures intended to reduce electrical requirements to match the electrical systems proposed. The first is the installation of two or three new state-of-the-art heat pumps to provide efficient year-round electric heating and cooling. The second is a shell upgrade in the form of an exterior wall enclosure and insulation under the main floor, which is currently open crawl-space. These upgrades include:

- A new Heating Ventilation and Air Conditioning (HVAC) system that includes three new HVAC units, condenser pads, controls, wiring, mounting, and activation;
- Enclose and insulate under-floor space, install stud-framed wall over strip footing with plywood siding; include provision for venting from expanded residence PV battery box, door; and install insulation in walls and exposed floor above, board wall and ceiling interiors.

### Riparian Planting

Suitable riparian vegetation will be planted on new bars that are formed downstream of the dam from the transport of coarse sediment stored behind the dam, and along the new low-water line upstream of the dam. The planting will be deferred to the year after the dam removal in order to allow fall and winter floods to move coarse sediment and form the new planting surfaces.

### Post-project Monitoring

Post-project monitoring will be conducted by the USFWS and CDFW. Pebble counts and cross-section and longitudinal profile surveys will be conducted approximately 1,000 feet upstream and downstream of the current diversion dam location, annually for three years following project implementation to monitor changes in channel form. The methods will follow those used to document pre-project conditions.

Habitat monitoring will occur approximately the first and fifth year after project implementation to monitor fish habitat conditions. Additional monitoring may be conducted, based on winter flow patterns. The methods will follow those used by USFWS to document pre-project conditions. In addition, a water temperature monitor will be installed to monitor the effects of the project on water quality.

Fish population monitoring will be conducted in the project reach of South Fork Cottonwood Creek using snorkel surveys. Monitoring will be carried out by CDFW for several years after the proposed project has been implemented.

Riparian habitat upstream and downstream of the current diversion dam location will be monitored annually for three years to monitor the status of riparian plantings within the context of natural flow events.

### **2.3.1 Requirements and Mitigations Incorporated into the Proposed Action**

The project includes a number of Resource Protection Measures (RPMs) that were developed to protect sensitive resources that could potentially be impacted by the project and are hereby incorporated into the project description and plans. These RPMs and project components are summarized below:

#### **Air Quality**

**AIR-1:** The USFWS will implement a dust control program to limit fugitive dust and particulate matter emissions associated with demolition and construction activities and travel to and from the project site. The dust control program will include the following elements as appropriate:

- Soil-disturbing activities will minimize disturbance to reduce the amount of bare soil exposed at any one time.
- Travel on unpaved dirt roads will be limited to 10 miles per hour, to minimize dust emissions.

**AIR-2:** The following Tehama County Air Pollution Control District (TCAPCD) Standard Mitigation Measures for Construction Equipment will be implemented as part of the proposed project during construction activities:

- Maintain all construction equipment in proper tune according to manufacturer's specifications.
- Maximize to the extent feasible, the use of diesel construction equipment meeting the California Air Resources Board's (CARB) 1996 or newer certification standard for off-road heavy-duty diesel engines.
- If required by the TCAPCD, verify that owners or operators of vehicles are registered with the CARB Diesel Off-Road On-Line Reporting System (DOORS) program: ([www.arb.ca.gov/msprog/ordiesel/ordiesel.htm](http://www.arb.ca.gov/msprog/ordiesel/ordiesel.htm)). The DOORS program assists fleet owners in reporting their off-road diesel vehicle inventories to reduce vehicle emissions, as required by the In-Use Off-Road Diesel Regulation.
- If required by the TCAPCD, verify that owners or operators of portable engines and certain other types of equipment are registered under the CARB's Statewide Portable Equipment Registration Program (PERP) in order to operate their equipment throughout California without having to obtain individual permits from local air districts: ([www.arb.ca.gov/portable/portable.htm](http://www.arb.ca.gov/portable/portable.htm)).

#### **Biological Resources**

**VEGETATION-1:** Disturbance to existing vegetation will be avoided or minimized to the extent possible.

**VEGETATION-2:** Disturbance to riparian vegetation will be avoided or minimized to the extent possible.

**VEGETATION-3:** All heavy equipment shall be thoroughly cleaned prior to mobilization to the project site to remove any soil, weed seeds and plant parts to reduce the importation and spread of invasive exotic plant species.

**VEGETATION-4:** Only certified weed-free straw shall be used for erosion control or other purposes to reduce the importation and spread of invasive exotic plant species.

**VEGETATION-5:** A riparian wetland planting plan will be prepared to replace impacted riparian wetlands by a measure of quantity and quality equal to or exceeding impacts of the project using appropriate native riparian trees and shrubs.

**VEGETATION-6:** Following the initial winter flows after dam removal, the area along the new low water line upstream of the former dam, and new point bars formed immediately downstream of the former dam will be revegetated in accordance with the riparian wetland planting plan.

**WILDLIFE-1:** Prior to dam removal and any dewatering /water diversion activities, water bodies shall be surveyed by a qualified biologist to determine if any foothill yellow-legged frogs or western pond turtles are present. If any individuals of these species are found, a qualified and permitted biologist shall determine and implement appropriate relocation procedures. Herpetological exclusion fencing shall be erected around the perimeter of the in-stream work area prior to construction initiation. Fencing shall remain until work in sensitive areas is complete.

**WILDLIFE-2:** A biologist experienced in the identification of amphibian species (particularly *Rana* species) will ensure that no California red-legged frogs are present within any of the disturbance areas. If any California red-legged frogs are found to be present, all potentially disturbing construction activities will be suspended until appropriate protective measures can be developed in consultation with USFWS Endangered Species Act (ESA) staff.

**WILDLIFE-3:** Measures **VEGETATION-2**, **VEGETATION-5** and **VEGETATION-6** associated with the avoidance and restoration of riparian vegetation will be fully implemented.

**WILDLIFE-4:** Measures **WATER-4** through **WATER-6** associated with minimizing impacts to water quality will be fully implemented.

**WILDLIFE-5:** Any tree removal, vegetation disturbance and/or the onset of potentially disturbing construction activities should occur between August 1 and February 1 (outside of the combined breeding season for songbirds, raptors and other migratory bird species).

**WILDLIFE-6:** If tree removal, vegetation clearing, or the onset of potentially disturbing construction activities must occur during the nesting season, a nesting survey of the construction area and adjacent suitable habitat should be conducted by a qualified biologist no more than seven days prior to the initiation of the onset of these activities. If active bird nests are found to be present, tree removal, vegetation clearing and the onset of potentially disturbing construction activities shall be suspended until a qualified biologist, in consultation with CDFW can establish an appropriate protective buffer area to minimize impacts to the nesting birds. No construction activities should commence within the buffer area until the qualified biologist determines that the young birds have fledged or the nest is no longer active.

**WILDLIFE-7:** Prior to any construction work at the diversion tunnel inlet, a bat survey of the diversion tunnel shall be conducted by a qualified biologist to ensure that pallid bats or Townsend's big-eared bats are not roosting in the tunnel.

**WILDLIFE-8:** If pallid bats or Townsend's big-eared bats are found to be roosting in the diversion tunnel, a qualified biologist shall be on site during all construction activities at the diversion tunnel inlet to observe the roosting bat's behavior and ensure that construction activities are not causing the bats to be significantly disturbed. If the biologist determines that construction activities are causing the bats to be significantly disturbed, all construction activities at the diversion tunnel inlet shall be suspended until the biologist, in consultation with the CDFW, can establish appropriate measures to minimize impacts to these species.

**WILDLIFE-9:** A construction worker education program shall be implemented that includes an explanation of all special-status animal species, identification, avoidance measures, and federal and state laws that protect the species. This shall include, at a minimum, those species described above.

**WETLAND-1:** Measures **VEGETATION-2**, **VEGETATION-5** and **VEGETATION-6** associated with the avoidance and restoration of riparian vegetation will be fully implemented.

**WETLAND-2:** Project activities will avoid impacts to wetlands to the extent possible.

**WETLAND-3:** High-visibility fencing will be installed in areas where equipment will be working near any wetlands and/or riparian habitat that are not to be disturbed.

**WETLAND-4:** Construction crews will be informed about the importance of avoiding sensitive areas, including wetlands.

**FISH-1:** Dam removal shall be conducted between June 15 and October 1 to minimize impacts to anadromous fish by working when water temperatures are warmer and anadromous fish are less likely to be present.

**FISH-2:** All shock tubes, explosive packaging and wires from the blasting operations will be removed from the site.

**FISH-3:** Measure **SOIL / GEO-3** regarding the use of time delays for blasting operations will be fully implemented to minimize the level of blast-induced overpressure rises.

**FISH-4:** Measures **VEGETATION-2**, **VEGETATION-5** and **VEGETATION-6** associated with the avoidance and restoration of riparian vegetation will be fully implemented.

**FISH-5:** Measures **WATER-4** through **WATER-6** associated with minimizing impacts to water quality will be fully implemented.

**FISH-6:** Prior to dam removal, exclusionary fish netting shall be installed approximately 500 feet upstream and 500 feet downstream of the diversion structure. USFWS, in coordination and consultation with NMFS and CDFW, will ensure that qualified fish biologists are onsite to implement fish rescue operations through the use of herding, seining and/or electrofishing, if necessary. Best professional determination will be used to decide which method(s) of rescue is most appropriate. Biologists will first try to haze and herd fish out of the fish exclusion area. If fish biologists determine that the use of electrofishing is necessary for the efficient and successful removal of fish, the NMFS electrofishing guidelines (NMFS 2000) will be strictly followed. The fish rescue team will be comprised of fishery biologists with professional experience using seines and electrofishing equipment.

## **Cultural Resources**

**CULTURAL-1:** An individual knowledgeable in identifying cultural resources will be present during any ground-disturbing activities. In the event subsurface cultural remains over 45 years of age are encountered, the project will cease work at the general area of discovery and the contractor will consult with a professional archaeologist on staff with the USFWS. A field exam by the professional archaeologist will likely be necessary and further steps considered in the evaluation, including mitigation and contacting the Native American Indian community if human remains are encountered [following Native American Graves Protection and Repatriation Act (NAGPRA) procedures].

## **Soils and Geology**

**SOIL / GEO-1:** After ground-disturbing activities are complete, all disturbed areas (outside of the active stream channel and the ditch bottom) shall be seeded with native plant species and mulched.

**SOIL / GEO-2:** Construction of all project actions shall comply with RWQCB Basin Plan Objectives and an erosion control plan. Standard BMPs will be incorporated into the project designs.

**SOIL / GEO-3:** Time delays will be used for the blasting operations during dam demolition to minimize the level of ground vibration and reduce the risk of damage to the nearby tunnel.

## **Hazards and Hazardous Wastes**

**HAZARDS-1:** Measures **WATER-4** through **WATER-6** associated with potential petroleum product spills will be fully implemented.

**HAZARDS-2:** Blasting operations will be isolated from flammable materials / vegetation. Weather conditions such as wind / humidity related to a threat of wildfire will be monitored and blast timing will be adjusted accordingly. A shovel and an operational full five-gallon backpack pump or a 4A fire extinguisher will be readily accessible at several strategic locations surrounding the blast site. Fire watchers will remain in the area for at least one hour following detonation.

## **Hydrology and Water Quality**

**WATER-1:** Ditch piping shall occur when the ditch is not flowing.

**WATER-2:** Dam demolition shall be conducted in the summer / early fall during the low flow period.

**WATER-3:** Monitoring of water turbidity and settleable materials shall be conducted in accordance with the Clean Water Act Section 401 Certification through consultation with the RWQCB.

**WATER-4:** All equipment and machinery that contains fuel, oil or other petroleum products used during dam demolition shall be checked for petroleum leaks immediately prior to being mobilized to the project site and again each day prior to use.

**WATER-5:** All equipment and machinery that contains fuel, oil or other petroleum products used during dam demolition will be operated and stored within an impervious secondary containment structure. All refueling and/or maintenance shall take place within the secondary containment structure.

**WATER-6:** An emergency spill kit and absorbent oil booms will be onsite during dam demolition preparation activities.

**WATER-7:** Measures **SOIL / GEO-1** and **SOIL / GEO-2** regarding erosion control will be fully implemented.

## **2.4 Alternatives Considered but Dismissed**

The following two additional alternatives that were developed in the alternatives analysis (NHC 2013a) were considered by the Technical Team but were dismissed due to the following reasons.

The alternative involving providing fish passage past the dam and installing a fish screen would require maintenance to keep it “fish-friendly”. In this case, maintenance would be on a daily / frequent basis to remove debris (sticks, leaves, rocks) out of the fish ladder. This usually requires two people (for safety purposes), utilizing long-handled tools to pry debris out of the ladder. The thirty-year-old damaged ladder onsite was an example of what happens when maintenance is not performed (i.e. the rocks that got into the cells of the ladder damaged the concrete sills and caused it to fail). The agencies do not have the resources / staff for this task and the landowner would not be able to perform this task safely on his own. In conjunction with building the ladder, a fish screen with the appropriate approach angle and velocity would have needed to be built that would also require frequent maintenance to keep the juvenile fish from being harmed or entangled in debris (e.g. leaves, sticks).

The alternative involving removal of the dam and moving the diversion upstream was reviewed carefully, but was deemed infeasible due to distance to the use site. The primary reason for maintaining the diversion in its current location is to limit the total dynamic head to approximately eight feet and reduce the required pump size.

### **3.0 Affected Environment and Environmental Consequences**

This section contains background information and descriptions of the natural and cultural resources found in the project area that could be affected by the proposed project and the No Action alternative. This is followed by a description of the methods used to determine the environmental impacts to the affected environment for each resource type. An analysis is then provided of the environmental impacts that can be expected to the affected environment for each resource type under the two alternatives discussed in this document. The analyses of anticipated environmental impacts include those required by both CEQA and NEPA. Mitigation measures that would reduce significant impacts to less than significant levels are listed, if applicable. California law requires lead agencies under CEQA to adopt a reporting and mitigation monitoring program. Environmental commitments in conjunction with any mitigation measures needed as conditions of project approval will be included in a Mitigation Monitoring and Reporting Program (MMRP) to verify compliance.

#### **3.1 Aesthetics**

##### **3.1.1 Affected Environment**

The South Fork of Cottonwood Creek flows east out of the Yolla Bolly-Middle Eel Wilderness in Tehama County and then northeastward to its confluence with Cottonwood Creek. The project area is within the middle segment of the creek, which starts at the U. S. Forest Service (USFS) boundary and proceeds downstream to the Cold Fork confluence. The South Fork was included in a Bureau of Land Management (BLM) inventory of rivers and streams to determine National Wild and Scenic Rivers System inclusion eligibility. The middle section, which includes the project area, was classified as scenic and eligible for inclusion as the shoreline is largely primitive and undeveloped with limited vehicle access. While eligible for inclusion, no BLM management plan is in place as the project area is located on private land. However, if Congress designates the stream as a component of the National Wild and Scenic River System, the BLM would consider “acquisition of available, unimproved private land within the designated corridors” (BLM 1993).

The aesthetic quality of the project area is high (BLM 1993). The area is characterized by a deep gorge with flowing, cascading water surrounded by a forested upland landscape. The Hammer property includes a 1,224 square-foot (SF) domestic residence and several outbuildings. Numerous cultural resources were identified and evaluated within the proposed project site. These include a concrete stream diversion dam, water conveyance tunnel, hydroelectric power plants, scaffolds and elevated pipe crossings, and an irrigation ditch.

##### **3.1.2 Environmental Consequences / Impacts and Mitigation Measures**

###### **Methodology**

An aesthetic resource impact analysis in the project area was based on document review, site analysis and the CEQA significance criteria. Significance thresholds are used to evaluate the proposed project’s potential impact on the visual character of the project area.

The project would have a significant impact if it would:

- a) Have a substantial adverse effect on a scenic vista;
- b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;
- c) Substantially degrade the existing visual character or quality of the site and its surroundings;
- d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

### **No Action Alternative**

Under this alternative, no impacts to the visual character of the project area would occur. No changes would occur to the character of the aesthetic features and existing land uses. The existing upstream visual characteristics related to the presence of the existing diversion dam, relative to an undammed natural creek flow, would remain.

### **Proposed Action Alternative**

Under this alternative, any direct impacts to aesthetics would be considered short-term and minor in intensity. The Hammer site is located on private land and not included in a National Wild and Scenic Rivers System management plan. The diversion dam and conveyance tunnel are not in consideration for National Register listing, therefore the proposed project would not visually impact any historic structure characteristics.

The isolated nature and topography of the project area helps shield any temporary visual construction or demolition impacts from view. The proposed dam demolition and retrofit would have a short-term impact on the visual environment relative to the long-term aesthetic benefits and visual diversity associated with the natural creek flow restoration. No new light sources would result from the proposed project. The impacts of short-term project implementation would therefore be less than significant.

## **3.2 Agricultural Resources**

### **3.2.1 Affected Environment**

The Hammer property is located in a remote foothill setting in western Tehama County. The Tehama County General Plan designation for the site is UA. The soils mapped within the project site are composed of the Maymen and Lodo gravelly loams, 30 to 65 percent slopes map unit [U.S. Department of Agriculture-Soil Conservation Service (USDA-SCS) et al. 1967] (Figure 14). These soils have a Capability Unit designation of VIIIs-8, which indicates that they are shallow, well drained, steep and mostly rocky or stony and therefore, not suited to farming. Agricultural uses in the general area include limited livestock grazing and timber production in the higher elevations. No Prime Farmland, Unique Farmland, or Farmland of Statewide Importance is present within, or near the project site. The Hammer property is enrolled in the Williamson Act but there will be no change as a result of the proposed project. Water from the existing diversion is used for cultivation of the landowner's family orchard and garden.

### **3.2.2 Environmental Consequences / Impacts and Mitigation Measures**

#### **Methodology**

The methodology used for an agricultural related analysis involved an assessment of the agricultural resources, production capabilities and current agricultural uses of the project site and surrounding area. The analysis was conducted through document review and site visits.

Impacts to Agriculture Resources would be significant if they would:

- a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use;
- b) Conflict with existing zoning for agricultural use, or a Williamson Act contract; or
- c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use.

### **No Action Alternative**

Under this alternative, no change from the existing agricultural use of the site would occur. Diverted flows from Cottonwood Creek would continue to service the small agricultural land use of the site. There would be no conflict impacts to the agricultural land uses in the project area.

### **Proposed Project Alternative**

Under this alternative, the amount of water that is diverted would be reduced from approximately 3 cfs to 0.7 cfs. The landowner has determined that this will meet the existing small agricultural land uses. The removal of the dam and other components of the proposed project would have no impact on any surrounding land agricultural land uses. Because there would be no impacts to agricultural resources, no mitigation is required.

## **3.3 Air Quality**

### **3.3.1 Affected Environment**

The 1977 federal Clean Air Act (CAA) requires the U.S. Environmental Protection Agency (EPA) to identify National Ambient Air Quality Standards (NAAQS) to protect public health and welfare.

Tehama County is part of the Northern Sacramento Valley Air Basin (NSVAB), and is under the jurisdiction of the TCAPCD. Similar to federal requirements, the 1988 California Clean Air Act (CCAA) outlines a program to attain the California Ambient Air Quality Standards (CAAQS). The CARB, California's state air quality management agency, regulates mobile source emissions and oversees the activities of the TCAPCD. Within Tehama County, the TCAPCD is responsible for adopting and enforcing controls on stationary sources of air pollutants through its permit and inspection programs. Other TCAPCD responsibilities include monitoring air quality, regulating agricultural burning, preparation of clean air plans, and responding to air quality complaints from citizens.

Tehama County is currently in attainment or unclassified status for all national criteria pollutant standards. Tehama County is a nonattainment area for state standards for ozone and particulate matter less than 10 microns in diameter (PM<sub>10</sub>).

Proximity to sensitive receptors is a concern in air quality analyses. A sensitive receptor is a location where human populations, particularly children, seniors, and sick individuals, are present and where there is a reasonable expectation of continuous human exposure to pollutants.

The project is not located near a school, hospital, or senior housing. The project is located near one residence, which is occupied by the Hammer family, who are cooperators for the project.

### Climate Change and Greenhouse Gases

Climate change refers to a significant change in measures of climate, such as average temperatures, precipitation, and wind patterns over time. Significant changes in global climate patterns have recently

been associated with global warming, an average increase in the temperature of the atmosphere near the earth's surface, attributed to the accumulation of greenhouse gas (GHG) emissions in the atmosphere.

In February 2010, the Council on Environmental Quality (CEQ) prepared NEPA guidance on consideration of the effects of climate change and greenhouse gas emissions. The guidance identifies ways in which Federal agencies can improve consideration of GHG emissions and climate change for federal actions. The guidance states that NEPA documents should provide decision-makers with relevant and timely information and should consider 1) GHG emissions of a proposed action and alternative actions and 2) the relationship of climate change effects to a proposed action or alternatives. Specifically, if a proposed action would be reasonably anticipated to cause direct emissions of 25,000 metric tons or more of carbon dioxide (CO<sub>2</sub>)-equivalent GHG emissions on an annual basis, agencies should consider this as an indicator that a quantitative assessment may be meaningful to decision-makers and the public (CEQ, 2010).

As of August 2007, CEQA lead agencies are required by law to analyze the potential of a proposed action to produce GHG emissions, which consist primarily of carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), and methane (CH<sub>4</sub>) (Public Resources Code Section 21083.05). The Governor's Office of Planning and Research released a Technical Advisory in June 2008 (California Office of Planning and Research 2008) that provides guidance for addressing CEQA GHG environmental impacts. In particular, "Lead agencies should make a good faith effort, based on available information, to calculate, model, or estimate the amount of CO<sub>2</sub> and other GHG emissions associated with vehicular traffic, energy consumption, water usage and construction activities." (California Office of Planning and Research 2008)

### **3.3.2 Environmental Consequences / Impacts and Mitigation Measures**

Data for the impacts analysis were taken from the following reports on local and regional air quality: Northern Sacramento Valley Planning Area 2012 Triennial Air Quality Attainment Plan, Planning and Permitting Air Quality Handbook [Sacramento Valley Air Quality Engineering and Enforcement Professionals (SVAQEEP) 2009], and the Tehama County General Plan EIR (Tehama County 2008). The air quality analysis is qualitative, and was conducted by assessing anticipated construction-related impacts of the project and comparing them to existing and anticipated future air quality conditions.

The project would have a significant impact if it would:

- a) Conflict with or obstruct implementation of the applicable air quality plan;
- b) Violate any air quality standard;
- c) Contribute substantially to an existing or projected air quality violation;
- d) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard;
- e) Result in sources of toxic air contaminants that may affect surrounding land uses;
- f) Expose sensitive receptors to substantial pollutant concentrations;
- g) Create objectionable odors affecting a substantial number of people;
- h) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or
- i) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHG.

## **No Action Alternative**

Under this alternative, dam removal activities and all construction-related activities would not occur. Because this alternative would not cause any direct emissions in the short-term, it would remain consistent, and in conformity with applicable plans. Because no activities would occur, this alternative would not adversely affect any sensitive receptors. No long-term indirect impacts to air quality have been identified.

## **Proposed Action**

Activities associated with the proposed project would require the removal of the existing diversion dam, the installation of a new diversion pump and fish screen, the replacement of a hydroelectric generating system with a solar electric system, and improvements to the irrigation system including a more efficient water conveyance and storage system. Dam removal would occur, in a single day, using explosives. Concrete rubble from the demolished dam would be left in place, after any exposed metal is removed. Equipment and materials for the dam removal portion of the proposed project would be flown in and out of the site using a helicopter. An existing concrete structure would be used to anchor the pumping station, and new irrigation water piping would be installed along the existing open ditch system to minimize percolation losses.

Construction-related activities would generate criteria air pollutants, including carbon monoxide; sulfur dioxide; PM<sub>10</sub>; precursors such as reactive organic gases and oxides of nitrogen; and GHG from exhaust, fugitive, and off-gas emissions. Sources of exhaust emissions include delivery trucks, commuting workers motor vehicles, and off-road heavy-duty equipment. Sources of fugitive emissions such as particulate matter dust include construction-related activities such as soil disturbance, grading, and material hauling. Asphalt paving and application of architectural coatings (not included in the project) are sources of off-gas emissions.

The project would involve the use of equipment and travel on an unpaved road to the site, which would temporarily contribute fugitive dust in the project area. This source of fugitive dust is associated with PM<sub>10</sub>, a criteria pollutant, for which the air basin is in non-attainment. Construction activities associated with the pumping station and irrigation piping are expected to take approximately one to two weeks. Once activities cease at the project area, the resulting impact on air quality and increase in GHG emissions would also cease.

Tehama County requires that projects that include demolition, construction, and grading obtain a Fugitive Dust Permit. The proposed project would need to obtain a Fugitive Dust Permit for demolition and construction activities; however, it is not anticipated that the project would require grading activities that would result in fugitive dust.

Construction associated with the proposed project would require the use of equipment that would temporarily contribute to air pollution in the local area. Exhaust emissions from heavy equipment during construction could contribute to air emissions. Construction activities would generate emissions from diesel- and gasoline-powered equipment and vehicles. Diesel particulate is an identified Hazardous Air Pollutant (HAP) and Toxic Air Contaminant (TAC), emissions of which should be minimized. The TCAPCD has standard mitigation measures for construction equipment, implementation of these measures would reduce impacts associated with exhaust emissions. In addition, vehicles traveling to the site and construction activities would generate GHG emissions from diesel- and gasoline-powered vehicles and equipment.

GHG emissions include chemicals such as CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. As primarily a dam removal project, the proposed project would not result in land use changes within the project area.

While project construction activities would result in GHG emissions associated with the use of heavy equipment during the demolition and construction activities, the exhaust from construction activities would be a temporary single source of GHG generated by the proposed project over pre-project conditions. The nature of the proposed project is not indicative of potential long-term air emissions and increases in greenhouse gases. The increase in GHG emissions due to construction and demolition activities would be short-term and would not exceed the 25,000 metric tons of carbon dioxide (CO<sub>2</sub>)-equivalent GHG emissions' threshold.

GHG emissions and any effects on global climate change would not be cumulatively significant considering the amount of GHG emissions generated by the project and the current local air quality conditions. The proposed project is consistent with the USFWS Climate Change Strategy's goals and objectives, including the promotion of habitat connectivity and integrity. The removal of the dam will restore a contiguous block of stream habitat, facilitating the movement of fish species (USFWS/USDI, 2010).

Opportunities for reducing GHG emissions from construction equipment and associated fuel consumption are addressed in the mitigation below. The proposed project would not conflict with any identified plans adopted for the reduction of GHG emissions. Therefore, relative to GHG emissions, the proposed project would result in less than significant impacts.

The following measures would be implemented to avoid and minimize impacts to air quality and to mitigate potentially significant impacts to air quality to less than significant levels:

**AIR-1:** The USFWS will implement a dust control program to limit fugitive dust and particulate matter emissions associated with demolition and construction activities and travel to and from the project site. The dust control program will include the following elements as appropriate:

- Soil-disturbing activities will minimize disturbance to reduce the amount of bare soil exposed at any one time.
- Travel on unpaved dirt roads will be limited to 10 miles per hour, to minimize dust emissions.

**AIR-2:** The following TCAPCD Standard Mitigation Measures for Construction Equipment will be implemented as part of the proposed project during construction activities:

- Maintain all construction equipment in proper tune according to manufacturer's specifications.
- Maximize to the extent feasible, the use of diesel construction equipment meeting the CARB's 1996 or newer certification standard for off-road heavy-duty diesel engines.
- If required by the TCAPCD, verify that owners or operators of vehicles are registered with the CARB DOORS program: ([www.arb.ca.gov/msprog/ordiesel/ordiesel.htm](http://www.arb.ca.gov/msprog/ordiesel/ordiesel.htm)). The DOORS program assists fleet owners in reporting their off-road diesel vehicle inventories to reduce vehicle emissions, as required by the In-Use Off-Road Diesel Regulation.
- If required by the TCAPCD, verify that owners or operators of portable engines and certain other types of equipment are registered under the CARB Statewide Portable Equipment Registration Program (PERP) in order to operate their equipment throughout California without having to obtain individual permits from local air districts: ([www.arb.ca.gov/portable/portable.htm](http://www.arb.ca.gov/portable/portable.htm)).

## 3.4 Biological Resources

### 3.4.1 Vegetation and Plant Communities

#### 3.4.1.1 Affected Environment

The predominant vegetation type in the upland portions of the project area is Mixed Foothill Woodland with smaller inclusions of Chaparral, scattered openings of Annual Grassland and rock outcrop (Barren) (Figure 12). Mixed Riparian Woodland / Scrub vegetation is supported by the active channel and floodplain of South Fork Cottonwood Creek. Emergent wetland vegetation is associated with the immediate edge of the creek, the irrigation ditch, and the excavated pond near the residence. A list of all plant species encountered during site surveys is included as Appendix C.

##### Mixed Foothill Woodland

This woodland type dominates upland slope and terrace habitats in the project area and intergrades with shrub-dominated Chaparral. The woodland corresponds closest to the *Pinus sabiniana* Woodland Alliance of Sawyer et al. (2009). Species composition varies by site, but is generally comprised of a closed, to relatively open canopy of trees, dominated by emergent foothill pine (*Pinus sabiniana*). Other trees include interior live oak (*Quercus wislizenii*) and occasional canyon live oak (*Quercus chrysolepis*). The shrub component varies by site, but generally includes elements of the surrounding chaparral assemblage, including chamise (*Adenostoma fasciculatum*) and scattered scrub oak (*Quercus berberidifolia*), big manzanita (*Arctostaphylos manzanita* ssp. *manzanita*), toyon (*Heteromeles arbutifolia*), poison oak (*Toxicodendron diversilobum*), skunkbrush (*Rhus aromatica*), birch-leaved mountain mahogany (*Cercocarpus betuloides* var. *betuloides*), buckbrush (*Ceanothus cuneatus*), hoary coffeeberry (*Frangula tomentella* ssp. *tomentella*), holly-leaved redberry (*Rhamnus illicifolia*). In places where the tree canopy and / or shrub layer is densest, the herbaceous understory is depauperate to lacking. Openings and edges support a varied mix of grasses and forbs.

##### Chaparral

This shrub-dominated vegetation type occurs in uplands in the project area and intergrades with mixed foothill woodland, with annual grassland in openings and along edges, and with rock outcrops along the ridge and steeper canyon walls. This shrubland best corresponds to the *Adenostoma fasciculatum* Shrubland Alliance and in places perhaps, to the *Quercus berberidifolia* Alliance of Sawyer et al. (2009). Species composition varies by site, but generally includes chamise, either growing in pure stands, or with shrub species already mentioned for mixed foothill woodland. Where the shrub canopy is best developed, herbaceous understory species are completely lacking. Openings and edges support grasses and forbs (see annual grassland description). Other species include chaparral honeysuckle (*Lonicera interrupta*), coffee fern (*Pellea andromedifolia*), California bird's-foot fern (*Pellea mucronata* var. *californica*), gold-backed fern (*Pentagramma triangularis* ssp. *triangularis*), naked-stemmed buckwheat (*Eriogonum nudum*), chaparral buckwheat (*Eriogonum dasyanthemum*), Wright's buckwheat (*Eriogonum wrightii* var. *trachygonum*), California fuchsia (*Epilobium canum* ssp. *latifolium*), pallid mountain monardella (*Monardella odoratissima* ssp. *pallida*) and globe gilia (*Gilia capitata*). Native perennial grasses include one-sided bluegrass (*Poa secunda* ssp. *secunda*), California melic (*Melica californica*) and Torrey's melic (*Melica torreyana*). Other herbaceous species present are shared with the annual grassland assemblage.

### Annual Grassland

This plant community occurs in small openings and along edges of chaparral and mixed foothill woodland. Depending on the site it best corresponds to the *Bromus (diandrus, hordeaceus)-Brachypodium distachyon* semi-natural stand of Sawyer et al. (2009). Non-native annual grasses include soft chess (*Bromus hordeaceus*), foxtail chess (*Bromus madritensis*), ripgut (*Bromus diandrus*), poverty brome (*Bromus sterilis*), silver European hairgrass (*Aira caryophyllea*), and rattail fescue (*Festuca myuros*). Native grasses include few-flowered fescue (*Festuca microstachys*) and in a few places, one-sided bluegrass and California melic. Frequently occurring forbs include grasspink (*Petrorhagia dubia*), narrow-leaved logfia (*Logfia gallica*) and crosswort (*Crucianella angustifolia*).

### Mixed Riparian Woodland / Scrub

This woodland type is associated with the banks and in places, adjacent low terraces along South Fork Cottonwood Creek. Composition varies by location. Along the upper banks and immediately adjacent terrace, depending on the site and scale of consideration, this type corresponds to the *Alnus rhombifolia* Woodland Alliance, and along immediate banks and where larger trees are lacking, to the *Salix exigua* and *S. lasiolepis* Shrubland Alliances of Sawyer et al. (2009). Trees include white alder (*Alnus rhombifolia*) and red willow (*Salix laevigata*). Saplings of Fremont cottonwood (*Populus fremontii*) are also present. Shrubs and subshrubs include sandbar willow (*Salix exigua*), arroyo willow (*Salix lasiolepis*), red willow, dusky willow (*Salix melanopsis*), mule fat (*Baccharis salicifolia*), California rose (*Rosa californica*), western spicebush (*Calycanthus occidentalis*), hoary coffeeberry and California brickellbush (*Brickellia californica*). Vines included California grape (*Vitis californica*), California blackberry (*Rubus ursinus*) and virgins-bower (*Clematis ligusticifolia*). Himalayan blackberry (*Rubus armeniacus*) is abundant in places. Herbaceous species observed include mugwort (*Artemisia douglasiana*), torrent sedge (*Carex nudata*), Baltic rush (*Juncus balticus* ssp. *ater*), blunt-scale rush (*Juncus covillei*), Klamath rush (*Juncus. exiguus*), iris-leaved rush (*Juncus xiphioides*), American wild mint (*Mentha arvensis*), Indian hemp (*Apocynum cannabinum*), western goldenrod (*Euthamia occidentalis*), Spanish lotus (*Acemison americanus* var. *americanus*), white sweet-clover (*Melilotus albus*), California goldenrod (*Solidago velutina* ssp. *californica*), rigid hedge nettle (*Stachys rigida* var. *rigida*), fringed willowherb (*Epilobium ciliatum*), Indian milkweed (*Asclepias eriocarpa*), narrow-leaved milkweed (*Asclepias fascicularis*), Canadian horseweed (*Erigeron canadensis*), blue wild rye (*Elymus glaucus* ssp. *g.*), tall wheatgrass (*Elymus ponticus*), English plantain (*Plantago lanceolata*), deer grass (*Muhlenbergia rigens*), panicgrass (*Panicum acuminatum* ssp. *acuminatum*), durango-root (*Datisca glomerata*), common horsetail (*Equisetum hyemale* ssp. *affine*), smooth scouring-rush (*E. laevigatum*), and cattail (*Typha domingensis* or *T. angustifolia*).

### Emergent Wetland

Small areas of Emergent Wetland are associated with the immediate margins of South Fork Cottonwood Creek, the irrigation ditch and the excavated pond. Depending on the site, this vegetation best corresponds to the *Carex nudata* Herbland Alliance of Sawyer et al. (2009). In addition to torrent sedge, deer grass and some species previously mentioned under mixed riparian woodland / scrub, plant species near the water's edge include scarlet monkey-flower (*Mimulus cardinalis*), downy mimetanthe (*Mimulus pilosus*), stream orchid (*Epipactis gigantean*) and wavy-leaved pondweed (*Potamogeton crispus*).

### Invasive Plant Species

Because of the remote location of the proposed project, very few exotic (non-native) woody (and semi-woody) plant species have become established in the area. Himalayan blackberry and edible fig (*Ficus carica*) are present in riparian habitats along South Fork Cottonwood Creek and a single giant reed

(*Arundo donax*) plant is present near the residence. As is typical in the Central Valley and foothills of northern California, a significant number of exotic herbaceous species are present (Appendix C), however the number of these species is still significantly lower than what would be expected in a less remote area.

### 3.4.1.2 Environmental Consequences / Impacts and Mitigation Measures

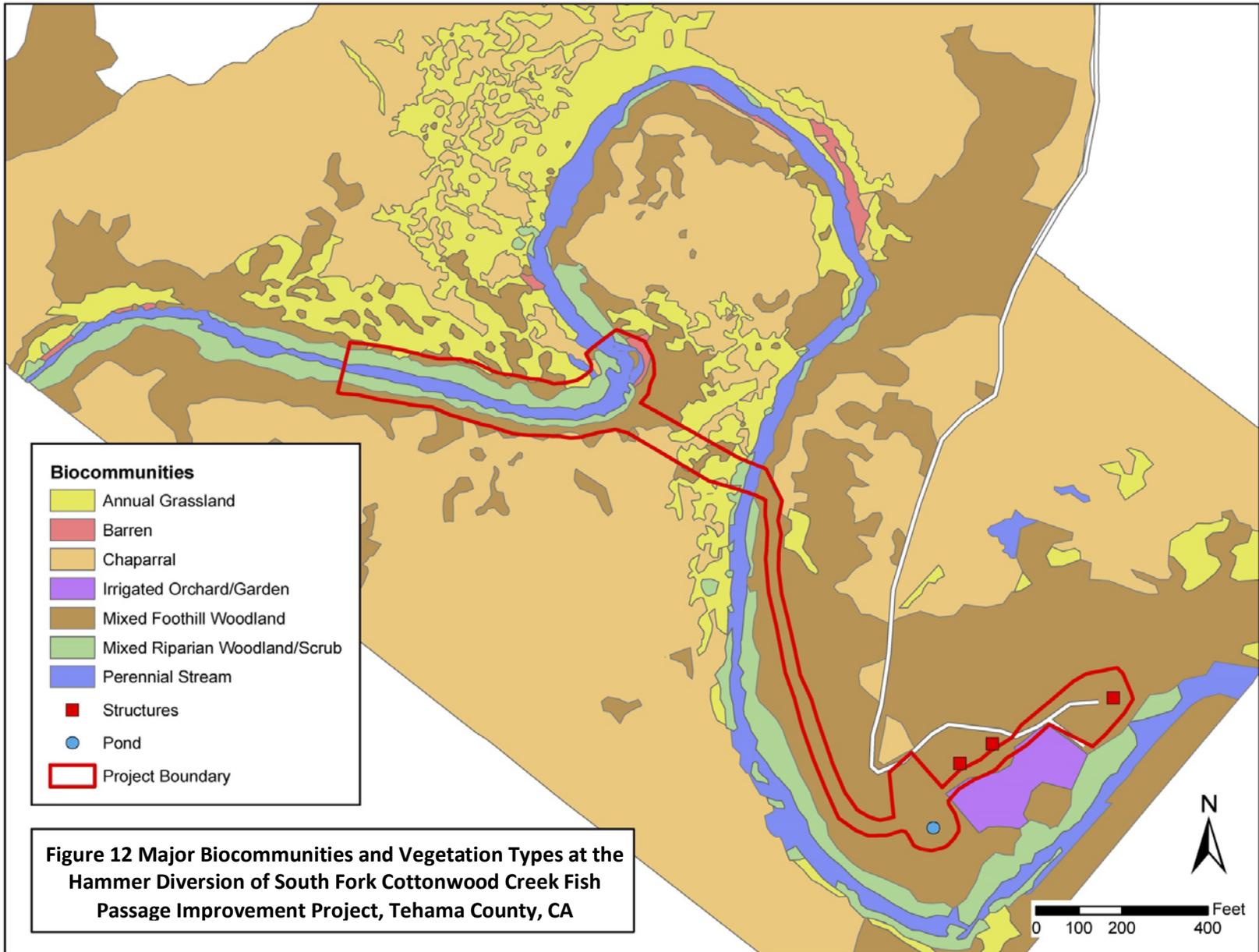
#### Methodology

The assessment of potential impacts of the proposed project on vegetation and plant communities is based on a review of databases and pertinent literature, consultation with resource agency staff, and field studies that are documented in a *Survey for Special-status Vascular Plant Species* (Dittes & Guardino 2013) that was prepared for the proposed project. This document is available on the Red Bluff Fish and Wildlife Office website on the AFRP webpage (<http://www.fws.gov/redbluff/afrp.html>). A preliminary investigation was performed that included a query of the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (CNPS 2013) for Tehama County. The California Natural Diversity Data Base (CNDDB) (CDFW 2013a) was also queried for special-status plant species from the USGS Raglin Ridge 7.5' quadrangle, in which the project is located, along with the eight adjoining quadrangles (Cold Fork, Tomhead Mountain, South Yolla Bolly, Ball Mountain, Riley Ridge, Paskenta, Lowry and Oxbow Bridge). In addition, the Consortium of California Herbaria (Regents of University of California 2013) was queried for special-status plant species potentially recorded from the vicinity, but not included in the CNDDB. The results of these database queries were used, along with consideration of site location and habitat (including parent material / soils), to compile a list of vascular plant species with potential to occur in the project area (Appendix D).

Field surveys were conducted by Dittes & Guardino Consulting staff on August 15, 2013. An intuitive-controlled survey was performed within the project site. The dam site was surveyed, including the lower canyon walls in the vicinity of the dam abutments and intake structure. The stream corridor was also surveyed upstream approximately 500 feet and approximately 250 feet downstream. In addition, the entire ditch system was surveyed on foot as were the lower access main road and vicinity of residential area. All plant species encountered were identified to the taxonomic level necessary to determine legal status and scientific significance.

An impact related to Vegetation and Plant Communities would be significant if the project would:

- a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the CDFW Does is change here? or USFWS;
- b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFW Change? or USFWS;
- c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.



The thresholds of significance listed above will be used to evaluate the potential for significant impacts on all of the remaining biological sections including Wildlife, Wetlands and Other Jurisdictional Waters of the U.S., and Fisheries.

### **No Action Alternative**

Under this alternative, no project activities would occur, therefore no impacts would occur to special-status plant species or existing vegetation, and no additional exotic plant species would potentially become established at the site.

### **Proposed Action Alternative**

Under this alternative, no direct or indirect impacts to any special-status plant species would occur. No special-status plant species were detected during 2013 field surveys, which were conducted at a time of year when any potential-occurring species would have been identifiable. Serpentine substrates, which can support a significant number of special-status plant species, are not present at the project site.

Indirect impacts to riparian vegetation upstream from the dam may occur due to changes in the topographic-hydrologic profile of the post-construction streambed elevation / grade. This is considered a potentially significant impact.

Invasive exotic plant species could potentially be introduced to the project area by the importation of plant seeds and tissues during the mobilization of equipment and could be spread by movement of equipment from one location to another within the project area. This is considered a potentially significant impact.

There are no adopted habitat conservation plans, natural community conservation plans or other conservation plans in the project area. The proposed project would not be in conflict with any local policies or ordinances protecting biological resources.

The following measures would be implemented to avoid and minimize impacts to vegetation and plant communities and to mitigate potentially significant impacts to vegetation and plant communities to less than significant levels:

**VEGETATION-1:** Disturbance to existing vegetation will be avoided or minimized to the extent possible.

**VEGETATION-2:** Disturbance to riparian vegetation will be avoided or minimized to the extent possible.

**VEGETATION-3:** All heavy equipment shall be thoroughly cleaned prior to mobilization to the project site to remove any soil, weed seeds and plant parts to reduce the importation and spread of invasive exotic plant species.

**VEGETATION-4:** Only certified weed-free straw shall be used for erosion control or other purposes to reduce the importation and spread of invasive exotic plant species.

**VEGETATION-5:** A riparian wetland planting plan will be prepared to replace impacted riparian wetlands by a measure of quantity and quality equal to or exceeding impacts of the project using appropriate native riparian trees and shrubs.

**VEGETATION-6:** Following the initial winter flows after dam removal, the area along the new low water line upstream of the former dam, and new point bars formed immediately downstream of the former dam will be revegetated in accordance with the riparian wetland planting plan.

## 3.4.2 Wildlife

### 3.4.2.1 Affected Environment

Four habitat types generally occur within the proposed project site as defined by the California Wildlife-Habitat Relationships (WHR) classification system (Mayer & Laudenslayer 1988). The habitat types include: Mixed Chaparral, Valley Foothill Riparian, Riverine, and Fresh Emergent Wetland habitats. The wildlife that potentially inhabit the area are those species that would normally be expected to use these habitats for food, shelter and cover within the general region (foothills of the Coastal Range). A list of all wildlife species observed during site surveys is included as Appendix E.

A Biological Resources Evaluation (BRE) (TES 2014a) was conducted to identify and address potential impacts of the proposed project on special-status wildlife species. This document is available on the Red Bluff Fish and Wildlife Office website on the AFRP webpage (<http://www.fws.gov/redbluff/afrp.html>). An evaluation of the potential presence of special-status species is included in Appendix F. Based on the results of the evaluation in Appendix F, the BRE further evaluated the potential impacts of the proposed project on those species with the potential to occur within, or near the proposed project site. Based on that further evaluation, the following special-status wildlife species, or groups of species, are known to, likely to, or may occur within the project area, and could potentially be impacted by the proposed project:

- Western Pond Turtle (*Emys marmorata*)
- California Red-legged Frog (*Rana draytonii*)
- Foothill Yellow-legged Frog (*Rana boylei*)
- Yellow Warbler (*Dendroica petechia brewsteri*)
- Yellow-breasted Chat (*Icteria virens*)
- Loggerhead Shrike (*Lanius ludovicianus*)
- Other Nesting Raptors
- Other Nesting Migratory Birds
- Pallid Bat (*Antrozous pallidus*)
- Townsend's Big-eared Bat (*Corynorhinus townsendii*)

One of these species (California red-legged frog) is federally listed as Threatened. Under Section 7 of the ESA, federal agencies are required to consult with the USFWS regarding impacts from a proposed action to listed species or species proposed for listing, and their designated Critical Habitat (CH). A Biological Assessment (BA) (TES 2014b) has been prepared and consultation with the USFWS will occur.

#### Western Pond Turtle

The western pond turtle is designated as a CDFW Species of Special Concern. Population declines are attributed to impacts to nesting habitat, nest and juvenile predation by non-native aquatic species, human-induced predator population increases and historic human overexploitation (Jennings and Hayes 1994). This species inhabits quiet waters of ponds, lakes, streams, etc., where there are rocks or logs for basking and safe underwater retreat areas (Stebbins 1972). They are closely tied to water except when females move overland to lay eggs or when either sex may move overland to upland sites to overwinter. They may overwinter on land or in water but are thought to be more likely to overwinter in water when inhabiting pond habitats. Egg-laying typically occurs in May and June but can occur from late April to early August, while overwintering generally begins in October or November (Jennings and Hayes 1994). Hatchlings are thought to overwinter in the nest and emerge to migrate to aquatic habitats the following spring (Jennings and Hayes 1994). The aquatic habitats within South Fork Cottonwood Creek and the

storage pond provide favorable habitat for this species. Adult and juvenile turtles were observed during site surveys in both of these habitats.

### California Red-legged Frog

The California red-legged frog was federally-listed as Threatened in 1996. CH was designated in 2006. The species is also designated as a CDFW Species of Special Concern. This species inhabits aquatic habitats below 3,500 feet in elevation within a matrix of riparian and upland habitats for dispersal (USFWS 2002). Breeding generally occurs in November through April in permanent to nearly permanent aquatic habitats with dense, woody or emergent herbaceous vegetation along the shorelines with deep (>2 feet) slow-moving water (Jennings and Hayes 1994). Declines in populations have been attributed to commercial overexploitation, habitat destruction by human activities and livestock grazing, and the introduction of exotic competitors such as bullfrogs (*Rana catesbeiana*) and green sunfish (*Lepomis cyanellus*) (Jennings and Hayes 1994).

Potential habitat for this species is present within the study area. Marginal habitat is present in the South Fork of Cottonwood Creek due to the generally high gradient of the stream and lack of emergent wetland backwater or other pond-type habitats. The emergent wetland habitat associated with the storage pond represents higher quality potential habitat, however the habitat is somewhat marginal due to the presence of bass (*Micropterus sp.*) and bluegill (*Lepomis macrochirus*). The project site is not located within designated critical habitat but is located within a core recovery area (Cottonwood Creek) identified in the recovery plan for this species (USFWS 2002). A detection of this species within approximately eight miles of the project site is reported in the CNDDDB from the 1980s (CDFW 2013a), however subsequent surveys have failed to detect them (Fellers 2007) and there are questions as to whether this observation may have been mistaken for the foothill yellow-legged frog (J. Karuzas pers comm.). Three diurnal surveys and one nocturnal survey were conducted at the project site using established protocols (USFWS 2005) in 2013. No individuals were observed during these surveys, however a full set of protocol-level surveys have not been conducted.

### Foothill Yellow-legged Frog

The foothill yellow-legged frog is designated as a CDFW Species of Special Concern. The main reported threat to the species is predation by introduced aquatic predators including fish and bullfrogs (Jennings and Hayes 1994). This species inhabits shallow flowing water in small to moderate-sized streams with some cobble-sized substrate (Jennings and Hayes 1994) in a variety of habitats including valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, coastal scrub, mixed chaparral and wet meadow from sea level to 6,000 feet in elevation (Ziener et al. 1988). Breeding occurs following the end of spring flooding from mid-March to May (Ziener et al. 1988). Adults forage on aquatic and terrestrial invertebrates and are rarely found far from permanent water (Ziener et al. 1988). All aquatic habitats within the project site provide potential habitat for this species. Numerous foothill yellow-legged frogs were observed in all aquatic habitats with the exception of the storage pond. The absence of observations in the pond may be due to the presence of bass and bluegill.

### Yellow Warbler

The yellow warbler is designated as a CDFW Species of Special Concern. Threats to the species include destruction of riparian habitat and nest parasitism by brown-headed cowbirds (*Molothrus ater*) (Remsen 1978). Numbers of breeding pairs have declined dramatically in recent decades in lowland areas. Yellow warblers are neotropical migrant songbirds that nest in riparian woodlands as well as in montane chaparral and in the shrubby understory of ponderosa pine and mixed conifer forests (Zeiner et al. 1990a,

Shuford and Gardali 2008). They nest from mid-April into early August, with peak nesting activity in June, and forage on insects, spiders and occasionally berries (Zeiner et al. 1990a). No yellow warblers were observed during site surveys, however potential nesting and foraging habitat is present in riparian habitat within the study area.

#### Yellow-breasted Chat

The yellow-breasted chat is designated as a CDFW Species of Special Concern. Threats to the species include destruction of riparian habitat and nest parasitism by brown-headed cowbirds (Remsen 1978). Yellow-breasted chats are neotropical migrant songbirds that nest in dense shrubs along streams and rivers and require dense, brushy thickets and tangles near water for cover. They nest from early May to early August with peak nesting activity in June; and they forage on insects, spiders, berries and other fruit (Zeiner et al. 1990a). No yellow-breasted chats were observed during site surveys, however potential nesting and foraging habitat is present in riparian habitat within the study area.

#### Loggerhead Shrike

The loggerhead shrike is designated as a CDFW Species of Special Concern. Potential threats and reasons for population declines are not well-documented for this species. Loggerhead shrikes construct nests in dense foliage in trees or shrubs in areas with open habitat and scattered shrubs, trees, or other perches. They are found primarily in valley foothill hardwood, hardwood-conifer and riparian habitats, as well as pinyon-juniper, juniper, desert riparian Joshua tree habitats (Zeiner et al. 1990a). Nesting occurs from March into May, with young becoming independent in July and August (Zeiner et al. 1990a). They feed primarily on large insects but also take small birds, mammals, amphibians, reptiles, fish, carrion and other invertebrates (Zeiner et al. 1990a). No loggerhead shrikes were observed during site surveys, however potential nesting and foraging habitat is present in riparian and upland habitats within the study area.

#### Nesting Raptors

Nesting habitat exists within, and near the project site for several raptor species (eagles, hawks, and owls) protected under several sections of the California Fish and Game Code. Several raptor species were observed during site surveys (Appendix E). A number of additional raptor species, while not observed, may potentially nest within, or near the project site. Several medium-sized nests were observed within, or in the vicinity of, the study area that could potentially serve as raptor nests.

#### Other Nesting Migratory Birds

Nesting habitat exists within the project site for a number of migratory bird species that are not identified by CDFW as special-status species, but are protected under the federal Migratory Bird Treaty Act. A number of migratory bird species were observed during site surveys (Appendix E). A number of additional migratory bird species, while not observed, may potentially nest within, or near the project site.

#### Pallid Bat

The pallid bat is designated as a CDFW Species of Special Concern. Threats to the species include destruction and disturbance of roosting sites which include caves, crevices, mines, and occasionally, hollow trees and buildings (Zeiner et al. 1990b). This species is most common in open, dry areas near rocky sites for roosting in a wide variety of habitats including grasslands, shrublands, woodlands and forests from sea level up through mixed conifer forests (Zeiner et al. 1990b). Females give birth in the

early summer in nursery colony roosts and the young are not weaned until the fall. Pallid bats feed on large arthropods including scorpions, cicadas, katydids, beetles, crickets, grasshoppers, praying mantids and moths (Bolster et al. 1998). Pallid bats were detected foraging within the study area during site surveys and may be roosting in outbuildings or in the diversion tunnel within the study area.

#### Townsend's Big-eared Bat

The Townsend's big-eared bat was listed as a Candidate for listing as Endangered or Threatened by the State of California on December 11, 2013. The main threat to this species is roost loss due to human disturbance, mine closure and renewed mining in abandoned mines. Townsend's big-eared bats occur in a variety of habitats but are more common in mesic sites (Williams 1986). Roosting sites include caves, lava tubes and mine tunnels, as well as other human-made structures such as buildings, bridges and water diversion tunnels. Roosting sites are extremely sensitive to human disturbance and can be abandoned due to a single human visit (Zeiner et al. 1990b), however in some instances it can become habituated to reoccurring and predictable human activity (CDFW 2013b). Females give birth from May to July in nursery colony roosts and the young are generally weaned by August. Townsend's big-eared bats feed primarily on large moths but also take small numbers of other insects (Bolster et al. 1998). Several Townsend's big-eared bats were observed day-roosting in small overhead domes within the diversion tunnel during site surveys.

### **3.4.2.2 Environmental Consequences / Impacts and Mitigation Measures**

#### **Methodology**

The assessment of potential impacts of the proposed project on wildlife is based on a review of databases and pertinent literature, consultation with resource agency staff, and field studies that are documented in a BRE (TES 2014a) and a BA (TES 2014b) that were prepared for the proposed project. Prior to the initiation of field studies, a records search of the CNDDDB (CDFW 2013a) was conducted to determine if any special-status wildlife species, or rare terrestrial natural communities had previously been documented within the study area, or in the vicinity of the study area. The query was conducted using the USGS Raglin Ridge 7.5' quadrangle, in which the project is located, as well as the eight adjoining quadrangles (Cold Fork, Tomhead Mountain, South Yolla Bolly, Ball Mountain, Riley Ridge, Paskenta, Lowry and Oxbow Bridge). In addition, a species list was generated using the USFWS Sacramento Fish and Wildlife Office website (USFWS 2014) for the Raglin Ridge quadrangle and the Cold Fork quadrangle, which lies just to the north of the project.

Based on the results of the CNDDDB and USFWS database searches, and TES's staff knowledge of the site and local area, a list of potentially occurring special-status wildlife species and terrestrial natural communities was developed for the proposed project, as well as an evaluation of their potential presence (Appendix F). For the purposes of this evaluation, special-status species were defined as:

1. Those species listed by the USFWS or NMFS as Endangered, Threatened, Proposed as Endangered or Threatened, Candidate to become Proposed, or Species of Concern.
2. Those species listed by the CDFW as Endangered, Threatened, Candidate for listing as Endangered or Threatened, Species of Special Concern, or Fully Protected.

Field surveys were conducted on August 14, August 15, and August 16, 2013, by TES staff. Additional observations were made during work conducted at the project site for other purposes in August and September of 2013. The study area included the entire project footprint, as well as an approximately 200-foot surrounding buffer area. The surveys were conducted by walking the entire study area and recording direct wildlife observations. Observations were made using the unaided eye, binoculars and

identification of vocalizations. Other methods included vocal solicitations and observations of animal tracks, scat and bird feathers. With the exception of partial protocol-level California red-legged frog surveys, no other protocol-level wildlife surveys were conducted.

In addition, to survey for bat species, two Pettersson DX-500 full-spectrum, ultrasound, acoustical recording devices were deployed during the evening hours of August 14 and August 15, 2013. The survey was performed at a time of year that was favorable for detection of all bat species that could potentially occur at the site. The recording devices were deployed at different locations each evening for a total of four different locations in order to sample varying habitats. The habitats sampled included riparian / riverine, an upland ridge top and an area near several outbuildings. The sampling occurred from approximately sundown to sunrise the following morning. Once recorded, the potential bat calls were then analyzed using SonoBat™ 3.1 software to identify calls to the species level. Only those calls, for which the software was able to reach a consensus decision, were used to generate a bat species list for the survey results (Appendix E).

The list of species evaluated in this document were derived as a result of further evaluations in the BRE of potential impacts to the list of potentially-occurring special-status wildlife species in Appendix F.

### **No Action Alternative**

Under this alternative, there would be no impacts to wildlife, including special-status wildlife species because the project would not be implemented. Some restrictions of movement upstream and downstream of the diversion dam would continue to occur for amphibians and western pond turtles. Some disturbance of Townsend's big-eared bats, and potentially other bat species such as the pallid bats would continue to occur as a result of periodic maintenance that occurs within the diversion tunnel.

### **Proposed Action Alternative**

#### Western Pond Turtle

Under this alternative, western pond turtles could be harmed or killed if they were present within the project area during dam demolition activities including blasting impacts or during ditch piping activities. This is considered a potentially significant impact.

Beneficial impacts would result from the removal of the diversion structure which would provide turtles with unrestricted movement upstream and downstream of the site.

#### California Red-legged Frog

Under this alternative, California red-legged frogs could be harmed or killed if they were present within the project area during dam demolition activities including blasting impacts or during ditch piping activities. Based on all the information presented in Section 3.4.2.1 of this document, there is a low likelihood that California red-legged frogs are present at the project site. However, in the absence of a full set of protocol-level surveys, their potential presence cannot be ruled out. This is considered a potentially significant impact.

As a result of the anticipated physical adjustments to the stream channel upstream of the current dam location, some of the woody riparian habitat that has become established along the reservoir margin will likely be lost. It is estimated that approximately 50 percent of the 0.65 acres of riparian wetland that was identified in a preliminary wetland delineation (Figure 13) conducted for the project (TES 2013b) may be lost as a result of the lowering of the low water elevation. This would result in a temporary loss of

potential resting and feeding habitat for California red-legged frogs. This is considered a potentially significant impact.

#### Foothill Yellow-legged Frog

Under this alternative, foothill yellow-legged frogs could be harmed or killed if they were present within the project area during dam demolition activities including blasting impacts or during ditch piping activities. This is considered a potentially significant impact.

#### Yellow Warbler

Under this alternative, project activities could cause nest abandonment if active yellow warbler nests were present in the project vicinity. Potential activities that could cause nest abandonment include people and equipment working at the dam site and noise from blasting activities. This is considered a potentially significant impact.

#### Yellow-breasted Chat

Under this alternative, project activities could cause nest abandonment if active yellow-breasted chat nests were present in the project vicinity. Potential activities that could cause nest abandonment include people and equipment working at the dam site and noise from blasting activities. This is considered a potentially significant impact.

#### Loggerhead Shrike

Under this alternative, project activities could cause nest abandonment if active loggerhead shrike nests were present in the project vicinity. Potential activities that could cause nest abandonment include vegetation removal, people and equipment working throughout the project site and noise from blasting activities. This is considered a potentially significant impact.

#### Nesting Raptors

Under this alternative, project activities could cause nest abandonment if active raptor nests were present in the project vicinity and project. Potential activities that could cause nest abandonment include vegetation removal, people and equipment working throughout the project site and noise from blasting activities. This is considered a potentially significant impact.

#### Other Nesting Migratory Birds

Under this alternative, project activities could cause nest abandonment if active migratory bird nests were present in the project vicinity. Potential activities that could cause nest abandonment include vegetation removal, people and equipment working throughout the project site and noise from blasting.

#### Pallid Bat

Under this alternative, project activities could cause pallid bats to abandon their roost or awaken from winter hibernation if bats were using the diversion tunnel for maternity activities or as a winter roost. Disturbance to maternity roosts, can cause bats to abandon their young, causing mortality. Bats that are awakened from winter hibernation tend to expend excess energy, which can cause a significant decrease in fat reserves, which can eventually lead to a decrease in condition, and potential mortality. Potential activities that could cause roost abandonment or awakening from winter hibernation include the

installation of the new pumping plant and intake system at the inlet of the tunnel. This is considered a potentially significant impact.

#### Townsend's Big-eared Bat

Under this alternative, project activities could cause Townsend's big-eared bats to abandon their roost or awaken from winter hibernation if bats were using the diversion tunnel for maternity activities or as a winter roost. Disturbance to maternity roosts, can cause bats to abandon their young, causing mortality. Bats that are awakened from winter hibernation tend to expend excess energy, which can cause a significant decrease in fat reserves that can eventually lead to a decrease in condition, and potential mortality. Potential activities that could cause roost abandonment or awakening from winter hibernation include in the installation of the new pumping plant and intake system at the inlet of the tunnel. This is considered a potentially significant impact.

There are no adopted habitat conservation plans, natural community conservation plans or other conservation plans in the project area. The proposed project would not be in conflict with any local policies or ordinances protecting biological resources.

The following measure would be implemented to avoid and minimize impacts to wildlife and to mitigate potentially significant impacts to wildlife to less than significant levels:

**WILDLIFE-1:** Prior to dam removal and any dewatering /water diversion activities, water bodies shall be surveyed by a qualified biologist to determine if any foothill yellow-legged frogs or western pond turtles are present. If any individuals of these species are found, a qualified and permitted biologist shall determine and implement appropriate relocation procedures. Herpetological exclusion fencing shall be erected around the perimeter of the in-stream work area prior to construction initiation. Fencing shall remain until work in sensitive areas is complete.

**WILDLIFE-2:** A biologist experienced in the identification of amphibian species (particularly *Rana* species) will ensure that no California red-legged frogs are present within any of the disturbance areas. If any California red-legged frogs are found to be present, all potentially disturbing construction activities will be suspended until appropriate protective measures can be developed in consultation with USFWS ESA staff.

**WILDLIFE-3:** Measures **VEGETATION-2**, **VEGETATION-5** and **VEGETATION-6** associated with the avoidance and restoration of riparian vegetation will be fully implemented.

**WILDLIFE-4:** Measures **WATER-4** through **WATER-6** associated with minimizing impacts to water quality will be fully implemented.

**WILDLIFE-5:** Any tree removal, vegetation disturbance and/or the onset of potentially disturbing construction activities should occur between August 1 and February 1 (outside of the combined breeding season for songbirds, raptors and other migratory bird species).

**WILDLIFE-6:** If tree removal, vegetation clearing, or the onset of potentially disturbing construction activities must occur during the nesting season, a nesting survey of the construction area and adjacent suitable habitat should be conducted by a qualified biologist no more than seven days prior to the initiation of the onset of these activities. If active bird nests are found to be present, tree removal, vegetation clearing and the onset of potentially disturbing construction activities shall be suspended until a qualified biologist, in consultation with CDFW can establish an appropriate protective buffer area to minimize impacts to the nesting birds. No construction activities should commence within the buffer area until the qualified biologist determines that the young birds have fledged or the nest is no longer active.

**WILDLIFE-7:** Prior to any construction work at the diversion tunnel inlet, a bat survey of the diversion tunnel shall be conducted by a qualified biologist to ensure that pallid bats or Townsend’s big-eared bats are not roosting in the tunnel.

**WILDLIFE-8:** If pallid bats or Townsend’s big-eared bats are found to be roosting in the diversion tunnel, a qualified biologist shall be on site during all construction activities at the diversion tunnel inlet to observe the roosting bat’s behavior and ensure that construction activities are not causing the bats to be significantly disturbed. If the biologist determines that construction activities are causing the bats to be significantly disturbed, all construction activities at the diversion tunnel inlet shall be suspended until the biologist, in consultation with the California Department of Fish and Wildlife, can establish appropriate measures to minimize impacts to these species.

**WILDLIFE-9:** A construction worker education program shall be implemented that includes an explanation of all special-status animal species, identification, avoidance measures, and federal and state laws that protect the species. This shall include, at a minimum, those species described above.

### 3.4.3 Wetlands and Other Jurisdictional Waters of the U.S.

#### 3.4.3.1 Affected Environment

Wetlands and other potentially jurisdictional waters of the U.S. (other waters) are limited in the general project region to areas within, and adjacent to streams due to the steep topography and generally dry nature of the area. Wetlands and other waters are present within the project area, associated with South Fork Cottonwood Creek and human-made features associated with the ditch system that carries the water diverted by the Hammer diversion. Table 2 presents the acreage of wetlands and other waters identified within the proposed project site followed by a description of the wetlands and other waters that are present within the project site.

<b>Table 2. Summary Of Preliminary Delineated Waters Of The U. S. Hammer Diversion On South Fork Cottonwood Creek Fish Passage Improvement Project</b>	
<b>Wetlands</b>	<b>Total Acreage</b>
Fresh Emergent Wetland / Open Water	0.13
Riparian Wetland	0.65
<b>Total Wetlands</b>	<b>0.78</b>
<b>Other Waters</b>	<b>Total Acreage</b>
Perennial Stream	0.81
Ditch	0.09
<b>Total Other Waters</b>	<b>0.90</b>
<b>TOTAL WATERS OF THE U.S.</b>	<b>1.68</b>

## **Wetlands**

### Riparian Wetland

The riparian wetland features are present on both banks, upstream of the Hammer diversion. These features are dominated by white alder and red willow. Other woody species include Fremont cottonwood, mule fat, narrow-leaved willow, California grape, arroyo willow and Himalayan blackberry. Herbaceous species include deergrass, torrent sedge and mugwort.

### Fresh Emergent Wetland / Open Water

A fresh emergent wetland is present in a small pond that received and stores water from the ditch system. This feature is dominated by narrow-leaved cattail, torrent sedge and deer grass. Approximately one-third of the pond appears to be too deep for emergent vegetation and exists as open water.

## **Other Waters of the U.S.**

### Perennial Stream

A perennial stream is present within the channel of South Fork of Cottonwood Creek. The creek channel is primarily devoid of vegetation, but the exposed barren rock and gravel along both banks of the stream support scattered woody and herbaceous species such as willows (*Salix spp.*), white alder, narrow-leaved milkweed, deer grass and torrent sedge.

### Ditch

The ditch system represents potentially jurisdictional waters of the U.S. due to the fact that it carries water from and / or to a jurisdictional feature (perennial stream). The ditches are regularly maintained but do support emergent vegetation in some areas.

## **3.4.3.2 Environmental Consequences / Impacts and Mitigation Measures**

### **Methodology**

A delineation of waters of the U.S. was conducted for the project site in August of 2013 (TES 2013c). This document is available on the Red Bluff Fish and Wildlife Office website on the AFRP webpage (<http://www.fws.gov/redbluff/afrp.html>). The delineation was conducted in accordance with the *1987 Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (U.S. Army Corps of Engineers 2008) using a Routine Determination Method. Based on the results of the delineation, a map of all identified wetlands and other waters was prepared (Figure 13). The map is considered preliminary until it is verified by the U.S. Army Corps of Engineers.

### **No Action Alternative**

Under this alternative, there would be no impacts to wetlands or other waters. The Hammer diversion would remain in place and the pond, ditches and other components of the hydroelectric and irrigation systems would remain in their existing state.

## Proposed Action Alternative

Under this alternative, as a result of the anticipated physical adjustments to the stream channel upstream of the current dam location, some of the riparian wetland features that have become established along the reservoir margin would likely be lost. It is estimated that approximately 50 percent of the 0.65 acres of riparian wetland that was identified in the preliminary wetland delineation may be lost as a result of the lowering of the low water elevation. This is considered a potentially significant impact.

The ditch system and the fresh emergent wetland / open water, associated with the storage pond would be altered due to the fact that the diversion flow would be reduced from approximately three cfs to approximately 0.07 cfs and piping will be installed throughout the ditch system. However, the piping of the ditch system is designed to allow the ditch to continue to carry water for irrigation by burying the pipe in the bottom of the ditch and installing risers so that no loss of potentially jurisdictional waters would occur. A pump would be installed to pump water from the storage pond into a new storage tank to increase the storage capability of the system. However, the ditch would continue to flow into the pond so no loss of fresh emergent wetland or open water would occur.

Beneficial impacts would occur as a result of changes to the perennial stream feature as a result of the removal of the Hammer diversion. The project was designed to restore passage to five miles of perennial stream for Central Valley Steelhead and Central Valley spring-run Chinook salmon. The removal of the dam would also restore perennial stream ecological processes by restoring sediment routing through the project reach. The dam removal would also likely decrease perennial stream water temperatures in the project reach due to the fact that the shallow reservoir pool upstream of the dam currently causes a significant increase in solar heating. In addition, increased flows (2.3 cfs) in approximately 0.43 river miles of perennial stream, downstream of the current dam would improve habitat conditions for salmonids and other native aquatic species.

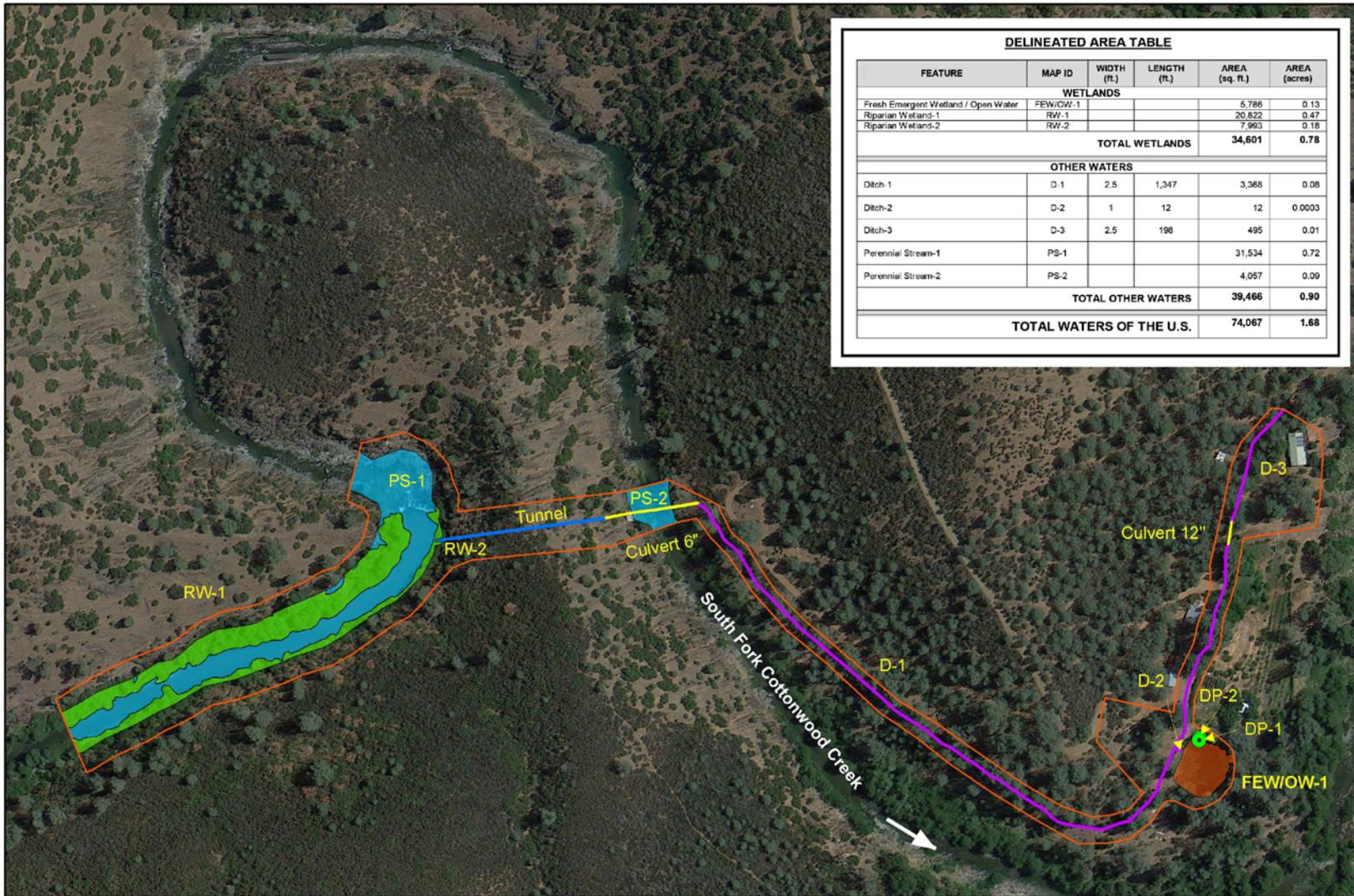
The following measures would be implemented to avoid and minimize impacts to wetlands and other jurisdictional waters of the U.S. and to mitigate potentially significant impacts to wetlands and other jurisdictional waters of the U.S. to less than significant levels:

**WETLAND-1:** Measures **VEGETATION-2, VEGETATION-5** and **VEGETATION-6** associated with the avoidance and restoration of riparian vegetation will be fully implemented.

**WETLAND-2:** Project activities will avoid impacts to wetlands to the extent possible.

**WETLAND-3:** High-visibility fencing will be installed in areas where equipment will be working near any wetlands and/or riparian habitat that are not to be disturbed.

**WETLAND-4:** Construction crews will be informed about the importance of avoiding sensitive areas, including wetlands.



DELINEATED AREA TABLE					
FEATURE	MAP ID	WIDTH (ft.)	LENGTH (ft.)	AREA (sq. ft.)	AREA (acres)
<b>WETLANDS</b>					
Fresh Emergent Wetland / Open Water	FEW/OW-1			5,786	0.13
Riparian Wetland-1	RW-1			20,822	0.47
Riparian Wetland-2	RW-2			7,983	0.18
<b>TOTAL WETLANDS</b>				<b>34,601</b>	<b>0.78</b>
<b>OTHER WATERS</b>					
Ditch-1	D-1	2.5	1,347	3,368	0.08
Ditch-2	D-2	1	12	12	0.0003
Ditch-3	D-3	2.5	198	495	0.01
Perennial Stream-1	PS-1			31,534	0.72
Perennial Stream-2	PS-2			4,057	0.09
<b>TOTAL OTHER WATERS</b>				<b>39,466</b>	<b>0.90</b>
<b>TOTAL WATERS OF THE U.S.</b>				<b>74,067</b>	<b>1.68</b>

**Legend**

- Study Area
- Fresh Emergent Wetland / Open Water
- Riparian Wetland
- Ditch
- Perennial Stream
- Tunnel
- Culvert
- Data Point

**FIGURE 13**  
Preliminary Delineation Map

DELINEATION/GPS SURVEY

Jeff Souza  
Ben Myhre  
Tehama Environmental Solutions, Inc.

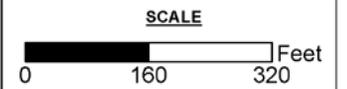
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**Delineation of Waters of the U.S.**  
Hammer Diversion on South Fork Cottonwood Creek  
Fish Passage Improvement Project  
Tehama County, California



January 2014

NOTE: DELINEATION SHOULD BE CONSIDERED PRELIMINARY UNTIL VERIFIED BY THE U.S. ARMY CORPS OF ENGINEERS

PHOTO SOURCE: Google Earth, July, 2012

### 3.4.4 Fisheries

#### 3.4.4.1 Affected Environment

The proposed project is located within, and along South Fork Cottonwood Creek, approximately 35 river miles upstream of the confluence with Cottonwood Creek. Because the Cottonwood Creek watershed drains the east side (in the rain shadow) of the Coastal Mountain Range, like other western tributaries to the Sacramento River, water flows and temperatures vary significantly based on the amount and timing of winter and spring rainfall. The presence of cold-water fish species such as trout and salmon in the Cottonwood Creek system are heavily influenced by these varying rainfall patterns.

Fisheries studies of South Fork Cottonwood Creek were conducted in 1977 for the Cottonwood Creek Project, which included the proposed construction of two reservoirs on Cottonwood Creek and South Fork Cottonwood Creek (Richardson et al. 1978). The 24 species of fish that were documented in Cottonwood Creek are presented in Table 3, along with an indication of the status and abundance of the species in South Fork Cottonwood Creek. The status and abundance information is presented for the upstream reach of South Fork Cottonwood Creek, above the formerly proposed Tehama Reservoir, within which the Hammer diversion is located.

Table 3. Fish Species Status and Abundance in South Fork Cottonwood Creek		
Common Name	Scientific Name	Abundance
White Catfish	<i>Ameiurus catus</i>	U
Black Bullhead	<i>Ameiurus melas</i>	R
Brown Bullhead	<i>Ameiurus nebulosus</i>	A
Sacramento Sucker	<i>Catostomus occidentalis</i>	A
Prickly Sculpin	<i>Cottus asper</i>	C
Carp	<i>Cyprinus carpio</i>	A
Mosquitofish	<i>Gambusia affinis</i>	A
Threespine Stickleback	<i>Gasterosteus aculeatus</i>	R
Tule Perch	<i>Hysterocarpus traski</i>	?
Pacific Lamprey	<i>Lampetra tridentata</i>	?
Hitch	<i>Lavinia exilicauda</i>	U
California Roach	<i>Lavinia symmetricus</i>	A
Green Sunfish	<i>Lepomis cyanellus</i>	A
Bluegill	<i>Lepomis macrochirus</i>	C
Smallmouth Bass	<i>Micropterus dolomieu</i>	A
Largemouth Bass	<i>Micropterus salmoides</i>	U
Hardhead	<i>Mylopharodon conocephalus</i>	A
Golden Shiner	<i>Notemigonus crysoleucas</i>	U
Steelhead	<i>Oncorhynchus mykiss</i>	C

Rainbow Trout	<i>Oncorhynchus mykiss</i>	R
King Salmon	<i>Oncorhynchus tshawytscha</i>	C
Sacramento Pikeminnow	<i>Ptychocheilus grandis</i>	A
Speckled Dace	<i>Rhinichthys osculus</i>	R
Brown Trout	<i>Salmo trutta</i>	?
Abundance: A=Abundant; C=Common; U=Uncommon; R=Rare; ?=Status Unknown		

While past fisheries studies of South Fork Cottonwood Creek have occurred, more recent information is generally lacking and very little is known about the fish species present within the proposed project site due to the fact that site-specific fisheries surveys have not been conducted.

A BRE (TES 2014a) was conducted to identify and address potential impacts of the proposed project on special-status fish species. This document is available on the Red Bluff Fish and Wildlife Office website on the AFRP webpage (<http://www.fws.gov/redbluff/afrp.html>). An evaluation of the potential presence of special-status species is included in Appendix F. Based on the results of the evaluation in Appendix F, the BRE further evaluated the potential impacts of the proposed project on those species with the potential to occur within, or near the proposed project site. Based on that further evaluation, the following special-status fish species, designated CH and Essential Fish Habitat (EFH) are known to, likely to, or have the potential to occur within the project area, and could potentially be impacted by the proposed project:

- Central Valley Spring-run Chinook Salmon (*Oncorhynchus tshawytscha*)
- Central Valley Steelhead (*Oncorhynchus mykiss*)
- Central Valley Steelhead CH
- Pacific Salmon EFH
- Hardhead (*Mylopharodon conocephalus*)

Two of these species (Central Valley spring-run Chinook salmon and Central Valley steelhead) are federally listed as Threatened. Under Section 7 of the ESA, federal agencies are required to consult with the NMFS regarding impacts from a proposed action to listed species or species proposed for listing and their CH and EFH. A BA (TES 2014b) has been prepared and consultation with the NMFS will occur.

#### Central Valley Spring-run Chinook Salmon

The Central Valley spring-run Chinook salmon was listed as Threatened by the State of California on February 5, 1999. NMFS listed the Central Valley spring-run Chinook salmon Evolutionarily Significant Unit (ESU) as Threatened on September 16, 1999. CH was designated by NMFS on January 2, 2005. EFH was designated for Pacific salmon, which includes this ESU, by NMFS on June 28, 2005. Chinook salmon are an anadromous fish species, meaning that they spawn in fresh water but spend their adult life in salt water. Population declines are attributed primarily to altered stream flows and blocked access to upper elevation headwaters due to dams. Spring-run Chinook salmon are thought, by some, to once have been the most abundant run of salmon in the Central Valley. This race once migrated into the headwaters of tributaries to the Sacramento and San Joaquin Rivers. They now only exist in the mainstem and a few tributaries to the Sacramento River. Central Valley spring-run Chinook salmon adult migration occurs in the Sacramento River from late March to September. The fish over-summer in cold-water habitats and then spawn from August to October with peak spawning occurring in September. Incubation occurs from mid-August to mid-March with rearing and emigration occurring from mid-August through April.

There is a lack of data regarding the current existence of Central Valley Spring-run Chinook salmon in South Fork Cottonwood Creek. Beegum Creek, another tributary to the mainstem of Cottonwood Creek is known to support a small persistent population, however annual monitoring of this population indicates that fish are not present in some years (Olson 2010). There are several past spring-run Chinook salmon observations in the South Fork (Richardson et al. 1978, Hewitt 1961), as well as a report of a known holdover location in the South Fork upstream of the Hammer diversion (Richardson et al. 1978). However, the result of several past surveys conducted on the South Fork Cottonwood Creek, upstream of the Hammer diversion by CDFW in the summers of 1962, 1972 (Healy 1962, 1972) and 1998 (Stein 1998) were negative for salmon, indicated that one small pool was found to have temperatures that were potentially capable of supporting a few holding salmon, and concluded that "...it is doubtful that a spring-run Chinook salmon of any significance exists in the South Fork Cottonwood Creek." (Healy 1972). A recent habitat assessment of the South Fork Cottonwood Creek concluded that the combination of a barrier upstream of the Hammer diversion and high water temperatures "...make it unlikely that South Fork Cottonwood Creek could support any population of spring-run Chinook salmon." (USFWS 2012). A fish passage assessment of the Hammer diversion structure (see Section 3.10.1 of this document) indicated that the structure is a complete barrier to Chinook salmon, with the exception of extremely high flows when fish may be able to swim around the structure (J. Howard, D. Killam pers. comm.). The Hammer project landowner reports that he observed salmon on the property many years ago but has not seen them in the recent era (H. Hammer pers. comm.). It is unknown whether these fish were spring-run Chinook salmon, but based on past downstream observations by credible sources, it is likely that they were.

#### Central Valley Steelhead

The Central Valley steelhead Distinct Population Segment (DPS) was listed as Threatened by NMFS on May 18, 1998 and February 6, 2006. CH was designated by NMFS on September 2, 2005. EFH has not been designated by NMFS. Population declines are attributed to blockage from upstream habitats, entrainment from unscreened diversions, hatchery practices, and degraded habitat conditions due to water development and land use practices. Steelhead are an anadromous species generally distributed from southern California to the Aleutian Islands. In the Central Valley, naturally producing populations only occur in the Sacramento River and its tributaries. Steelhead stocks in the Central Valley are considered winter-run steelhead (McEwan and Jackson 1996). Central Valley steelhead adult migration occurs from October through February. Spawning occurs from December through April in streams with cool, year-round, well-oxygenated water. Incubation generally occurs from December through April. Emigration occurs in the spring and early summer as one-year-old fish.

Central Valley steelhead are reported to occur in the South Fork of Cottonwood Creek (Richardson et al. 1978) and juvenile steelhead have been observed above the Hammer diversion in the South Fork Cottonwood Creek Yolla Bolly Wilderness Area (CH2MHill 2002). Rainbow trout, which may be resident trout or steelhead, were observed at the project site during 2013 site surveys (TES 2014a) and the USFWS observed juvenile rainbow trout both above and below a waterfall upstream of the Hammer diversion at river mile 49.5 (Olson 2012). A fish passage assessment of the Hammer diversion structure (see Section 3.10.1 of this document) indicated that the structure is a partial barrier to steelhead, depending on the condition of the fish and whether or not the flashboards are installed in the dam weir (NHC 2013).

### Central Valley Steelhead Critical Habitat

The stream reach in which the project is located is within the designated CH for Central Valley steelhead. CH for Central Valley steelhead is defined as specific areas that contain Primary Constituent Elements (PCE) and physical habitat elements essential to the conservation of the species. The inland habitat types present within the project area that are used as PCEs for Central Valley steelhead include spawning habitat, freshwater habitat and freshwater migration corridors.

### Essential Fish Habitat

The proposed project is within the EFH of "Pacific Salmon". EFH occurs within the project area for the Central Valley spring-run Chinook salmon. EFH has not been designated for Central Valley steelhead.

### Hardhead

The hardhead is a CDFW Species of Special Concern. This species inhabits undisturbed mid- to low-elevation streams that have clear, deep pools with sand, gravel and boulder substrates and low water velocities (Moyle et al. 1995). Threats to the species include loss of habitat from changes in stream flows and temperature regimes, elimination of habitat due to dams and predation by non-native fish species (Moyle et al. 1995). In the Sacramento River system, they are widely distributed in most of the larger tributaries as well as the river. Hardhead are known to occur in the South Fork of Cottonwood Creek (Richardson et al. 1978). No hardhead were observed during 2013 field surveys, however this species is likely to occur within the project area.

## **3.4.4.2 Environmental Consequences / Impacts and Mitigation Measures**

### **Methodology**

The assessment of potential impacts of the proposed project on fisheries is based on a review of data bases and pertinent literature, consultation with resource agency staff, and field studies that are documented in a BRE (TES 2014a) and a BA (TES 2014b) that were prepared for the proposed project. Prior to the initiation of field studies, a records search of the CNDDDB (CDFW 2013a) was conducted to determine if any special-status fish, or rare natural communities had previously been documented within the study area, or in the vicinity of the study area. The query was conducted using the USGS Raglin Ridge 7.5' quadrangle, in which the project is located, along with the eight adjoining quadrangles (Cold Fork, Tomhead Mountain, South Yolla Bolly, Ball Mountain, Riley Ridge, Paskenta, Lowry and Oxbow Bridge). In addition, a species list was generated using the USFWS Sacramento Fish and Wildlife Office website (USFWS 2014) for the Raglin Ridge quadrangle and the Cold Fork quadrangle, which lies just to the north of the project.

Based on the results of the CNDDDB and USFWS database searches, and TES's staff knowledge of the site and local area, a list of potentially occurring special-status fish species and aquatic natural communities was developed for the proposed project, as well as an evaluation of their potential presence (Appendix F). For the purposes of this evaluation, special-status species were defined as:

1. Those species listed by the USFWS or NMFS as Endangered, Threatened, Proposed as Endangered or Threatened, Candidate to become Proposed, or Species of Concern.
2. Those species listed by the CDFW as Endangered, Threatened, Candidate for listing as Endangered or Threatened, Species of Special Concern, or Fully Protected.

Field surveys were conducted on August 14, August 15, and August 16, 2013, by TES staff. Additional observations were made during periods of work conducted at the project site for other purposes in

August and September of 2013. The study area included all aquatic sites within the project boundary. The surveys were conducted by walking the entire project site and recording fisheries observations. No snorkel surveys, or other intensive fisheries surveys were conducted. A list of all fish species observed during 2013 field surveys is included in Appendix E.

The list of species evaluated in this document were derived as a result of further evaluations in the BRE of potential impacts to the list of special-status fish species in Appendix F.

## **No Action Alternative**

### Central Valley Spring-run Chinook salmon

Under this alternative, the diversion dam would remain in place, which would continue to potentially impact the ability for Central Valley spring-run Chinook salmon to migrate upstream of the site.

Beneficial impacts from the increased potential for spring-run Chinook salmon to access upstream areas that have favorable temperatures for holding, which could restore a small population in South Fork Cottonwood Creek, would not occur. Sediment routing through the project reach which would restore ecological processes that are expected to benefit all native fish and wildlife species would not occur. A potential decrease in stream water temperatures in the project reach due to the elimination of the shallow reservoir following dam removal would not occur. Increased flows in approximately 0.43 river miles of stream, downstream of the current dam would also not occur.

### Central Valley Steelhead

Under this alternative, potential impacts to Central Valley steelhead would not occur from delays in migration or avoidance of habitat, blasting activities, heavy equipment working in water, fish rescue operations and the temporary loss of shaded riverine aquatic habitat.

Beneficial impacts as a result of year-round unimpeded upstream and downstream passage for steelhead, which is expected to increase steelhead populations in South Fork Cottonwood Creek and decrease potential stress, injury and mortality associated with the blockage of downstream emigration, would not occur. Sediment routing through the project reach which would restore ecological processes that are expected to benefit all native fish and wildlife species would not occur. A potential decrease in stream water temperatures in the project reach due to the elimination of the shallow reservoir following dam removal would not occur. Increased flows in approximately 0.43 river miles of stream, downstream of the current dam would also not occur.

### Central Valley Steelhead Critical Habitat

Under this alternative, no modifications would occur to Central Valley steelhead CH. Beneficial effects to Central Valley steelhead CH as result of improved passage, restored sediment routing, increased flows and potential decreased water temperatures would also not occur.

### Essential Fish Habitat

Under this alternative, no modifications would occur to Central Valley spring-run Chinook salmon EFH. Beneficial impacts to Central Valley spring-run Chinook salmon EFH as result of improved passage, restored sediment routing, increased flows and potential decreased water temperatures would also not occur.

## Hardhead

Under this alternative, potential injury or mortality would not occur to hardhead as a result of dam demolition. Beneficial effects to hardhead as result of improved passage, restored sediment routing, increased flows and potential decreased water temperatures would also not occur.

## **Proposed Action Alternative**

### Central Valley Spring-run Chinook Salmon

Under this alternative, no adverse impacts to spring-run Chinook salmon would be expected to occur due to the fact that spring-run Chinook salmon are not likely to occur in the project reach of South Fork Cottonwood Creek at the time of implementation (dam removal phase). Stream temperatures in the project reach of South Fork Cottonwood Creek are reported to be marginal for spring-run Chinook salmon. Given that the existing diversion dam is a complete barrier to upstream migration by Chinook salmon, and the summer stream temperatures in the vicinity of the project (Appendix I), any spring-run Chinook salmon adults that migrated upstream to the dam in the spring would either have perished or potentially (but unlikely) migrated back downstream to pools with favorable holding temperatures. Further, given the extremely dry winter of 2013 / 2014 to date, water temperatures will likely be particularly unfavorable for adult and juvenile salmonids (trout and salmon) in the vicinity of the diversion dam, and likely throughout the entire South Fork Cottonwood Creek system, when the project is planned (summer / fall 2014).

During the initial winter, and to a lesser extent for several following winters, an estimated 1,200 to 2,600 cubic yards of sediment, that is currently stored upstream of the dam, would be redistributed by high flows (J. Howard pers. comm.). Because the amount of sediment is small, and mobilization would occur during high flows when background turbidity and sediment transport is relatively high, no significant effects to adult or juvenile spring-run Chinook salmon, or spring-run Chinook salmon redds are anticipated. The stored sediments are primarily composed of gravel and cobble, with smaller amounts of sand and finer materials (J. Howard pers. comm.). These sediments would form new bars and riffles downstream of the current dam location, which will create additional spawning and rearing habitat for salmonids.

As a result of the anticipated physical adjustments to the stream channel upstream of the current dam location, some of the woody riparian habitat that has become established along the reservoir margin would likely be lost. It is estimated that approximately 50 percent of the 0.65 acres of riparian wetland that was identified in a preliminary wetland delineation (Figure 13) conducted for the project (TES 2014c) may be lost as a result of the lowering of the low-water elevation, resulting in a temporary loss of shaded riverine aquatic habitat. This is considered a potentially significant impact.

Beneficial impacts would occur from the increased potential for spring-run Chinook salmon to access upstream areas that have favorable temperatures for holding, which could restore a small population in South Fork Cottonwood Creek. Sediment routing through the project reach would restore ecological processes that are expected to benefit all native fish and wildlife species. A decrease in stream water temperatures may occur in the project reach due to the elimination of the shallow reservoir following dam removal. Increased flows would occur in approximately 0.43 river miles of stream, downstream of the current dam. The impacts identified above are not considered to be at a level to incur take as defined in the California ESA but the impacts are at a level that would incur an effect as per the Federal ESA.

## Central Valley Steelhead

Under this alternative, several potential direct impacts to adult or juvenile steelhead have been identified. All are all associated with the dam removal portion of the project and include impacts due to:

- delays in migration or avoidance of habitat due to project activities,
- blasting activities, and
- fish rescue operations.

At the time proposed for the in-stream portion of the project (August through September), rearing / emigrating juveniles would be expected to potentially be in project area. Fish that may potentially be emigrating through the project reach could be impacted by delays caused by disturbance during the three-day construction period. However, upstream and downstream migration at the existing structure is already very limited during the late summer / fall period when the weir boards are in place. Juvenile fish that may be rearing in the project area, given the time of year, would be larger and more apt and able, to avoid the area given their size and ability to maneuver more effectively in a lower flow. General observations of fish numbers during 2013 site surveys indicate that salmonid fish numbers are extremely low. Significant effects would not be expected due to increased competition for resources if fish need to move to other areas of the stream during the very short construction period.

Injury or mortality could occur from ground vibration or water overpressure rises from blasting operations. Blast-induced ground vibrations, measured in inches per second (i/s), can have deleterious effects on fish embryos (fertilized eggs) at certain stages of their development. Blast-induced overpressures in water, measured in pounds per square inch (psi), can injure or kill juvenile and adult fish. Studies have shown that adult fish are less sensitive to blast-induced overpressures than juvenile fish (Kolden and Aimone-Martin 2013). A recent review of literature regarding the effects of blasting on salmonids indicated that the most sensitive species of salmonid embryos begin to experience mortality at vibrations around 5.8 i/s (Kolden and Aimone-Martin 2013). This led the State of Alaska to establish a 2013 blasting standard limit of 2.0 i/s for projects where salmonids are present (Timothy 2013). The shot plan prepared by CDFW (Appendix B) indicates that a 2.0 i/s vibration limit could easily be attained at a distance of 80 feet from the blast source. Because no salmonid embryos are expected to be present at the time of year when blasting would occur (summer to early fall), no impacts to steelhead embryos would occur.

The same literature review found that the lowest peak overpressure to cause injury to juvenile salmonid fish was 10.0 psi which led the State of Alaska to establish a 2013 blasting standard limit of 7.3 psi (Timothy 2013). Need information here about predicted overpressures from the project.

Injury or mortality could also occur from fish being hit or crushed by flying debris during the blast. The potential for this is very small since most of the fish will have been relocated approximately 500 feet from the blast source, so the likelihood of any few remaining fish being struck by debris is very remote, but nevertheless possible.

Increased turbidity and a small amount of suspended sediment would likely be released downstream immediately following blasting activities as the channel immediately begins to adjust to the new conditions. This turbidity and an unknown amount of suspended sediment would likely persist in the water column for several hours until channel conditions stabilize. If juvenile steelhead are present downstream of the dam site, it is believed that the number of fish affected would be few and most would volitionally leave the action area until activities cease or turbidity diminishes. Juvenile fish should be able to escape to available refugia downstream, a non-lethal behavioral response. Because the work would occur in the summer to early fall, no steelhead redds would be affected.

A fish exclusion zone from approximately 500 feet upstream to 500 feet downstream of the dam would be implemented prior to the onset of demolition activities. The actions necessary to remove fish out of the construction area would be expected to result in some form of fish capture and handling. A permitted CDFW and / or USFWS crew would be responsible for the seining, dip-netting, and /or electroshocking. NMFS electrofishing guidelines (NMFS 2000b) would be used. Any capture and handling associated with electrofishing is likely to result in direct effects to juvenile steelhead rearing in the fish exclusion zone. It is expected that capture, handling, and release of the juvenile steelhead would disrupt normal behavior and cause temporary stress, injury, and occasional mortality. Actions would be taken first to encourage fish to voluntarily move out of the area prior to implementing other methods. It is anticipated that fish capture / relocation would not last more than one day, however additional capture / relocation would occur over several additional days if additional fish are observed within the exclusion zone as a result of daily monitoring. The fish exclusion zone would be maintained for three to four days until the blasting is completed and in-stream turbidity has dissipated. Juveniles are the only steelhead life stage expected to be in the project area at the time when capture / relocation would occur. It is expected that, although NMFS electroshocking guidelines would be used, direct effects to individual fish would occur (CDFW 2014). While some mortality of juvenile steelhead may occur, the small number would not jeopardize the continued existence of the ESU.

Indirect effects for steelhead from the temporary loss of shaded riverine aquatic habitat are expected to be similar to the indirect effects described above for spring-run Chinook salmon. Beneficial impacts are also expected to be similar to the indirect effects described above for spring-run Chinook salmon. In total, the potential impacts to Central Valley steelhead are considered potentially significant.

#### Central Valley Steelhead Critical Habitat

Under this alternative, while there would be some changes to the habitat that currently exists upstream and downstream of the dam as a result of the restoration of sediment routing, no net loss of CH would be expected as a result of project implementation. Turbidity generated by dam demolition activities could have an effect on the CH elements that address water quality, however the impact to this element is considered very minimal because 1) the impact is considered very small in quantity; 2) the project would make additional habitat accessible to fish; and 3) the project is expected to improve water quality by potentially lowering water temperatures as a result of increased in-stream flows and decreased solar warming due to the elimination of the shallow reservoir upstream of the dam. A Biological Assessment would be prepared to address potential impacts to Central Valley steelhead CH and an Endangered Species Act consultation would occur with NMFS.

#### Essential Fish Habitat

Under this alternative, no net loss of EFH is expected as a result of project implementation. The effects would be expected to be similar to the effects described under the “Central Valley steelhead Critical Habitat” section above.

#### Hardhead

Under this alternative, hardhead could be harmed or killed by dam demolition activities if they were present within the project area. This is considered a potentially significant impact.

Beneficial impacts of this alternative are expected to be similar to the beneficial impacts described above for spring-run Chinook salmon.

The following measures would be implemented to avoid and minimize impacts to fisheries and to mitigate potentially significant impacts to fisheries to less than significant levels:

**FISH-1:** Dam removal shall be conducted between June 15 and October 1 to minimize impacts to anadromous fish by working when water temperatures are warmer and anadromous fish are less likely to be present.

**FISH-2:** All shock tubes, explosive packaging and wires from the blasting operations will be removed from the site.

**FISH-3:** Measure **SOIL / GEO-3** regarding the use of time delays for blasting operations will be fully implemented to minimize the level of blast-induced overpressure rises.

**FISH-4:** Measures **VEGETATION-2, VEGETATION-5** and **VEGETATION-6** associated with the avoidance and restoration of riparian vegetation will be fully implemented.

**FISH-5:** Measures **WATER-4** through **WATER-6** associated with minimizing impacts to water quality will be fully implemented.

**FISH-6:** Prior to dam removal, exclusionary fish netting shall be installed approximately 500 feet upstream and 500 feet downstream of the diversion structure. USFWS, in coordination and consultation with NMFS and CDFW, will ensure that qualified fish biologists are onsite to implement fish rescue operations through the use of herding, seining and/or electrofishing, if necessary. Best professional determination will be used to decide which method(s) of rescue is most appropriate. Biologists will first try to haze and herd fish out of the fish exclusion area. If fish biologists determine that the use of electrofishing is necessary for the efficient and successful removal of fish, the NMFS electrofishing guidelines (NMFS 2000) will be strictly followed. The fish rescue team will be comprised of fishery biologists with professional experience using seines and electrofishing equipment.

## 3.5 Cultural Resources

### 3.5.1 Affected Environment

Numerous cultural resources exist within the project area. These include a concrete stream diversion dam, water conveyance tunnel, hydroelectric power plants, scaffolds, elevated pipe crossings and an irrigation ditch. The diversion dam construction materials include concrete, rebar and scrap iron. The original hydroelectric plants and portions of the associated support structures and features may have been originally constructed in the late 1930s and early 1940s. Little of these original constructions survived a flood event in 1960.

The scaffolds and pipe crossings in use today were constructed after 1975. The elements of the concrete stream diversion dam and water conveyance tunnel include construction dates in the 1930s, and as such require consideration as historic properties.

The 250-foot-long tunnel conveys diversion flows to a headwall where its flows can be diverted through a gate valve to a Pelton wheel and generator located near the outlet of the tunnel. Construction on the tunnel began in 1926 and was completed in 1931, and in 1960, there was a huge flood event. The gate on the tunnel had been left open that winter, and the water shot through the tunnel and blew out the generator shack and bridges. It was not until 1973 and 1974 that the sand that had filled in the tunnel from the 1960 and a new dam was built. Repairs to the interior of the tunnel include supports for the eroding roof and walls.

## Hammer Diversion Dam

The diversion dam was rebuilt between 1973-1975 with 110 sacks of concrete, rebar and scrap iron. The current dam was built in one year using ½-inch plywood sheets for forms. The 750 watts (W) from the Hensley Creek generator was used to power the cement mixer. A gas welder was used to armor the edges of the dam with grader blades. A small portion of the original masonry and cobble construction are visible on the eastern side of the diversion.

### 3.5.2 Environmental Consequences / Impacts and Mitigation Measures

#### Methodology

A comprehensive review and evaluation of potential levels of significant impacts on cultural resources was conducted for the project site (DeMar 2013). This document is available on the Red Bluff Fish and Wildlife Office website on the AFRP webpage (<http://www.fws.gov/redbluff/afrp.html>). A site survey was conducted in September 2013. A literature search for previous cultural resources work near the project area was completed by the Northeast Center of the California Historical Resources Information System (File # G13-6). Local tribal groups identified by the Native American Heritage Commission (NAHC) were contacted by the USFWS with a request for information on the existence of any archaeological or cultural sites within the project boundaries.

The project would have a significant impact if it would:

- a. Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5;
- b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5;
- c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature; or
- d. Disturb any human remains, including those interred outside of formal cemeteries.

#### No Action Alternative

Under this alternative, no impacts or changes would occur to existing cultural resources that were identified and evaluated in the project area. The identified cultural resources, including the dam and conveyance tunnel, would continue to provide water and utility service within the project area.

#### Proposed Action Alternative

The Hammer diversion dam and conveyance tunnel are historic and are associated with a home site and hunting camp that have historical roots in Tehama County. However, they do not appear to retain much of their original integrity. In consideration of 36 Code of Federal Regulation (CFR) 60 criteria for potential listing of the property to the National Register, this dam and associated ditches are related to the agricultural development of Tehama County as a whole. The elements of the concrete stream diversion dam and water conveyance tunnel include construction dates in the 1930s, requiring consideration as historic properties. The diversion dam and conveyance tunnel do appear to possess “integrity of location, feeling and association”, some of the aspects that are considered when following 36 CFR 60. These aspects have been diminished by reconstruction. The aspects of integrity comprised by design, materials and workmanship have been diminished by the reconstruction and maintenance of the structures since its initial construction in the 1930s.

The diversion dam and conveyance tunnel are associated with past events. However, they do not appear to have made a significant contribution to the broad patterns of our history beyond a local level. In

addition, they do not appear to be associated with the lives of significant persons in our past and do not embody distinctive architectural characteristics. In addition, there is no additional archaeological data beyond that already collected from the site documentation and photography. Given these findings, the diversion dam and conveyance tunnel do not wholly meet the 36 CFR 60 criteria to appear eligible for listing in the National Register.

The proposed project would include modifications or destruction of structural elements that post-date 1975. This would not significantly alter any feature integrity. Recorded history of the elements, previously lost in a 1960 flood event, should mitigate any potential loss of local history.

Under this alternative, no significant impacts would occur to any known cultural resource. The hydroelectric power plants, irrigation ditch, scaffolds and pipe crossings presently in use have all been constructed no earlier than 1975. As such, they do not make the 50-year guideline for consideration as historic properties. In addition, this alternative would not impact the hydropower plants or the diversion tunnel as they will be left intact. No known archaeological or cultural sites were identified from the local tribal groups contacted by the USFWS, and no known human remains will be disturbed within the project area.

However, unknown subsurface cultural resources could be impacted during ground-disturbing activities associated with the proposed project. This is considered a potentially significant impact.

The following measure would be implemented to avoid and minimize impacts to cultural resources and to mitigate potentially significant impacts to cultural resources to less than significant levels:

**CULTURAL-1:** An individual knowledgeable in identifying cultural resources will be present during any ground-disturbing activities. In the event subsurface cultural remains over 45 years of age are encountered, the project will cease work at the general area of discovery and the contractor will consult with a professional archaeologist on staff with the USFWS. A field exam by the professional archaeologist will likely be necessary and further steps considered in the evaluation, including mitigation and contacting the Native American Indian community if human remains are encountered [following Native American Graves Protection and Repatriation Act (NAGPRA) procedures].

### **3.6 Cumulative Effects and Other CEQA and NEPA Considerations**

This EA / IS includes a discussion of statutory considerations required under CEQA, such as cumulative impacts, the significant environmental effects of the proposed project, the significant effects that cannot be avoided if the Proposed Action is implemented, and growth-inducing effects of the project. Additional discussions are also required under NEPA, such as the significant irreversible and irretrievable commitments of resources and the relationship between local short-term uses of the environment and the maintenance of long-term productivity. These considerations are addressed below.

#### **3.6.1 Cumulative Effects**

This section provides a description of other actions in the area and a discussion of the cumulative impacts of those projects, in combination with the previously identified effects of the proposed project. A cumulative impact is defined 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. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7). CEQA Guidelines Section 15355 states that “cumulative impacts refers to two or

more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.

- a) The individual effects may be changes resulting from a single project or a number of separate projects.
- b) The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.”

Changes to the local environment will be made through removal of the dam. The proposed project is intended to provide long-term improvements to the environment through improved hydrological connectivity, fish passage, and biological integrity and diversity. The proposed project would improve habitat connectivity and alleviate the current habitat fragmentation for anadromous fish and other fish and wildlife species. Reestablishing habitat connectivity is an important factor that helps reduce the risk of extinction of species and populations during environmental changes such as climate change. Effects of the proposed project would be positive towards maintaining the quality of the human environment. Overall, the proposed project would cause short-term impacts to some environmental resources. Mitigation measures would result in these impacts being less than significant. Analysis for the individual resources considered in this EA / IS are described within the individual sections of this document.

There are several watershed restoration projects that have been implemented by the Cottonwood Creek Watershed Group and / or the USFWS over the past approximately ten years. These projects include riparian habitat restoration, streambank stabilization, non-native vegetation control, fish passage improvement and fuels management. The Tehama County Resource Conservation District is planning a riparian and stream restoration project on Crowley Gulch, a small tributary to the mainstem of Cottonwood Creek, located in the town of Cottonwood, California. The cumulative impacts of these projects and the Hammer Diversion on South Fork Cottonwood Creek Fish Passage Improvement Project are not anticipated to be adverse, and in fact, in combination should improve natural resource conditions for native fish and wildlife species in the Cottonwood Creek watershed.

### **3.6.2 Irreversible and Irretrievable Commitments of Resources**

NEPA (Section 102) and the CEQ NEPA implementing regulations (40 CFR 1502.16), require a discussion of “any irreversible and irretrievable commitments of resources which would be involved in a proposed project should it be implemented.” Section 15126.2(c) of the CEQA Guidelines also requires a discussion of the significant irreversible environmental changes that would result from implementation of a proposed project.

Implementation of the proposed project would not involve the substantial use of nonrenewable resources in such a way that would result in conditions that would be irreversible though removal or nonuse thereafter. Implementation of the proposed project would result in the use of fossil fuels, a nonrenewable form of energy for construction activities. A relatively minor amount of nonrenewable resources would be used in the demolition of the dam, transport of equipment and personnel, and related activities at the project area. The material requirements for this project would be relatively minor compared to the overall demand for such materials, and the use of these materials would not have a significant adverse effect on their continued availability. Future generations would not be committed to irreversible consequences or uses; the effect on future generations would be beneficial as a result of the restored stream ecosystem and related fishery resources. No irreversible damage from environmental accidents would be foreseeable in association with the proposed project.

### **3.6.3 Local Short-Term Uses and Long-Term Productivity Relationship**

Section 102 of the CEQ NEPA Regulations and CFR 1501.16 require that an environmental document include a discussion of “the relationship between local short-term uses of man’s environment and the maintenance and enhancement of long-term productivity.” The proposed project does not involve a trade-off between a “local short-term use” of the environment and the maintenance and enhancement of the environment in the sense contemplated by NEPA. Implementation of the proposed project is intentionally aimed at restoring and enhancing the long-term biological and environmental productivity of the fishery resource in Cottonwood Creek and downstream in the Sacramento River system. Construction impacts associated with the proposed project would be short-term and temporary. Short-term effects to the environment from construction include soil erosion, air quality emissions, noise, disturbance to fish, wildlife, vegetation and wetlands, and temporary surface water quality impacts. In the long-term, however, the proposed project would enhance and restore habitat for native fish and wildlife species. Implementation of the proposed project would not sacrifice the long-term productivity of the project area for short-term uses during construction.

### **3.6.4 Growth-Inducing Impacts**

Under CEQA, growth itself is not assumed to be particularly beneficial, detrimental, or insignificant to the environment. If an action is determined to be growth-inducing, an evaluation is made to determine whether significant impacts on the physical environment would result from that growth. Analysis of growth-inducing impacts includes those characteristics of an action that may encourage and facilitate activities that would affect the environment, either individually or cumulatively. For example, an increase in population may impose new burdens on community service facilities. Similarly, access route improvements may encourage growth in previously undeveloped areas. Implementation of the proposed project would not contribute to significant development or economic growth in the vicinity. No businesses would be established or housing required as a result of this project. Therefore, no growth inducement would result from implementing the proposed project.

### **3.6.5 Environmental Commitments and Mitigation Measures**

Because this document is a joint NEPA / CEQA document, mitigation measures have been identified for potentially significant impacts in compliance with CEQA requirements. Under CEQA, lead agencies are required to adopt a program for monitoring or reporting on the revisions that they required to be made part of the project, and other measures required to mitigate or avoid significant environmental effects. An MMRP for implementation of the proposed project will be developed to comply with CEQA. The mitigation measures that were identified as part of this analysis, and that will be included in the MMRP, are listed in Appendix G.

### **3.6.6 Significant Effects**

CEQA establishes a duty for public agencies to avoid or minimize environmental damage where feasible (CEQA Guidelines Section 15021), and determinations of significance play a critical role in the CEQA process (CEQA Guidelines 15064). Potentially significant effects associated with implementation of the proposed project have been identified in the areas of soils and geology; hydrology and water quality; fisheries; vegetation; wildlife; and wetlands. These potential effects are discussed in the individual resource sections in this document. As part of the environmental impact assessment for each resource area, mitigation measures have been identified that reduce potential impacts to less-than-significant levels. The environmental analysis conducted for the proposed project did not identify any effects that, after mitigation, remained significant and therefore unavoidable. No significant irreversible effects were identified associated with the proposed project.

## **3.7 Environmental Justice**

### **3.7.1 Affected Environment**

On February 11, 1994, President Clinton issued Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority and Low-Income Populations.” Environmental justice refers to “nondiscrimination in federal programs substantially affecting human health and the environment” and “providing minority communities and low income communities access to public information on, and an opportunity for public participation in, matters relating to human health or the environment”. In particular, it involves preventing minority and low-income communities from being subjected to disproportionately high and adverse environmental effects of federal actions. In complying with NEPA, federal agencies are required to consider human health, economic, and social impacts of the proposed project on minority and low-income communities.

The majority (91.3 percent) of Tehama County’s population is white or Caucasian. Minorities of African American, Asian, Hawaiian or Pacific Islander, and Hispanic ethnicity comprise the remaining 8.7 percent of the county’s population (U.S. Census Bureau 2012).

In 2012, per capita personal income for Tehama County was \$20,259, below the State average of \$29,551. Tehama County had an unemployment rate of 11.2 percent in August 2013 (U.S. Bureau of Labor). There is one residential property associated with the proposed project.

### **3.7.2 Environmental Consequences / Impacts and Mitigation Measures**

Incorporation of environmental justice principles throughout the planning and decision-making processes implements the principles of NEPA, Title VI of the Civil Rights Act, and the Uniform Relocation Act.

#### **No Action Alternative**

Under this alternative, no direct impact to a minority or low-income population or community would take place because the project would not be implemented. Therefore, there would be no impact.

#### **Proposed Action Alternative**

There is one residential dwelling within the project area and associated with the project. Under this alternative, the proposed project would result in improvements to the existing residence and associated power and irrigation systems including:

- Water conveyance facilities;
- Improvements to temporary water storage;
- Residential PV and emergency power upgrades;
- Energy efficiency measures at residence; and
- Upgrades to existing buildings and facilities to meet Tehama County standards.

The water conveyance and temporary storage system will convey water from the suspension bridge pipe crossing to the existing pond, orchard and garden. The temporary storage system will be upgraded by adding a pump to convey water from the existing pond to a 2,500-gallon storage tank that will be used for low pressure irrigation of the garden and orchard. The residence’s existing PV / battery system will be expanded to allow more solar energy production and increase energy holding capacity. Because there may be times when both the PV system and Hensley Creek hydropower plant are out of service simultaneously, a propane generator will be installed to recharge the batteries, if needed to maintain electric power for the residence. The residence receives power intermittently from the seasonal Hensley Creek hydropower plant. The electrical feed from this plant is to be upgraded at the house, and it is

anticipated to be the primary source of electricity in the winter months. The residence is to receive two energy efficiency measures intended to reduce electrical requirements to match the electrical systems proposed.

The proposed project's potential effects on environmental justice would be negligible, because it would have no significant unmitigatable impacts, and would be a small, short-term project with no negative effect on any minority or low-income population.

## **3.8 Soils / Minerals and Geology**

### **3.8.1 Affected Environment**

#### Soils

One soil map unit (Maymen and Lodo gravelly loams, 30 to 65 percent slopes) occurs within the project site according to the local soil survey (USDA-SCS et al. 1967) (Figure 14). This soil map unit exists in the mountainous areas of the western part of the county. It is composed of Maymen gravelly loam, 30 to 65 percent slopes and Lodo shaly loam, 30 to 65 percent slopes, eroded. The depth to the broken and weathered rock is from 6 to 20 inches in the Maymen soil and is 6 to 10 inches in the Lodo. The erosion hazard is severe to very severe.

The following information is excerpted from the Summary of Geologic and Structural Conditions Assessment that was prepared for the project (Sanders and Associates Engineering 2013).

#### Geologic Setting

The project site is located on the extreme western edge of the Great Valley geomorphic province of California, which is an alluvial plain approximately 50 miles wide and 400 miles long in the central part of California. The Great Valley is a structural depression that has been filled with a thick sequence of Mesozoic and Tertiary marine sediments covered by Quaternary alluvial sediments. Subsequent deformation has folded these older sediments into a northwest-trending asymmetrical syncline with its axis off center toward the Coast Ranges.

The site region is mapped as the Elder Creek Terrane. The Elder Creek Terrane is divided into mudstone, sandstone, and conglomerate units of Early Cretaceous and Late Jurassic age. The mudstone unit is described as dark-gray, hackly-fractured mudstone that contains minor tan siltstone and sandstone; nodules, lenses, and thin beds of limestone are locally abundant. The mudstone unit is relatively erodible and forms valleys and swales parallel to strike. The geologic literature describes the sandstone and conglomerate unit as fine- to coarse-grained sandstone, local conglomerate, and minor interbedded mudstone. The sandstone and conglomerate unit is relatively resistant and forms prominent topographic ridges parallel to strike.

#### Site Geology

The existing concrete diversion structure was constructed at the bottom of an incised valley that is traversed by South Fork Cottonwood Creek. The diversion structure is located just downstream of the apex of a tight bend in the creek and at the beginning of a larger horseshoe-shaped bend downstream. The creek channel is approximately 80 to 100 feet below the prominent ridge (immediately to the southeast) that separates the diversion structure and inlet structure from the hydroelectric-generation plant, which is located on the opposite side of the ridge. The northwest side of the diversion structure is

adjacent to a slope that forms a prominent northwest trending ridge that rises approximately 100 feet to 400 feet above the creek channel.

The site is underlain by bedrock units of meta-siltstone and meta-sandstone that contain thin interbeds of mudstone. The banks of South Fork Cottonwood Creek are overlain by both colluvial and alluvial deposits and the active creek channel contains recent alluvial deposits. The adjacent hill slopes are generally covered by a thin mantle of soil.

### Bedrock Units

The bedrock units within the slopes above the creek, and exposed in the creek channel, consist primarily of steeply dipping inter-layered beds of meta-siltstone and meta-sandstone with occasional thin interbeds of mudstone. The primary bedding strikes approximately northwest (320° - 345°) dipping steeply to the northeast (75° - 80°) with primary jointing trending to the southwest (~275° - 280°) and dipping to the southeast (~35°). The sandstone and siltstone units are generally thickly bedded ranging from 6 inches to approximately 16 inches thick and occasionally 24 to 36 inches and thicker. The sandstone and siltstone layers are light to dark gray where fresh, and light to medium reddish brown where weathered. The mudstone units are dark gray to black and range up to 6 inches thick with individual mudstone laminae typically ranging between 1/16-inch to 1/8-inch thick.

Outcrops exposed in the active channel and near bank have been scoured and are typically hard (difficult to break when struck with a hammer). The weathering of the outcrops on the slopes range from fresh (rings when struck with a hammer) to completely decomposed (crumbles with hand pressure). The exposed edges of the hillside outcrops tend to be more weathered than the less exposed rock. The mudstone is moderately to highly weathered (easily broken by rock hammer to crumbles by hand). The infilling of the joints appeared to be dependent on degree of surface weathering. Upslope, the joints within the outcrops range from fresh to soil coated with minor to moderate iron staining, while jointing of the outcrops within the creek channel and adjacent banks are relatively clean with only occasional iron staining. We did observe some moss infilling of the joints in the outcrops on the lower areas of the slopes and adjacent to the channel.

### Colluvial and Alluvial Deposits

The surficial materials exposed within and immediately adjacent to the active creek channel typically consist of colluvium (angular boulders / cobbles / gravels) and alluvial deposits (rounded boulders and cobbles with lesser amounts of gravel and sand). These colluvial and alluvial materials are generally composed of meta-siltstones and meta-sandstones and appear to be locally derived from the surrounding bedrock.

The hillsides are generally covered with a thin veneer of colluvium (soil and highly weathered rock) derived from the underlying bedrock. Where the slope flattens to the creek banks, very little soil development was observed, especially below the visible high water marks.

### Recent Alluvial Deposits

The recent alluvial materials observed within the creek channel appeared to be loose and unconsolidated rounded boulders and cobbles with lesser amounts of gravel and sand. The depth and composition of the recent alluvial materials may be substantially altered during high flows.

## Geologic Observations

Overall, the site geologic conditions appeared to be relatively stable with respect to the existing diversion structure. The bedrock outcrops, which are incorporated into the structure, appeared generally intact and hard with no visible evidence of adverse movement. The visible outcrops on the slopes above the diversion structure also appeared to be relatively intact and generally hard with no apparent adverse bedding or jointing. However, some weathering of the exposed edges of many of these outcrops was observed and evidence of minor rock fall (angular cobble- to small boulder-sized rock) was noted near the base of the slopes.

### **3.8.2 Environmental Consequences / Impacts and Mitigation Measures**

#### **Methodology**

The geology and soils analysis is based on information in a *Summary of Geologic and Structural Conditions Assessment* (Sanders and Associates Engineering 2013) that was prepared for the project, the *Soil Survey of Tehama County, California* (USDA-SCS et al. 1967), and a review of reports regarding regional geology, soils, and mineral resources as well as the Alquist-Priolo Earthquake Fault Zoning Map (California Department of Conservation 2013).

Significant impacts would occur if the project would:

- a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving earthquake fault rupture, seismic ground shaking, liquefaction or landslides;
- b) Result in substantial soil erosion or the loss of topsoil;
- c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in onsite or offsite landslide, lateral spreading, subsidence, liquefaction or collapse;
- d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property;
- e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater;
- f) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; or
- g) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

#### **No Action Alternative**

Under this alternative, there would be no impact to soils, minerals or geology due to the fact that the dam would not be demolished and the new water pipeline and other water and power upgrades would not be installed. The sediments deposited upstream of the dam would remain in place.

#### **Proposed Action Alternative**

Under this alternative, no known mineral resources of value or mineral resource recovery sites would be disturbed or lost. No permanent structures or facilities would be constructed that expose structures and / or people to geologic hazards. The Alquist-Priolo Earthquake Fault Zoning Act (1972) and the Seismic Hazards Mapping Act (1990) direct the State Geologist to delineate regulatory "Zones of Required Investigation" to reduce the threat to public health and safety posed by earthquake-triggered ground failures. Cities and counties affected by the zones must regulate certain projects within them.

A search of the Alquist-Priolo Earthquake Fault Zoning Map <http://www.quake.ca.gov/gmaps/WH/regulatorymaps.htm> shows there are no Earthquake Fault Zones or Landslide and Liquefaction Zones of regulatory interest within or surrounding the project area. The project does not include elements that would cause ground failure (including liquefaction) or landslides.

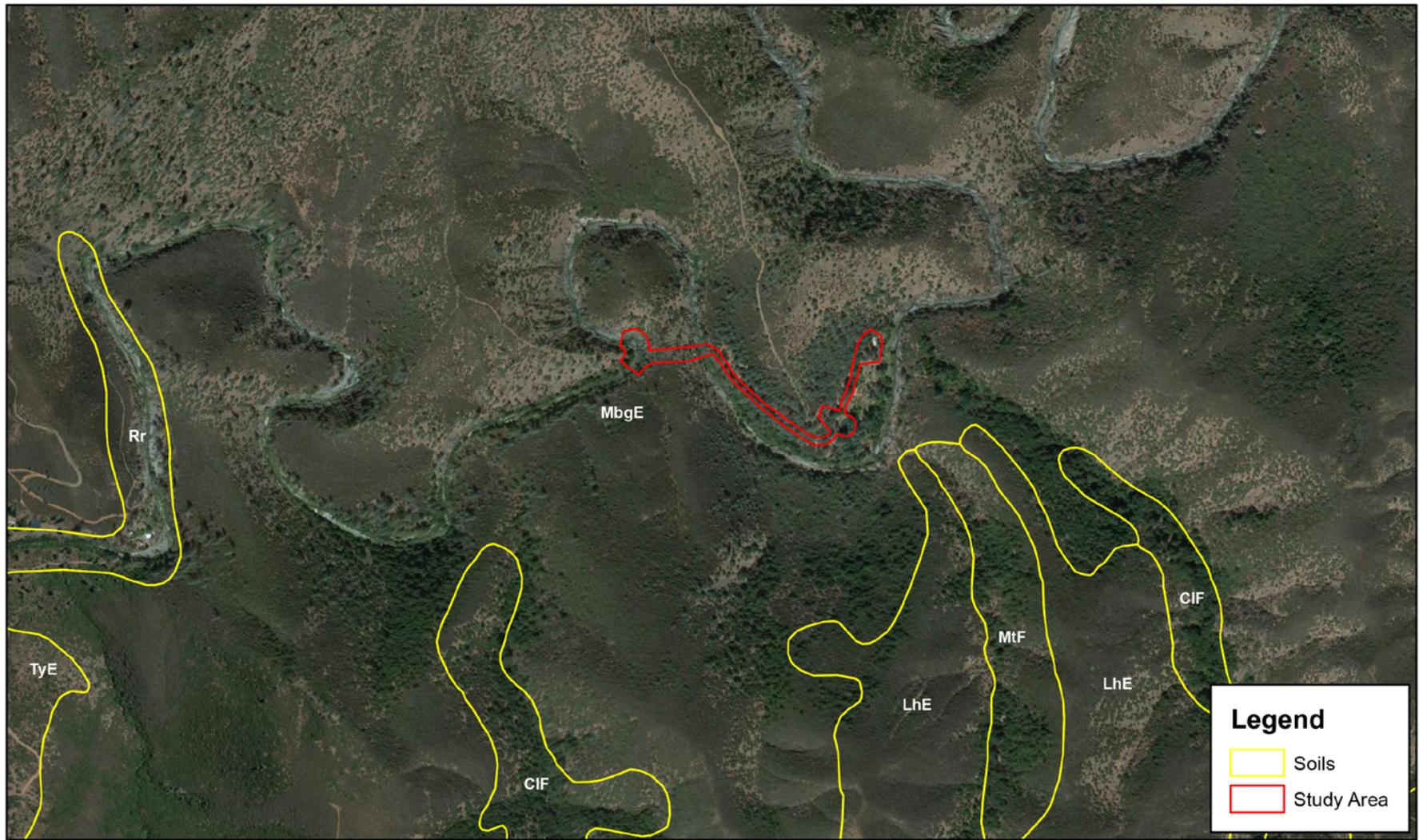
Ground vibration would occur as a result of the explosives used for the dam demolition. The main concern that has been identified is any potential impact on the nearby diversion tunnel. Potential damage to the tunnel is considered a potentially significant impact. The shot plan prepared by CDFW (Appendix B) indicates that the amount of explosives that will be detonated at a given point in time (with the use of a delay sequence) is far below the suggested limit for blasting around human-made structures.

Construction-related ground disturbances will occur as a result of the piping of the ditch, the installation of the new water storage tank, and other work associated with the power and water system upgrades. Substantial soil erosion could occur as a result of the ground disturbance which is considered a potentially significant impact.

During the initial winter, and to a lesser extent for several following winters, an estimated 1,200 to 2,600 cubic yards of sediment that is currently stored upstream of the dam will be redistributed by high flows (J. Howard pers. comm.) The stored sediments are primarily composed of gravel and cobble, with smaller amounts of sand and finer materials (J. Howard pers. comm.). This restoration of sediment routing through the project reach which will restore ecological processes that are expected to benefit all native fish and wildlife species. These sediments are expected to form new bars and riffles downstream of the current dam location, which will create additional spawning and rearing habitat for salmonids. Because the amount of sediment is small, and mobilization will occur primarily during high flows when background turbidity and sediment transport is relatively high, these impacts are less than significant.

The following measures would be implemented to avoid and minimize impacts to geology and soil resources and to mitigate potentially significant impacts to less than significant levels:

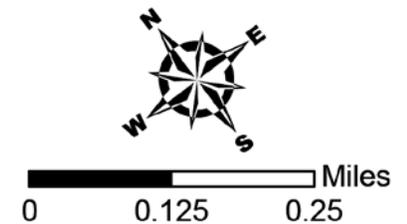
- SOIL / GEO-1:** After ground-disturbing activities are complete, all disturbed areas (outside of the active stream channel and the ditch bottom) shall be seeded with native plant species and mulched.
- SOIL / GEO-2:** Construction of all project actions shall comply with RWQCB Basin Plan Objectives and an erosion control plan. Standard Best Management Practices will be incorporated into the project designs.
- SOIL / GEO-3:** Time delays will be used for the blasting operations during dam demolition to minimize the level of ground vibration and reduce the risk of damage to the nearby tunnel.



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**Hammer Diversion on  
 South Fork Cottonwood Creek  
 Fish Passage Improvement Project**  
 Tehama County, California  
 January, 2014

**FIGURE 14**  
 Soil Survey Map



DATA SOURCE: USDA Natural Resources Conservation Service, November, 2013

PHOTO SOURCE: Google Earth, July, 2012

## **3.9 Hazards and Hazardous Wastes**

### **3.9.1 Affected Environment**

Hazardous materials management involves the prevention of illegal hazardous materials actions on public lands; the proper authorization, permitting, and regulation of the uses of hazardous materials; and the timely, efficient, and safe responses to hazardous materials incidences. Federal, state, and local agencies regulate hazardous materials and hazardous waste. Nonetheless, illegal storage and disposal and unintentional releases of hazardous materials or waste from leaks and accidents can occur when hazardous materials are used or hazardous waste is generated by a project.

Under the California Code of Regulations (CCR), Title 13, Section 1150-1194, and CFR, Title 49, the California Highway Patrol (CHP) regulates the transport of hazardous materials. When a spill of hazardous material or waste occurs on a highway, such as State Route 36, the CHP is responsible for directing cleanup and enforcement (CCR Section 2450-2453b).

There are no public airports or private airstrips near the project site.

The project site is located within an area that is designated as a “very high” fire severity zone. On the Tehama County Natural Hazard Disclosure (fire) map, most of the non-federal land outside the valley floor of Tehama County is classified as a “wildland area that may contain substantial forest fire risks and hazards” pursuant to Public Resources Code Section 4125. It is noted on this map that the owners of property in this area are subject to the maintenance requirements of Section 4291 of the Public Resources Code.

### **3.9.2 Environmental Consequences / Impacts and Mitigation Measures**

#### **Methodology**

A governmental record search (EnviroStor 2014) indicated that there are no known hazardous waste and substances sites located within the project vicinity.

An impact related to hazards and hazardous materials would be significant if the project would:

- a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school;
- d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment;
- e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, the project would result in a safety hazard for people residing or working in the project area;
- f) For a project within the vicinity of a private airstrip, the project would result in a safety hazard for people residing or working in the project area;
- g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or

- h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

### **No Action Alternative**

Under this alternative, no direct use or generation of hazardous materials or wastes would need to be transported within the project area. Because no project would take place, no demolition and construction activities would occur and thus there would not be a risk of hazard to the public through the transport, use, or disposal of hazardous materials; nor would this alternative interfere with emergency response and evacuation plans. Since the project area is not located within an airport land use plan or in the vicinity of a private airstrip, this alternative would not result in an airport safety hazard. Similarly, there would be no impact on wildland fire potential or catastrophic fire behavior because the project would not be implemented.

### **Proposed Action Alternative**

Under this alternative, activities associated with the proposed project would utilize potentially hazardous materials (e.g., oil and fuels) associated with the demolition of the dam and operation of vehicles and construction equipment during project implementation. These materials are similar to those routinely used for other types of construction projects throughout Tehama County. The widespread use and associated transport of these materials along the highways and county roads that traverse Tehama County, combined with the low level of incidents (spills), suggest that impacts related to project activities would be similar to that found elsewhere in the county. Given the temporary nature of construction and the distance from residences, schools, and frequently used recreation areas, implementation of BMPs would minimize the potential for any project-related hazardous materials becoming a public hazard. However, to minimize the potential for release of hazardous materials into the creek as a result of demolition activities, mitigation measures are identified to reduce potential impacts to a less than significant level.

Under the proposed project, construction traffic would include the trucks traveling to and from the site over the course of the construction period. Construction traffic would be limited to daily trips for personnel and routine service and supply vehicles. Accessing the project area would not impede emergency response and evacuation plans. The impacts created would be less than significant; therefore, no mitigation is required.

Shot guards (personnel) would be placed up and down the canyon and blasting signs on the road leading to the residence. Shot guards would ensure that all personnel and the public are safely excluded from the blast site. Only personnel needed for the shot would be allowed at the site while it is being loaded. Once loaded, no one would be allowed back into the site until the "all clear" signal is given by the blaster in charge. In addition to personnel safeguards, all requirements from Tehama County-issued Blasting Permit would be implemented to ensure hazards compliance and a less than significant impact on any potential sensitive receptors within the project area.

Blasting activities are a potential source of wildfire ignition. The vegetation in the project area is composed of a fire-adapted vegetation community and is very susceptible to wildfire. This is considered a potentially significant impact.

The following measures would be implemented to avoid and minimize impacts to hazards and hazardous wastes and to mitigate potentially significant impacts to hazards and hazardous wastes to less than significant levels:

**HAZARDS-1:** Measures **WATER-4** through **WATER-6** associated with potential petroleum product spills will be fully implemented.

**HAZARDS-2:** Blasting operations will be isolated from flammable materials / vegetation. Weather conditions such as wind / humidity related to a threat of wildfire will be monitored and blast timing will be adjusted accordingly. A shovel and an operational full five-gallon backpack pump or a 4A fire extinguisher will be readily accessible at several strategic locations surrounding the blast site. Fire watchers will remain in the area for at least one hour following detonation.

## 3.10 Hydrology and Water Quality

### 3.10.1 Affected Environment

The project site is located within South Fork Cottonwood Creek, a perennial stream which is one of three main tributaries of Cottonwood Creek, which eventually flows into the Sacramento River. The Cottonwood Creek watershed includes a total area of 938 square miles. The South Fork Cottonwood Creek / Cottonwood Creek confluence is approximately 12 stream miles west of the Cottonwood Creek / Sacramento River confluence and encompasses approximately half of the total Cottonwood Creek watershed area (CH2MHill 2002). No other streams are present within the project site, however there are a number of perennial, intermittent and ephemeral streams in the general project area.

#### Water Quality

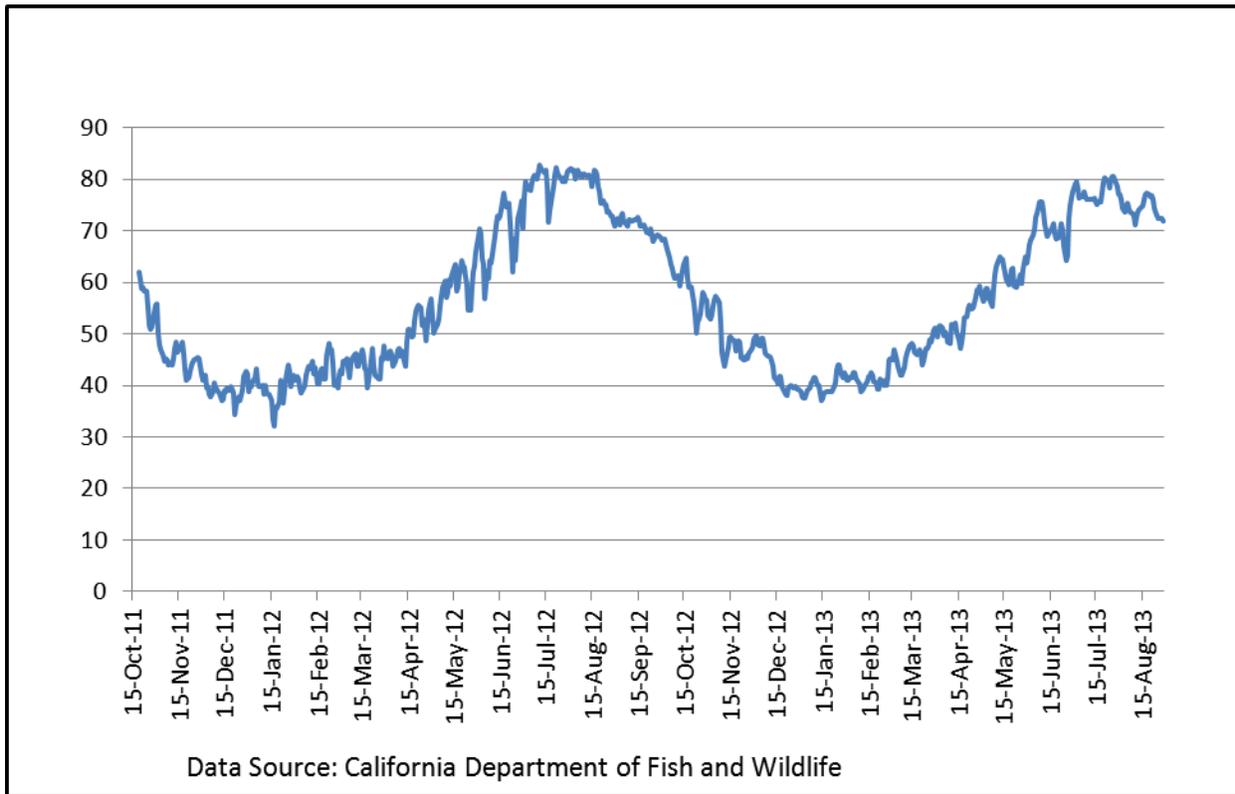
Cottonwood Creek water quality is generally considered to be good from a drinking water perspective (CH2MHill 2002). Fairly extensive water quality monitoring occurred in the 1970s during studies conducted for the then-proposed Tehama Dam on South Fork Cottonwood Creek and the then-proposed Dutch Gulch Dam on the Middle Fork Cottonwood Creek. These studies indicated that the South Fork has higher maximum stream temperatures and greater daily temperature fluctuations than the Middle Fork (CH2MHill 2002). Another study in the late 1980s indicated that South Fork Cottonwood Creek and the mainstem of Cottonwood Creek were the second and third most turbid streams of 11 westside Sacramento River tributary streams sampled (CH2MHill 2002). Several potential causes for elevated turbidity in the South Fork include a landslide at Slides Creek, unique geography or soils, past fires, land use practices and construction activities (CH2MHill 2002).

Water temperature data has been collected at the Hammer diversion site by CDFW since the fall of 2011. The results indicate that summer maximum stream temperatures in the reservoir just upstream of the dam exceed 80°F during the summer months (Figure 15). No other water quality monitoring has been collected at the project site.

#### Groundwater Quality

Cottonwood Creek falls within the Redding Groundwater basin. The Redding Groundwater basin is 120 square miles and is drained by the Sacramento River (CH2MHill 2002). Water-bearing minerals include younger and older alluvium with an average well yield of 640 gpm (CH2MHill 2002). Well studies were conducted by the USGS in 1982 downstream of the then-proposed Tehama and Dutch Gulch dam sites near the South Fork and Middle Fork, respectively. The results indicated that the groundwater quality was considered good to excellent with regard to drinking water standards (CH2MHill 2002).

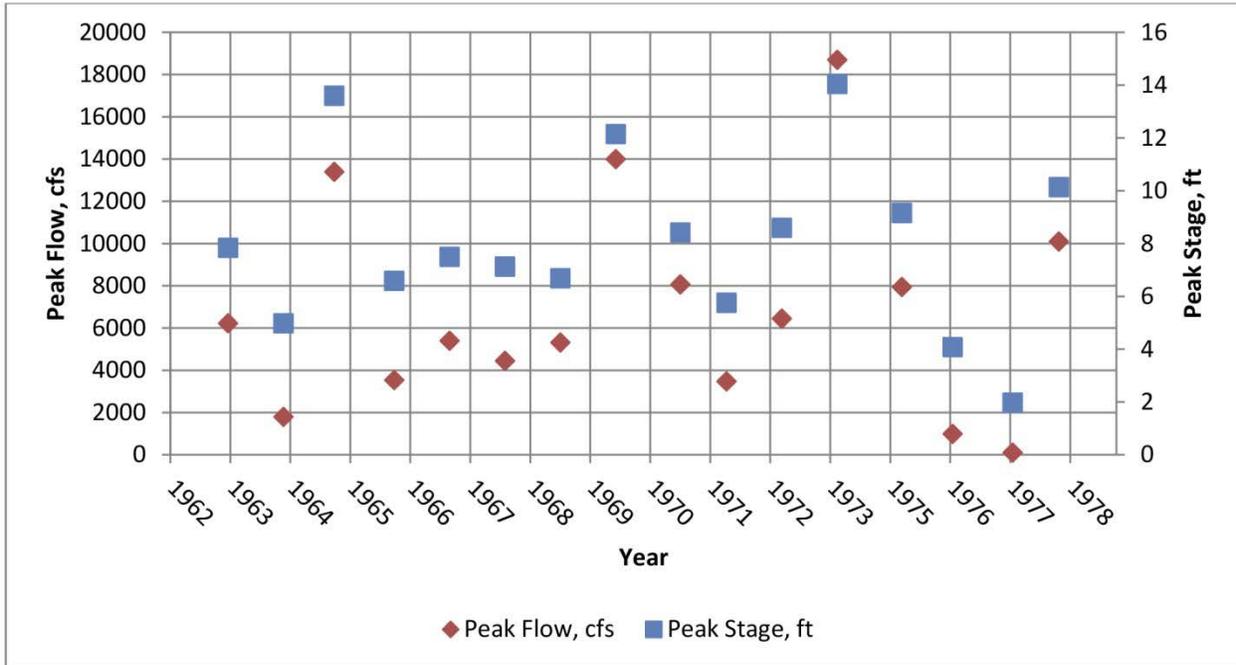
Figure 15. Maximum Hammer Diversion Stream Temperatures



### Hydrologic Analysis

A hydrologic analysis was conducted for the project site as part of the alternative analysis (NHC 2013a). Project site hydrology was established by transposing the recorded mean daily flow data from a USGS gage station located approximately 23 miles downstream of the site (USGS gage 11375820). The stream near the gage is known to go dry during the late summer and early fall and as a result may not measure data that can be transposed to the project site during this period. The USGS measured mean daily flow data and annual peak flow data from water year (WY) 1963 through WY 1978. Figure 16 shows the annual peak flows and stage recorded at the USGS gage. The highest mean daily flood flow recorded was approximately 18,700 cfs.

**Figure 16. Recorded Peak Flow and Stage at USGS Gage from WY 1964 Through WY 1978**



Flow duration estimates were transposed from the USGS gage data to the project site Table 4 summarizes these values for the project site and gage station. Table 5 shows flood event flows at the USGS gage and project site. The 100-year and 2-year event flows at the project site are 14,842 cfs and 2,085 cfs, respectively.

	Project Site	USGS Gage
Drainage Area (square miles)	218	103
Mean Annual Precipitation (inches)	42.8	51.5
Altitude Index (1000 feet)	2.76	3.83

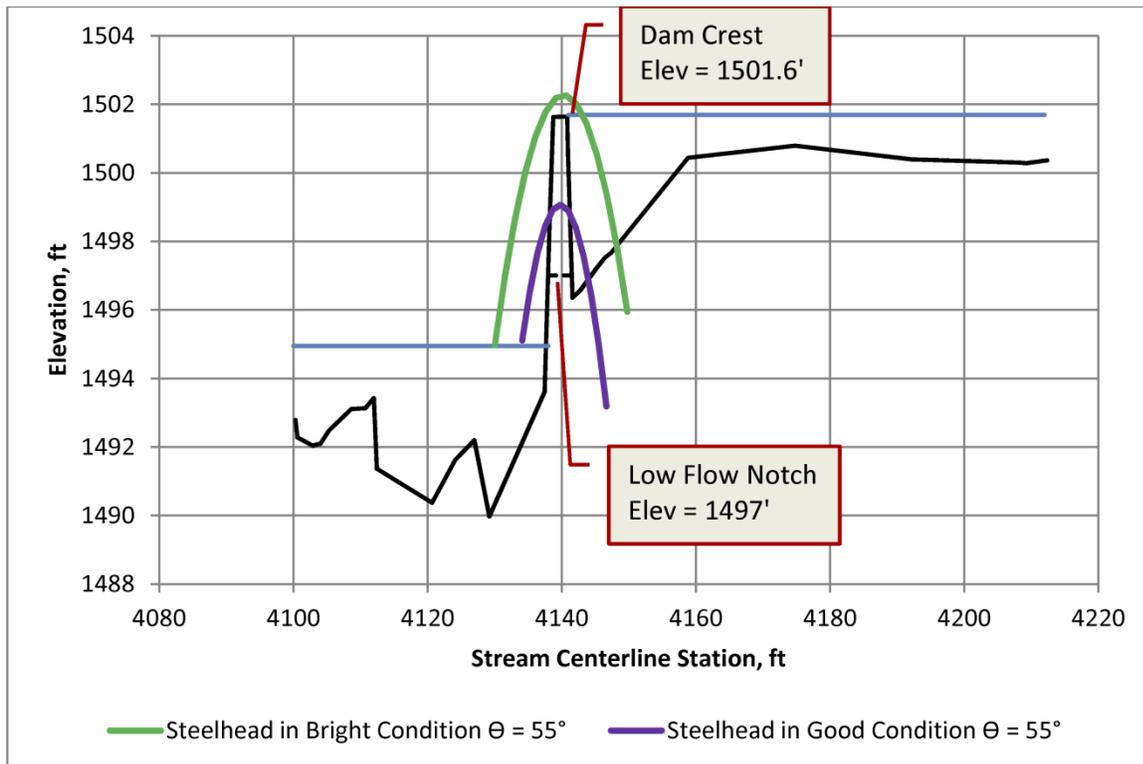
	Flows at USGS Gage (cfs)	Transposed Flow at Site (cfs)
2-Year	4,050	2,085
5-Year	7,039	3,811
10-Year	9,975	5,606
25-Year	13,939	8,171
50-Year	19,091	11,569
100-Year	23,813	14,842

## Fish Passage Assessment

Fish passage past the Hammer diversion dam was estimated by comparing the hydraulic head differences and average velocities for a range of flows with steelhead leaping and swimming capabilities (NHC 2013a). The hydraulic conditions for flows from 10 to 4,000 cfs were computed immediately upstream and downstream of the diversion dam. Trajectories of leaping steelhead were computed using methods and parameters used by Power and Osborn (1985). The fish's leap trajectory is computed based on the burst speed and leap angle. The burst speed varies with the condition of the fish. Power and Osborn define the condition of fish as bright, good, and poor. This determination is based on the distance a fish travels upriver from the ocean. Steelhead capabilities of passing the dam were computed for the condition when the flashboards were not installed in the notch of the dam and at the flow with the maximum leap height of 6.7 feet (140 cfs).

Figure 17 shows the trajectory of steelhead in bright and good condition leaping at an angle of 55 degrees at stream flow of 140 cfs. Based on this assessment, a steelhead in bright condition is capable of leaping a height of about 7.3 feet over a distance of about 20 feet, which is sufficient to pass the existing dam. A steelhead in good condition possesses the ability to leap a height of 4.1 feet and travel a horizontal distance of about 10 feet. Under these assumptions, a steelhead in good condition would not be able to leap over the crest of the dam, but could leap into the nape of the low flow notch of the dam and potentially continue swimming to the pool behind the dam. Although not shown in the figure, a steelhead in poor condition is not capable of passing the dam. With the flashboards in place, the leap height and distance would likely exceed a steelhead's capability of leaping over the dam crest. This analysis is useful for assessing if the dam is likely to be a complete barrier to steelhead. However, the fact that a fish is capable of passing a structure does not consider other important impacts that a partial barrier may have on a fish's ability to complete its lifecycle, such as the structure's potential to cause delay, increased risk of predation, and increased stress.

**Figure 17. Fish Leaping Ability at Hammer Diversion Dam at Flow of 140 cfs**



### 3.10.2 Environmental Consequences / Impacts and Mitigation Measures

#### Methodology

Impacts on water quality and hydrology were evaluated by analyzing regional and site specific reports, including hydrologic studies conducted for the project (NHC 2013a, 2013b, 2013c). The analysis was conducted through document review and site visits.

Significant impacts would occur to the water quality and hydrology if the project would:

- a) Violate any water quality standards or waste discharge requirements;
- b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted);
- c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation onsite or offsite;
- d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding onsite or offsite;
- e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- f) Otherwise substantially degrade water quality;

- g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- h) Within a 100-year flood hazard area, structures which would impede or redirect flood flows;
- i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; or
- j) Inundation by seiche, tsunami, or mudflow.

### **No Action Alternative**

Under this alternative, no changes would occur to the existing diversion or diversion practices. Stream flows would continue to be diverted at the current rate between spring and late fall / early winter and no changes to instream flows or water temperatures would occur. Beneficial impacts to water quality downstream of the current diversion structure from reduced diversion amounts, and the elimination of the water warming effects of the shallow reservoir upstream of the diversion would not occur.

### **Proposed Action Alternative**

Under this alternative, water quality impacts to South Fork Cottonwood Creek could occur as a result of the piping of the ditch, if work were to occur when the ditch was flowing and water return flows were to reenter the creek. This is considered a potentially significant impact.

Water quality impacts to South Fork Cottonwood Creek could occur if fuel, oil or other petroleum products were accidentally spilled as a result of operation of the generator during dam demolition activities and entered surface waters. This is considered a potentially significant impact. A short-term increase in turbidity and suspended sediments would likely occur immediately following blasting operations as the creek channel adjusted to the change in bed form. This increase in turbidity and suspended sediments would occur when background turbidity and suspended sediments are low, therefore this is considered a potentially significant impact. During the initial winter, and to a lesser extent for several following winters, an estimated 1,200 to 2,600 cubic yards of sediment that is currently stored upstream of the dam would be redistributed by high flows (J. Howard pers. comm.) The stored sediments are primarily composed of gravel and cobble, with smaller amounts of sand and finer materials (J. Howard pers. comm.). This restoration of sediment routing through the project reach would restore ecological processes that are expected to benefit all native fish and wildlife species. These sediments would be expected to form new bars and riffles downstream of the current dam location, which would create additional spawning and rearing habitat for salmonids. The redistribution of sediments would likely cause a temporary increase in turbidity in South Fork Cottonwood Creek. However because the amount of sediment is small, and mobilization would occur primarily during high flows when background turbidity and sediment transport is relatively high, these impacts are considered less than significant. This alternative would not impact groundwater supplies, increase onsite or offsite flooding, contribute additional run-off water, place housing within flood hazard areas, place structures that would impede or redirect flood flows, expose people or structures to flooding impacts, or cause inundation by seiche, tsunami or mudflows. Under this alternative, beneficial impacts to water quality downstream of the current diversion structure would occur from reduced diversion flows and the elimination of the water warming effects of the shallow reservoir upstream of the diversion.

The following measures would be implemented to avoid and minimize impacts to water resources and water quality and to mitigate potentially significant impacts to water resources and water quality to less than significant levels:

**WATER-1:** Ditch piping shall occur when the ditch is not flowing.

**WATER-2:** Dam demolition shall be conducted in the summer / early fall during the low flow period.

**WATER-3:** Monitoring of water turbidity and settleable materials shall be conducted in accordance with the Clean Water Act Section 401 Certification through consultation with the RWQCB.

**WATER-4:** All equipment and machinery that contains fuel, oil or other petroleum products used during dam demolition shall be checked for petroleum leaks immediately prior to being mobilized to the project site and again each day prior to use.

**WATER-5:** All equipment and machinery that contains fuel, oil or other petroleum products used during dam demolition will be operated and stored within an impervious secondary containment structure. All refueling and/or maintenance shall take place within the secondary containment structure.

**WATER-6:** An emergency spill kit and absorbent oil booms will be onsite during dam demolition preparation activities.

**WATER-7:** Measures **SOIL / GEO-1** and **SOIL / GEO-2** regarding erosion control will be fully implemented.

### **3.11 Land Use**

#### **3.11.1 Affected Environment**

The Tehama County General Plan designation for the project site is UA. The Tehama County zoning designation for the project site is zoned AG-1 (Pacific Municipal Consultants 2009). The project site is within the Western Planning Area of the Tehama County General Plan. This planning area is located in the western portion of the County and includes the communities of Paskenta, Flournoy, Henleyville, and the Rancho Tehama subdivision.

This area supports large land areas held in public ownership, timber preserve, and lands utilized for grazing. Road access within the West County Planning Area is provided primarily by State Highway 36, which runs east-west across the northern portion of the County. The primary east-west running county roads in the West County Planning Area are Paskenta Road, Lowery / Red Bank Roads, Reeds Creek Road, Corning Road, and Cannon Road. Currently, there are no improved north-south roadways within the West County Planning Area.

#### **3.11.2 Environmental Consequences / Impacts and Mitigation Measures**

##### **Methodology**

The methodology used for the land use impact analysis involved an assessment of the compatibility of the proposed project with relevant plans and policies, and a review of the Tehama County General Plan, and zoning in relation to surrounding land uses and site features. The analysis was conducted through document review, site visits and discussions with Tehama County staff.

Impacts to land uses would be significant if they would:

- a) Physically divide an established community;

- b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect; or
- c) Conflict with any applicable habitat conservation plan or natural community conservation plan.

### **No Action Alternative**

Under this alternative, no change of land use or activities would occur. Diverted flows from Cottonwood Creek would continue to service the private residential and agricultural uses of the site. Diversions would continue to generate electricity, irrigate, and supply secondary domestic residential water on the property. There would be no impacts to the current land use.

#### **3.11.2.3 Proposed Project Alternative**

Under this alternative, construction for the residential improvements will require permitting and inspection by Tehama County Planning and Public Works Department. The project area is located within Tehama County's AG-1 land use zone, which limits land uses to further agriculture production. Discussions with Tehama County staff indicates that due to the project providing water to the landowner's existing agricultural use orchards and gardens, the work likely fits within acceptable improvements in the land use zone. Tehama County requires that the Planning Department review the project plans to ensure the activities meet the allowable land use. Upon Planning Department approval, the plans will be reviewed by Tehama County Public Works Department to confirm the improvements meet County building codes. The proposed project remains consistent with the goals, policies, and objectives of the Tehama County General Plan and Zoning Ordinance. Project implementation would not interfere with, preclude, or conflict with existing land uses adjacent to the project area. There would be no conflicts with, or disruptions to adjacent land uses from the proposed project. Because there would be no impact to land use, no mitigation is required.

### **3.12 Noise**

#### **3.12.1 Affected Environment**

Noise concerns are described in terms of sensitive receptors, or noise-sensitive land uses within hearing range of the activity. In addition to the Hammer residence, aerial photography helped identify three other potential sensitive receptors near the project area. These potential receptors were located within the canyon of South Fork Cottonwood Creek at 1.0 mile west, 1.3 miles west and 0.6 miles east of the Hammer dam location. Land uses at these locations could not be accurately identified from aerial photography.

The project area is rural and extremely isolated with unpaved road access to the Hammer residence and no road access to the dam site. There is no sustained daily traffic noise in the area due to the rural features. There is existing ambient and background noise associated with South Fork Cottonwood Creek, the Hammer dam spillway and varied wildlife activities. Varying ambient noise level at the dam is dependent upon the volume of water flowing over the structure.

### 3.12.2 Environmental Consequences / Impacts and Mitigation Measures

#### Methodology

Construction noise related to the dam removal and site improvements are the focus of this analysis. Assumptions related to construction equipment and industry noise averages were used to evaluate construction-related noise impacts.

An impact related to Noise would be significant if the project would cause:

- a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- b) Exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels;
- c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels;
- f) For a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

#### No Action Alternative

Under this alternative, the proposed project would not be implemented, therefore no change in permanent, temporary or periodic ambient noise levels would occur.

#### Proposed Action Alternative

Under this alternative, construction vehicles entering and leaving the residence area would temporarily increase traffic levels and, thus, ambient noise levels along 4,900 feet of unpaved driveway. Due to the weight of the equipment necessary to perform the dam removal, and the lack of road access to the dam, helicopter support would be needed to mobilize the equipment on the first day of the project as well as demobilize from the site on the last day. Any drilling noise required for dam removal should take approximately two days and the impacts relating to loading, blasting and cleanup should take one additional day. The noise levels of typical construction equipment that could be used to implement the project are shown in Table 6.

<b>Equipment Description</b>	<b>At 50 feet (Decibels- Acoustic, slow)</b>
Auger Drill Rig	85
Backhoe	80

Blasting	94
Boring Jack Power Unit	80
Compressor (air)	80
Crane	85
Dozer	85
Flat Bed Truck	84
Front End Loader	80
Generator	82
Jackhammer	85
Pneumatic Tools	85
Pumps	77
Rock Drill	85

Source: Federal Highway Administration Roadway Construction Noise Model

During the construction phase of the project, noise from construction activities would temporarily impact the environment in the immediate area. There would be no permanent noise impacts resulting from implementation of the proposed project. It is not anticipated that ground vibration created by project activities would be detectable at any sensitive receptor locations and would not result in any structural damage. Recreational users in the general vicinity of the site could encounter increased noise levels during construction activities if they were nearby but its impact would be temporary and localized. As such, the temporary nature and anticipated noise levels of the proposed construction activities would produce less than significant impacts.

The dam would be removed with the use of binary explosives. The use of time delays would minimize the level of ground vibration thus reducing noise impacts and the risk of damage to the nearby tunnel. Shot guards (personnel) would be stationed up and down the canyon and blasting signs placed on the road leading into the residence. Shot guards would ensure that all personnel and the public are excluded from the blast site. Only personnel needed for the shot would be allowed at the site while it is being loaded. Once loaded, no one would be allowed back into the site until the "all clear" signal is given by the blaster in charge.

Air blast is a potential impact, but due to the canyon wall confinement, minimal noise would escape from the immediate area. In addition to personnel safeguards, all requirements from a Tehama County- issued Blasting Permit would be implemented to ensure a less than significant impact on any potential sensitive receptors within the project area.

There are no noise related impacts relating to airport land or airstrips adjacent to or within the project area. Noise related impacts would be less than significant from the proposed project.

### **3.13 Population and Socioeconomic Resources**

#### **3.13.1 Affected Environment**

The project site is located on a remote 160-acre private parcel and serves one primary residence. The property includes a 1,224-square-foot domestic residence and several outbuildings. The residence is serviced by a relatively steep narrow unpaved driveway.

#### **3.13.2 Environmental Consequences / Impacts and Mitigation Measures**

##### **Methodology**

Analysis of the potential population and socioeconomic impacts of the proposed project included qualitative assessments of potential impacts associated with housing, conflicts with county and local plans, population growth, displacement of persons and businesses, and community disruption.

The project would have a significant impact if it would:

- a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure);
- b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere;
- c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

##### **No Action Alternative**

Under this alternative, there would be no impacts to the demographic or socioeconomic characteristics on the Hammer Property or surrounding area. The current land use and zoning, combined with the rural transportation infrastructure of the project area, limit substantial population growth and displacement.

##### **Proposed Action Alternative**

Under this alternative, removal of the dam would not cause an economic or housing disruption. The dam currently serves no economic purpose other than to service the primary residence. Modifications associated with the project would continue to provide power, electricity, irrigation water and fire control to the existing site in order to sustain the current population and residential needs. No short-term or long-term residential displacement would occur during the implementation phases of the proposed project. No new transportation infrastructure or businesses would develop that would directly or indirectly influence local or regional population growth. No impacts would occur on the Hammer property or surrounding areas to the local population, unemployment, median per capita income, or local industry.

### **3.14 Public Services and Utilities / Energy**

#### **3.14.1 Affected Environment**

The utility needs for the Hammer site are self-contained and not dependent upon public infrastructure. The Hammer family has an appropriative right for 3 cfs on the South Fork of Cottonwood Creek. Diverted flows are used to generate electricity, irrigate, and as a secondary source of domestic water for a residence on the property. During the months of July and September, the maximum power consumption

by the landowner is about 3,000W. About two-thirds of the peak power needs are met with solar energy and about one-third with hydropower.

Power to the buildings on the property is conventional 120V Alternating Current (AC). Within the residence, electricity is used to power household appliances, water heater, electric resistance heaters in the winter, and a wall mounted air conditioning unit in the summer. Power outside of the residence is used for lighting, tools and equipment. Power is generated through hydroelectric plants on South Fork Cottonwood Creek and Hensley Creek and from twelve 192W PV panels installed on the roof. The stream diversion and hydroelectric power plant was constructed in the 1930s and 1940s to provide power and water to the property. The diversion has been maintained and upgraded, but appears to utilize much of the original infrastructure.

### **3.14.2 Environmental Consequences / Impacts and Mitigation Measures**

#### **Methodology**

A technical energy systems analysis was conducted for the existing conditions within the project area (Sharpe Energy Solutions 2012).

An impact related to Public Services and Utilities / Energy would be significant if the project would:

- a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:
  - a. Fire protection
  - b. Police protection
  - c. Schools
  - d. Parks
  - e. Other public facilities
- b) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board;
- c) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- d) Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- e) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed;
- f) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments;
- g) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs; or
- h) Comply with federal, state, and local statutes and regulations related to solid waste.

#### **No Action Alternative**

Under this alternative, no demand for public services would occur over the short-term or long-term. The project area's utility needs would continue to be serviced through solar power and diversions from South Fork Cottonwood Creek.

## **Proposed Action Alternative**

Under this alternative, no activities would occur to disrupt or require any government facilities. Site electrical and water needs would continue to remain self-sufficient within the project area and would not require additional public utilities or maintenance. No public stormwater infrastructure, wastewater treatment or additional landfill service is needed.

Construction would result in the generation of solid waste associated with the dam removal as well as other construction-related waste (e.g., garbage, containers, and oil). Disposal of potentially hazardous waste is evaluated in Section 3.9 Hazards and Hazardous Wastes. Construction would not have a significant effect on local or regional energy sources. Contractors would be responsible for their own utilities during construction activities. No impacts would result to public utilities and services in the project area as a result of the proposed project.

## **3.15 Recreation**

### **3.15.1 Affected Environment**

Parcels directly to the north and south of the project site are federal lands administered by the BLM. Both parcels include portions of South Fork Cottonwood Creek where fishing and hunting are known to occur, along with hiking and other outdoor recreational activities. The BLM has identified the middle section of the South Fork as having the potential for Class IV-VI whitewater floating but has no record of floating having occurred. According to BLM analysis, much of the middle segment has excellent opportunities for “primitive types of outdoor experiences” due to its secluded, undeveloped, physically demanding, and inaccessibility by roads or trails (BLM 1993). Parcels directly east and west are privately owned and recreation use is unknown. There are no developed regional or neighborhood parks or other recreational facilities within or directly adjacent to the project site.

### **3.15.2 Environmental Consequences / Impacts and Mitigation Measures**

#### **Methodology**

The analysis of the potential effect on recreation resources as a result of the proposed project consists of identifying recreational resources near the project area and determining whether implementation of the action would impact these resources. In addition to evaluating the impacts on recreational resources, an evaluation was made of the project’s consistency with Tehama County recreation objectives.

Impacts associated with recreational uses would be significant if the project would:

- a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated;
- b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

#### **No Action Alternative**

Under this alternative, no change in recreational uses would occur. The types of recreational activities within the project area, as well as upstream and downstream of the dam would remain unaffected. Potential recreational benefits, in the form of increased fish populations as a result of the proposed project, would not occur.

## **Proposed Action Alternative**

Under this alternative, no new recreational facilities would be required nor would any existing facilities be negatively impacted. During the demolition of the dam, a limited duration of increased turbidity downstream of the project site would likely occur that could impact recreational uses for a short time. However, because recreational use of the area appears to be very light, and the impact would be very short in duration, this is considered a less than significant impact.

Within the Tehama County General Plan, the UA land use designation preserves lands for commercial recreation such as fishing, and lists fishing as a general use. Under this alternative, beneficial impacts to recreation would likely result from increased fish populations, both locally and regionally, consistent with the Tehama County General Plan recreation goals. Construction mitigation would comply with water quality objectives for the project to make sure any materials released into the river that could cause a nuisance or adversely affect recreation uses would not result in a significant impact. Refer to Section 3.10 Hydrology and Water Quality for water quality mitigation measures.

## **3.16 Transportation**

### **3.16.1 Affected Environment**

The project area is rural and extremely isolated with unpaved road access to the Hammer residence and no road access to the dam site. There is no sustained daily traffic in the area due the rural features. Vehicular access to the residence requires driving about 4,900 feet along a relatively steep narrow unpaved driveway. The driveway is about 10 feet wide and has several sections with slopes of about 10 percent or more. Access to the dam at Cottonwood Creek requires access from the Hammer Loop Road along the Hammer property access road, crosses the channel at a wet crossing and follows along a 3800-foot-long “scooter trail” to the site.

### **3.16.2 Environmental Consequences / Impacts and Mitigation Measures**

#### **Methodology**

A qualitative assessment of traffic effects was performed, based on the construction procedures and equipment that would be used and site review of existing conditions.

An impact related to Transportation would be significant if the project would:

- a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections);
- b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways;
- c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- e) Result in inadequate emergency access;
- f) Result in inadequate parking capacity; or
- g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).

## **No Action Alternative**

This alternative would not produce any potential direct transportation / traffic effects. The project area is rural and isolated nature with unpaved road access to the Hammer Residence. There are no traffic impacts related to sustained regional commuter or residential traffic within the project area.

## **Proposed Action**

Under this alternative, construction activities associated with the proposed residential improvements would require truck and worker vehicle trips from the Hammer Loop Road access via a 4,900 feet relatively steep narrow unpaved driveway. No vehicle access exists to the dam site. Access to the diversion dam requires travel from the Hammer Loop Road via the Hammer property access road, followed by a wet crossing of the stream channel and a 3,800-foot-long "scooter trail" to the site. Due to the weight of the equipment necessary to perform the dam removal, and the extreme difficulty that would be involved transporting this equipment to the site, helicopter support would be needed to transport the equipment on the first day of the project and then out of the site on the last day. The explosives required for dam removal would be transported manually. Due to the small quantities (less than 1,001 pounds) and packaging, the materials can be classified as 1.4 explosives and therefore do not have to be transported in a placarded vehicle, nor do any special route restrictions apply. Construction activities would not reduce / close existing traffic lanes or impact local or regional level of service. As a result of the proposed project, there would be no impacts on transportation.

## **4.0 Consultation and Coordination**

### **4.1 Tribes, Agencies, and Organizations Contacted or Consulted**

Letters were sent to Native American Tribes in accordance with Section 106 of the National Historic Preservation Act. The California State Historic Preservation Officer, NMFS, and USFWS were also consulted regarding the project.

### **4.2 Public Comments**

The Draft EA / IS and FONSI / MND were released for public review from April 2, 2014 to May 1, 2014. Appendix J includes copies of all of the comments received. Appendix K includes responses to the comments received.

## 5.0 Compliance with Environmental Laws and Regulations

The following environmental laws and regulations will be complied with, as applicable, for the proposed project:

<b>Environmental Law / Regulation</b>	<b>Agency</b>
California Endangered Species Act	California Department of Fish and Wildlife
California Environmental Quality Act	Central Valley Regional Water Quality Control Board
Clean Air Act	Tehama County Air Pollution Control District
Clean Water Act Section 401	Central Valley Regional Water Quality Control Board
Clean Water Act Section 404	U.S. Army Corps of Engineers
California Water Code Sections 8710-8723	Central Valley Flood Protection Board
Endangered Species Act	National Marine Fisheries Service U.S. Fish and Wildlife Service
Magnuson-Stevens Fishery Conservation and Management Act	National Marine Fisheries Service
Migratory Bird Treaty Act	U.S. Fish and Wildlife Service
National Environmental Policy Act	U.S. Fish and Wildlife Service
National Historic Preservation Act Section 106	State Historic Preservation Officer
Executive Order 11990 Protection of Wetlands	U.S. Fish and Wildlife Service
Executive Order 11988 Floodplain Management	U.S. Fish and Wildlife Service

## 6.0 List of Preparers and Participants

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## 7.0 References and Persons Consulted

### 7.1 References

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## **7.2 Persons Consulted**

- Mr. Harold Hammer, Hammer Property Landowner, Tehama County, California.
- Mr. Joey Howard, Principal, Cascade Stream Solutions, LLC, Ashland, Oregon.
- Mr. Jeremiah Karuzas, USFWS, Coast Bay/Forest and Foothills Division, Sacramento, California.
- Mr. Doug Killam, Fish Biologist, California Department of Fish and Wildlife, Region 1, Red Bluff, California.

## **APPENDIX A**

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Design Plan Drawings

**SHEET INDEX**

COVER SHEET	G1
GENERAL NOTES & SCHEMATIC SHEET	G2
INTAKE DEMOLITION SHEET	C1
INTAKE PLAN SHEET	C2
PROJECT SITE OVERALL PLAN SHEET	C3
PROFILE SHEET	C4
DETAILS SHEET #1	D1
DETAILS SHEET #2	D2
RESIDENCE IMPROVEMENT SHEET	D3

**GENERAL NOTES**

- THIS PROJECT IS SUBJECT TO REQUIREMENTS OF PERMITS ISSUED BY VARIOUS REGULATORY AGENCIES. THE CONTRACTOR IS RESPONSIBLE TO UNDERSTAND AND PERFORM ALL WORK IN ACCORDANCE WITH THE REQUIREMENTS OF THE PERMITS. COPIES OF THE PERMITS HAVE BEEN PROVIDED TO THE CONTRACTOR ALONG WITH THESE PLANS. PRIOR TO COMMENCING WORK THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT MANAGER TO VERIFY THE MOST RECENT COPY OF ALL APPLICABLE PERMITS ARE INCORPORATED INTO THE PROJECT CONSTRUCTION DOCUMENTS.
- THE CONTRACTOR IS RESPONSIBLE FOR DEVELOPING AN EROSION CONTROL AND POLLUTION PREVENTION PLAN FOR CONSTRUCTION ACTIVITIES. THIS PLAN MUST BE APPROVED BY THE PROJECT MANAGER PRIOR TO CONSTRUCTION ACTIVITIES COMMENCING FOR THIS PROJECT.
- WHEN CONDITIONS IN THE FIELD DO NOT CONFORM WITH INFORMATION IN THESE PLANS AND/OR WHEN UNUSUAL CIRCUMSTANCES ARISE DURING CONSTRUCTION, THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE PROJECT MANAGER.
- IN THE EVENT THAT ANY ARCHEOLOGICAL ARTIFACTS ARE UNCOVERED DURING CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL STOP ALL WORK IMMEDIATELY IN THE AREA AND CONTACT THE PROJECT MANAGER. WORK IN THE AREA SHALL NOT RESUME UNTIL APPROVED BY THE PROJECT MANAGER.
- DURING CONSTRUCTION THE PROJECT MANAGER OR DESIGNATED REPRESENTATIVE MAY MAKE ADJUSTMENTS TO THE DESIGN TO ACCOMMODATE CONDITIONS ENCOUNTERED AT THE SITE.
- ACCESS TO SITE IS THROUGH PRIVATE PROPERTY. CONTRACTOR TO COORDINATE ACCESS, WORK HOURS, AND WORK DATES IN ADVANCE WITH THE OWNER.
- CONSTRUCTION SHALL BE IN ACCORDANCE TO THE FOLLOWING SPECIFICATIONS AND PROVISIONS:
  - COTTONWOOD CREEK FISH PASSAGE IMPROVEMENT PROJECT SPECIFICATIONS
  - CALIFORNIA STANDARD SPECIFICATIONS FOR CONSTRUCTION 2010, REFERRED TO AS "CALTRANS STANDARD SPECIFICATIONS" HEREIN

**LEGEND**

PROPOSED EARTHWORK	
CONSTRUCTION BASELINE	
PRESERVATION FENCE	
PRESERVATION FENCE WITH SILT BARRIER	
CONTROL POINT	

**U.S. Fish & Wildlife Service**

Red Bluff Fish & Wildlife Office

**CONSTRUCTION PLANS FOR  
Hammer Diversion on South Fork Cottonwood Creek  
Fish Passage Improvement Project  
100% DESIGN  
SUBMITTAL  
FEB 2014**

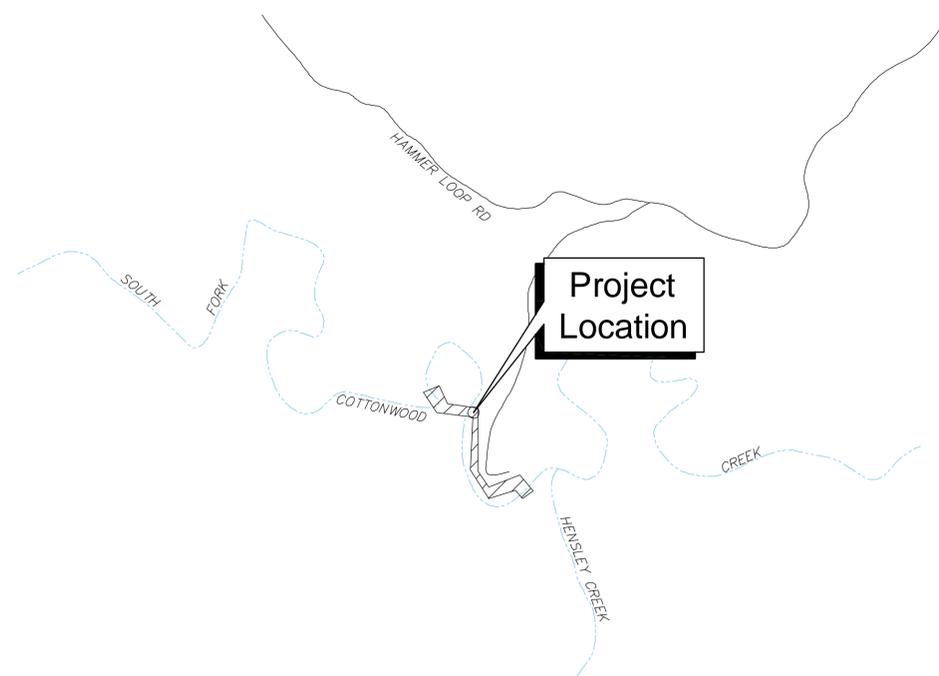
**PROJECT MANAGER**

TRICIA PARKER HAMELBERG  
ANADROMOUS FISH RESTORATION PROGRAM: NORTHERN SACRAMENTO RIVER  
US FISH AND WILDLIFE SERVICES - RED BLUFF OFFICE

APPROVED BY:

HAROLD HAMMER, LAND OWNER (date)

KEN ROOD, NORTHWEST HYDRAULIC CONSULTANTS (date)



Vicinity Map



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northwest  
hydraulic  
consultants

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STREAM  
SOLUTIONS

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*Leonard J. Howard*

2/3/2014

LEONARD J. HOWARD  
CALIFORNIA REGISTERED  
PROFESSIONAL ENGINEER NO. # 53319  
CascadeStreamSolutions

(date)



Project Location Map

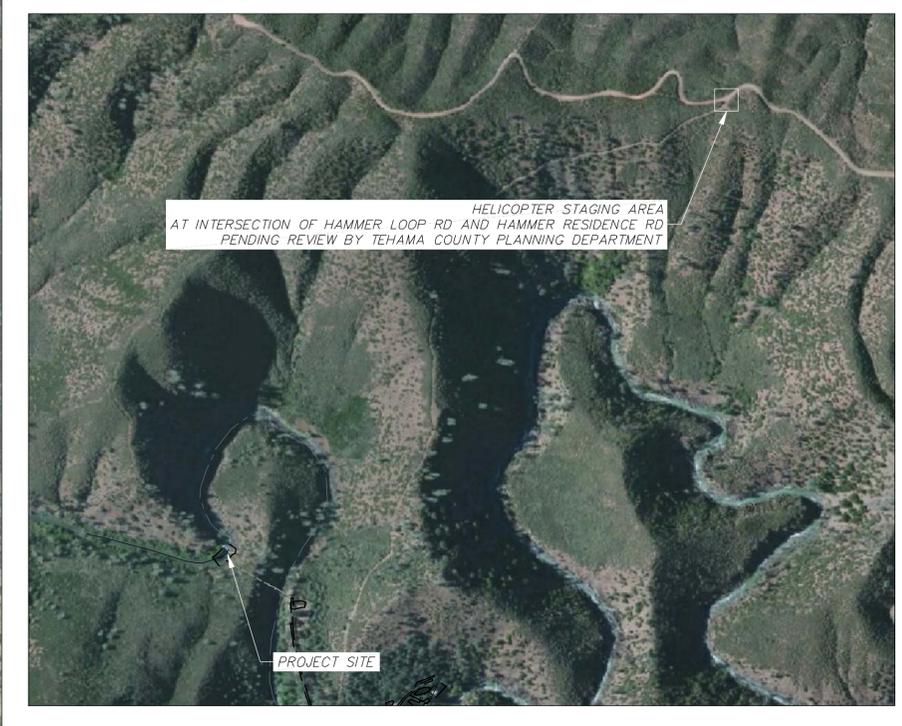
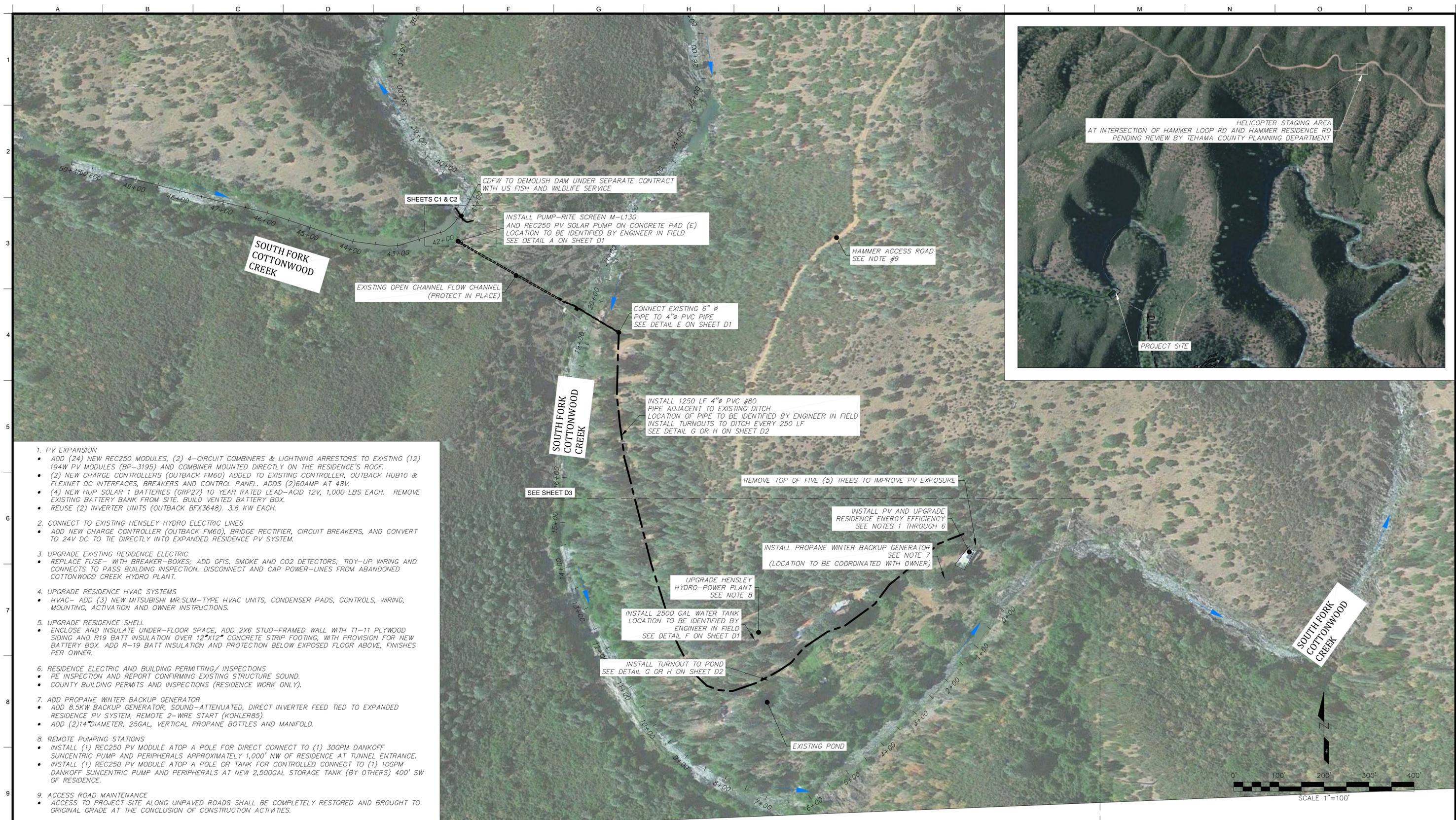
Drawing Name: HAMMER DIVERSION Date: 03 FEBRUARY 2014

Drawing Status: 100% Submittal	Designer: jth/tvs	Drafter: tvs	Checked:	Job Number: 500057
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Sheet Number

Sheet 1 of 9

G1



1. PV EXPANSION
  - ADD (24) NEW REC250 MODULES; (2) 4-CIRCUIT COMBINERS & LIGHTNING ARRESTORS TO EXISTING (12) 194W PV MODULES (BP-3195) AND COMBINER MOUNTED DIRECTLY ON THE RESIDENCE'S ROOF.
  - (2) NEW CHARGE CONTROLLERS (OUTBACK FM60) ADDED TO EXISTING CONTROLLER, OUTBACK HUB10 & FLEXNET DC INTERFACES, BREAKERS AND CONTROL PANEL. ADDS (2)60AMP AT 48V.
  - (4) NEW HUP SOLAR 1 BATTERIES (GRP27) 10 YEAR RATED LEAD-ACID 12V, 1,000 LBS EACH. REMOVE EXISTING BATTERY BANK FROM SITE. BUILD VENTED BATTERY BOX.
  - REUSE (2) INVERTER UNITS (OUTBACK BFX364B), 3.6 KW EACH.
2. CONNECT TO EXISTING HENSLEY HYDRO ELECTRIC LINES
  - ADD NEW CHARGE CONTROLLER (OUTBACK FM60), BRIDGE RECTIFIER, CIRCUIT BREAKERS, AND CONVERT TO 24V DC TO TIE DIRECTLY INTO EXPANDED RESIDENCE PV SYSTEM.
3. UPGRADE EXISTING RESIDENCE ELECTRIC
  - REPLACE FUSE- WITH BREAKER-BOXES; ADD GFI, SMOKE AND CO2 DETECTORS; TIDY-UP WIRING AND CONNECTS TO PASS BUILDING INSPECTION. DISCONNECT AND CAP POWER-LINES FROM ABANDONED COTTONWOOD CREEK HYDRO PLANT.
4. UPGRADE RESIDENCE HVAC SYSTEMS
  - HVAC- ADD (3) NEW MITSUBISHI MR.SLIM-TYPE HVAC UNITS, CONDENSER PADS, CONTROLS, WIRING, MOUNTING, ACTIVATION AND OWNER INSTRUCTIONS.
5. UPGRADE RESIDENCE SHELL
  - ENCLOSE AND INSULATE UNDER-FLOOR SPACE, ADD 2X6 STUD-FRAMED WALL WITH T1-11 PLYWOOD SIDING AND R19 BATT INSULATION OVER 12"x12" CONCRETE STRIP FOOTING, WITH PROVISION FOR NEW BATTERY BOX. ADD R-19 BATT INSULATION AND PROTECTION BELOW EXPOSED FLOOR ABOVE, FINISHES PER OWNER.
6. RESIDENCE ELECTRIC AND BUILDING PERMITTING/ INSPECTIONS
  - PE INSPECTION AND REPORT CONFIRMING EXISTING STRUCTURE SOUND.
  - COUNTY BUILDING PERMITS AND INSPECTIONS (RESIDENCE WORK ONLY).
7. ADD PROPANE WINTER BACKUP GENERATOR
  - ADD 8.5KW BACKUP GENERATOR, SOUND-ATTENUATED, DIRECT INVERTER FEED TIED TO EXPANDED RESIDENCE PV SYSTEM, REMOTE 2-WIRE START (KOHLERB5).
  - ADD (2)14"DIAMETER, 25GAL, VERTICAL PROPANE BOTTLES AND MANIFOLD.
8. REMOTE PUMPING STATIONS
  - INSTALL (1) REC250 PV MODULE ATOP A POLE FOR DIRECT CONNECT TO (1) 30GPM DANKOFF SUNCENTRIC PUMP AND PERIPHERALS APPROXIMATELY 1,000' NW OF RESIDENCE AT TUNNEL ENTRANCE.
  - INSTALL (1) REC250 PV MODULE ATOP A POLE OR TANK FOR CONTROLLED CONNECT TO (1) 10GPM DANKOFF SUNCENTRIC PUMP AND PERIPHERALS AT NEW 2,500GAL STORAGE TANK (BY OTHERS) 400' SW OF RESIDENCE.
9. ACCESS ROAD MAINTENANCE
  - ACCESS TO PROJECT SITE ALONG UNPAVED ROADS SHALL BE COMPLETELY RESTORED AND BROUGHT TO ORIGINAL GRADE AT THE CONCLUSION OF CONSTRUCTION ACTIVITIES.




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Revisions		
No.	Date	Description

Drawing Information	
Date	03 FEBRUARY 2014
Status	100% Submittal
Designer	ljh/tvs
Drafter	tvs
Checked	ljh
File Name	HAMMER DIVERSION
Plotted Scale	0 1/2 1

**Cottonwood Creek Fish  
 Passage Improvement Project**

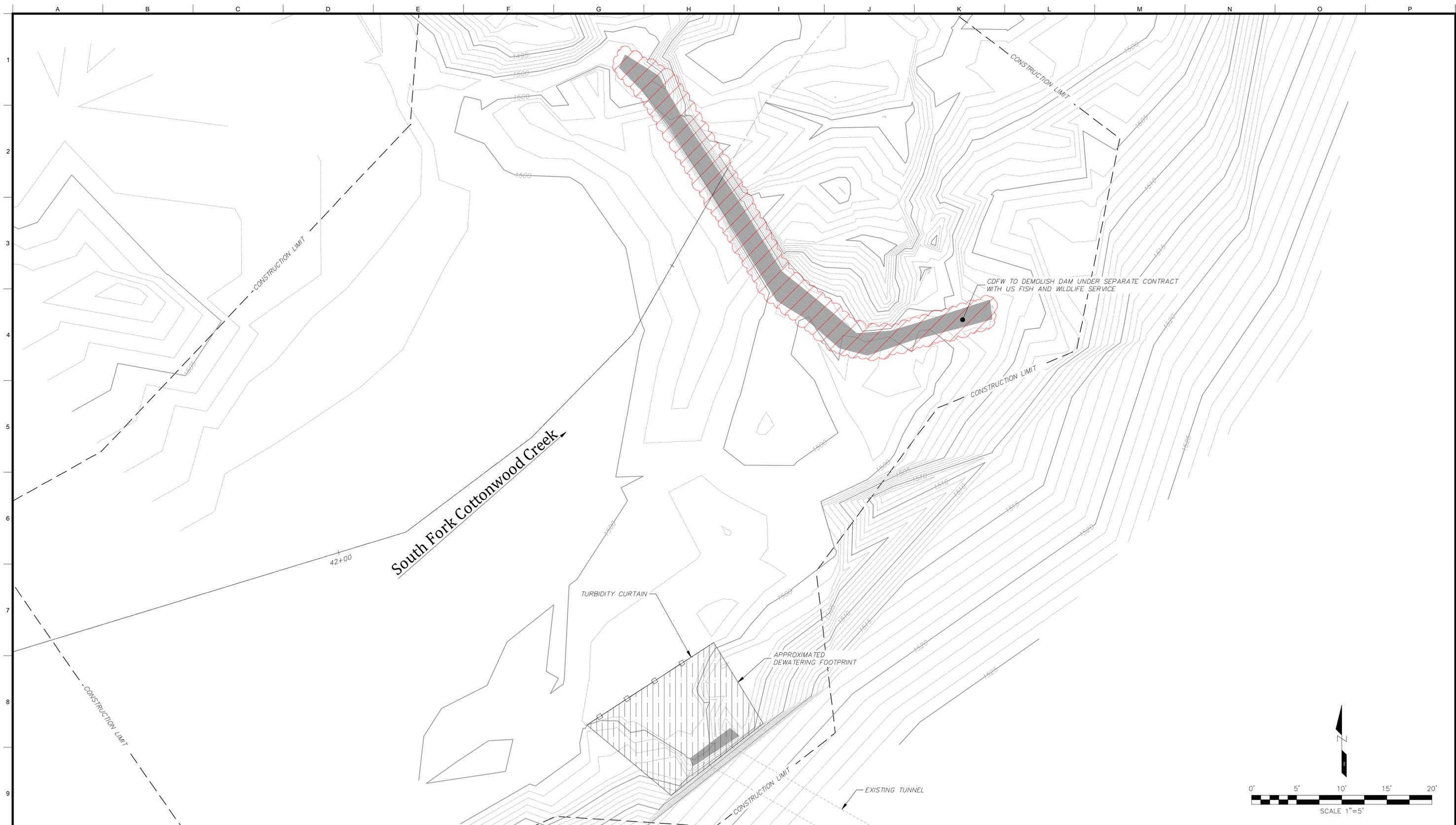
**General Notes & Schematic Sheet**

Job Number  
500057

Sheet Number

G2

Sheet 2 of 9



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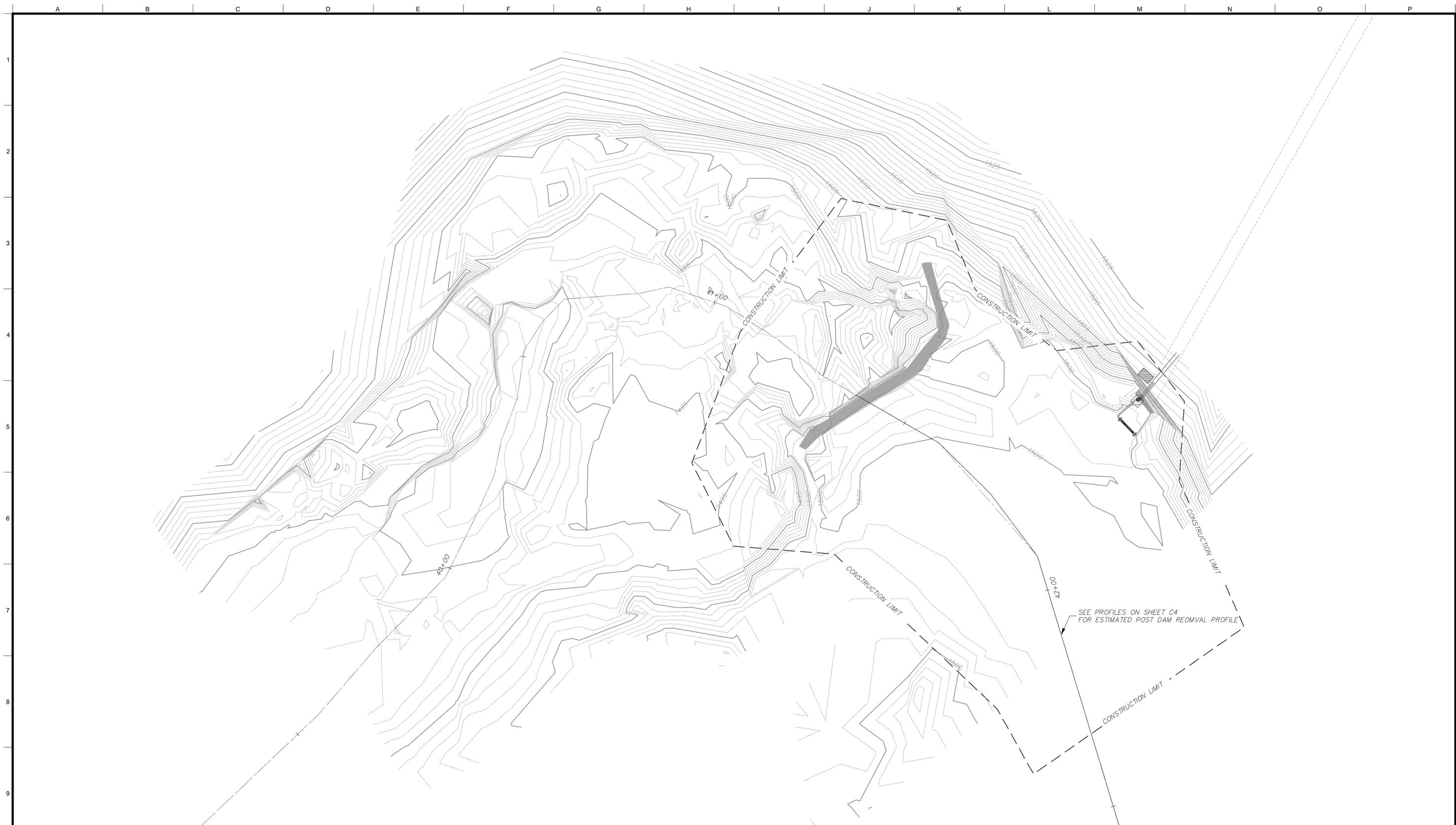


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			Checked	ljh	
			File Name	HAMMER DIVERSION	
			Plotted Scale	0 1/2 1	

**Cottonwood Creek Fish  
 Passage Improvement Project**  
**Demolition Intake Plan Sheet**

Job Number  
 500057  
 Sheet Number  
**C1**  
 Sheet 3 of 9





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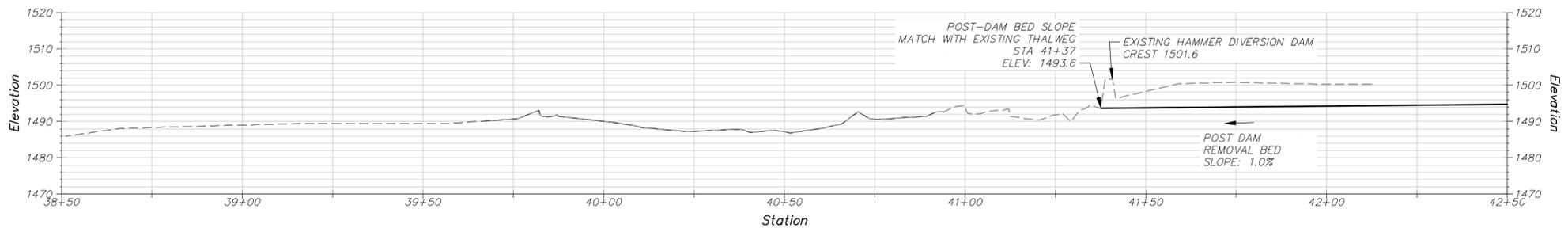
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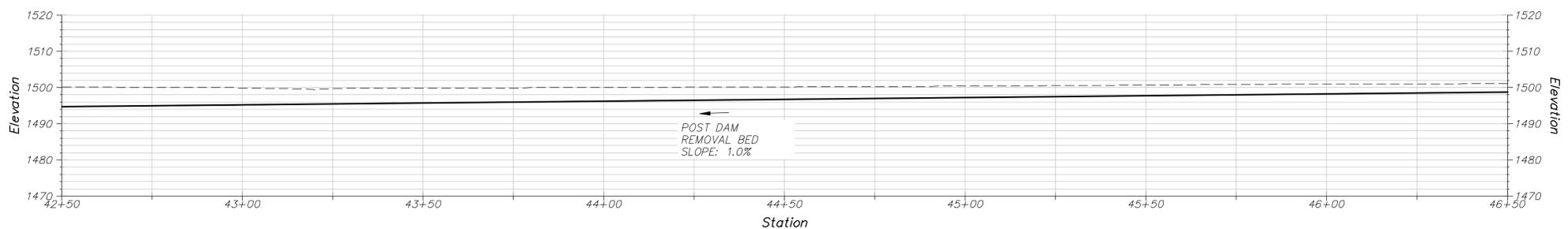
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**Cottonwood Creek Fish  
 Passage Improvement Project**  
**Project Site Overall Plan Sheet**

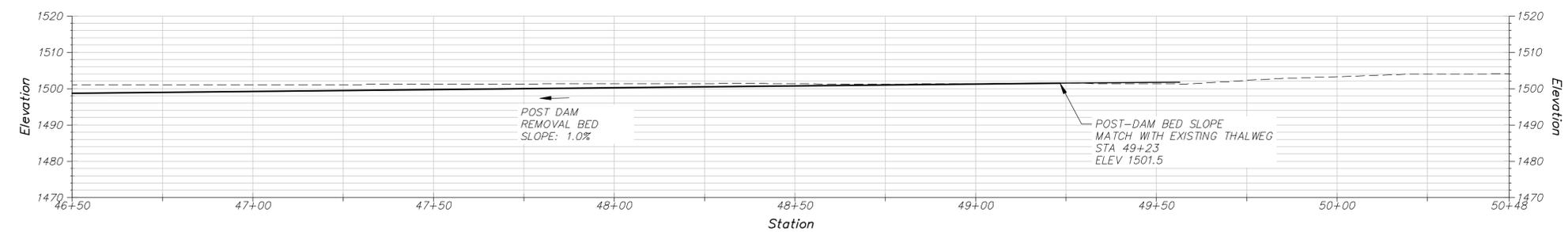
Job Number  
 500057  
 Sheet Number  
**C3**  
 Sheet 5 of 9



1 PROFILE - STA 38+50 TO 42+50  
H:1"=20' V:1"=20'



2 PROFILE - STA 42+50 TO 46+50  
H:1"=20' V:1"=20'



3 PROFILE - STA 46+50 TO 50+48  
H:1"=20' V:1"=20'



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			Drafter	ivs
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			Plotted Scale	0 1/2 1

**Cottonwood Creek Fish  
Passage Improvement Project**

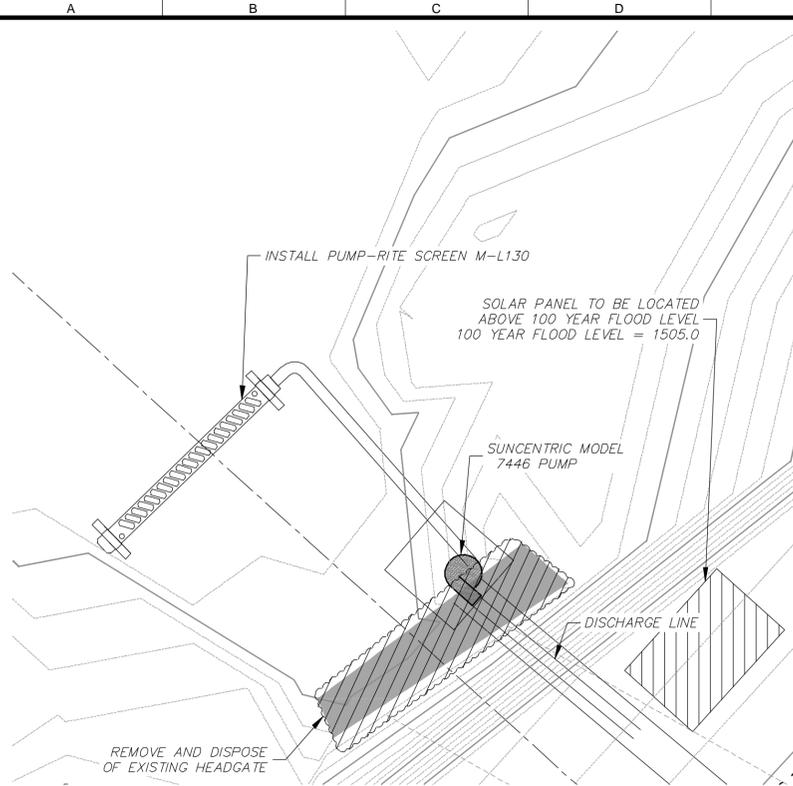
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Job Number  
500057

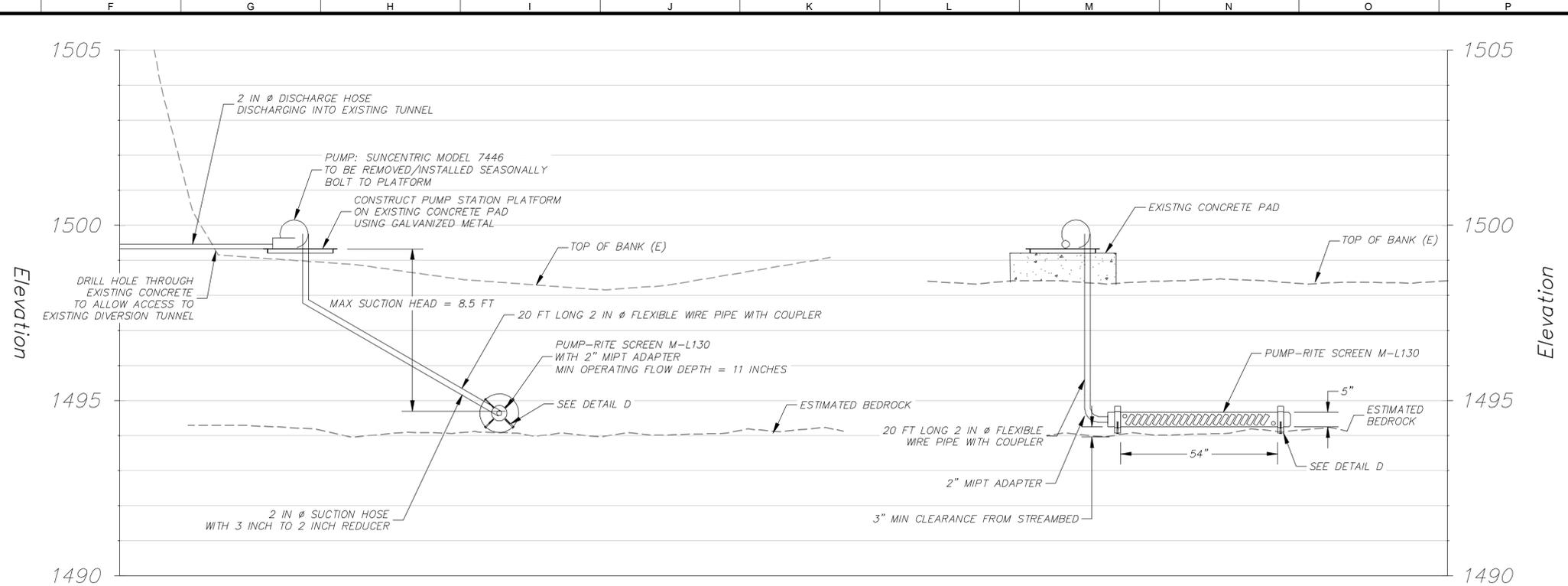
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**C4**

Sheet 6 of 9

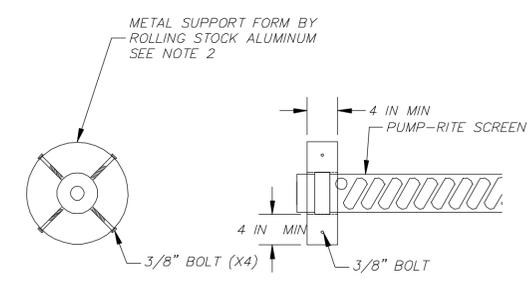


**A FISH SCREEN & INTAKE PLAN**  
H:1"=2" V:1"=2"

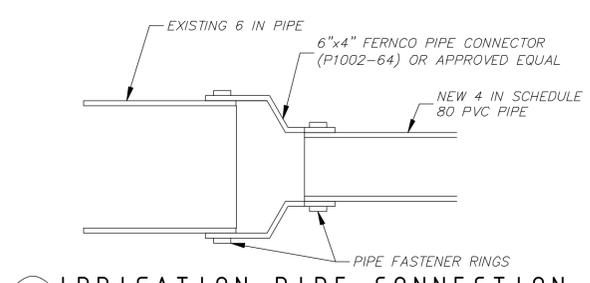


**B INTAKE SECTION**  
H:1"=2" V:1"=2"

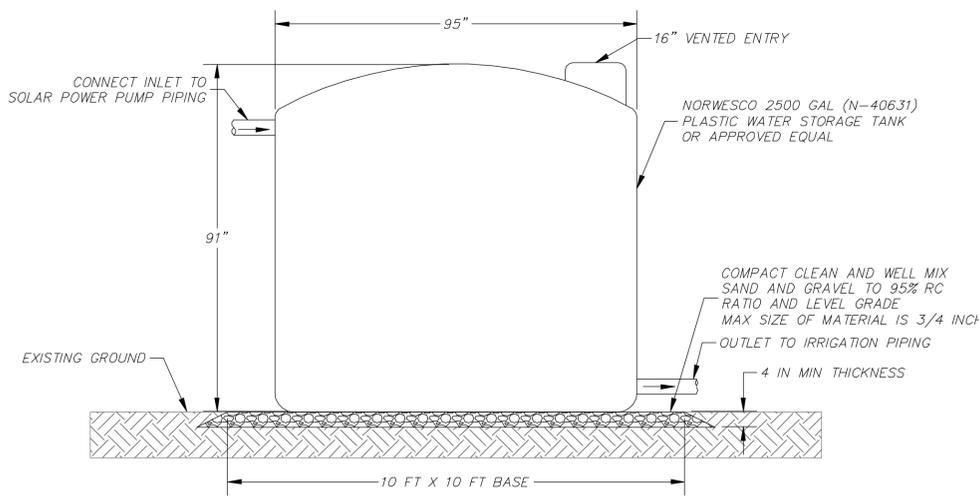
**C INTAKE ELEVATION**  
H:1"=2" V:1"=2"



**D SCREEN SUPPORT**  
H:1"=1" V:1"=1"



**E IRRIGATION PIPE CONNECTION**  
H:1"=1" V:1"=1"



**F 2500 GAL WATER STORAGE TANK AND BASE**  
H:1"=1" V:1"=1"

NOTES:  
1. THE 4-IN PIPELINE SHALL HAVE A MINIMUM SLOPE OF 0.005 FT/FT FROM INLET TO OUTLET, TO ENSURE PROPER DRAINAGE. THE GENERAL SLOPE OF PIPELINE SHALL FOLLOW THE EXISTING DIVERSION DITCH SLOPE.  
2. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF PROPOSED SCREEN SUPPORT AND ATTACHMENT PRIOR TO COMMENCING WORK ON PUMP STATION.

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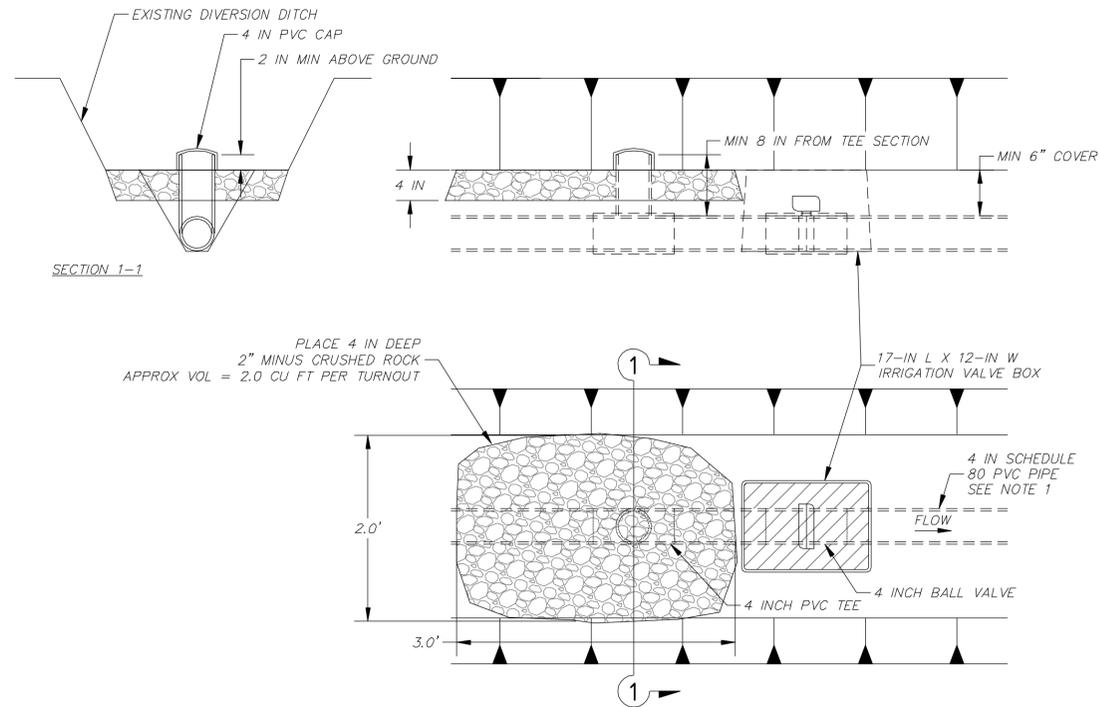
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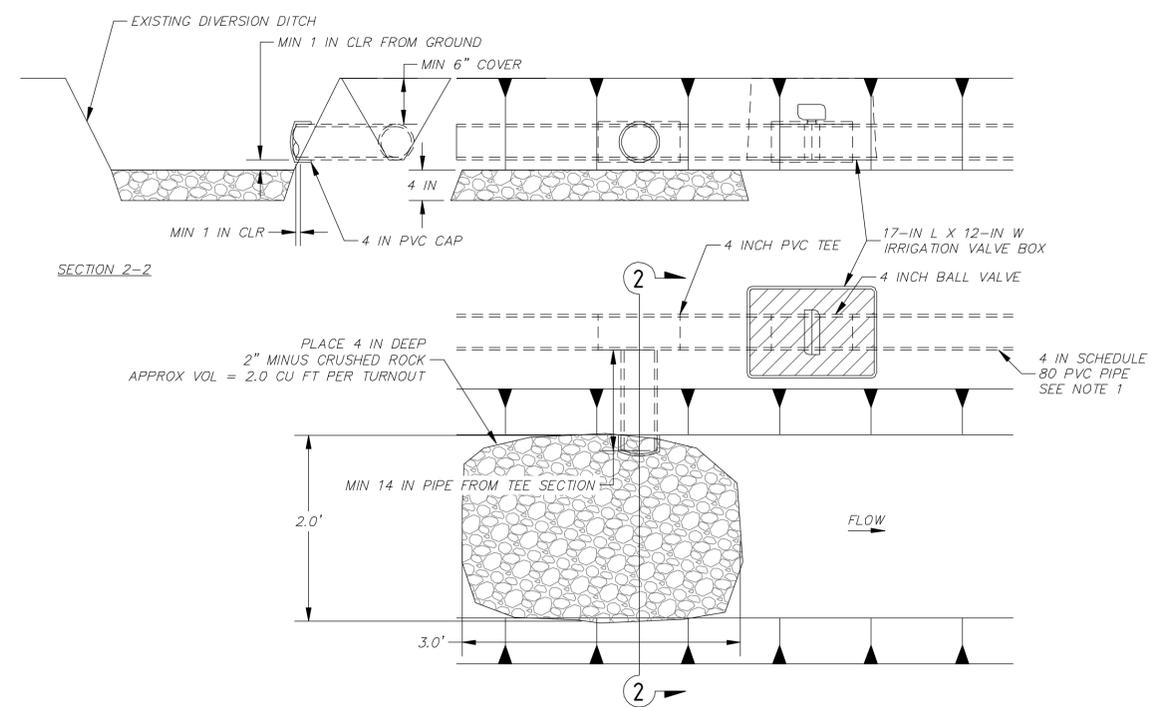
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			Drafter	tvs
			Checked	ljh
			File Name	HAMMER DIVERSION
			Plotted Scale	0 1/2 1

**Cottonwood Creek Fish Passage Improvement Project**  
**Details Sheet #1**

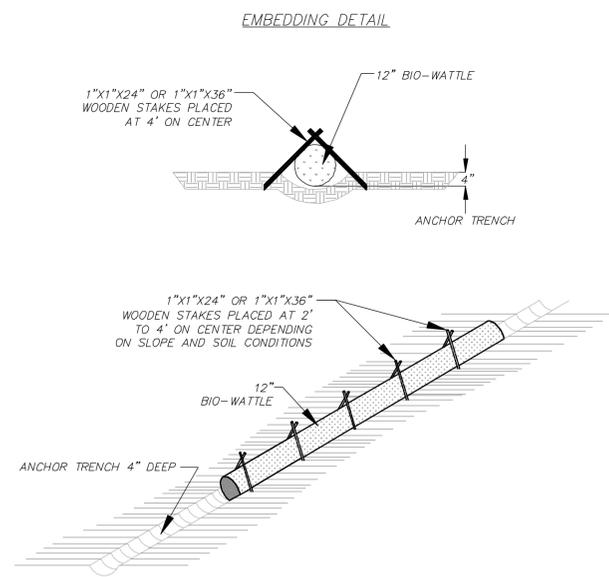
Job Number  
500057  
Sheet Number  
**D1**  
Sheet 7 of 9



**G** TURN OUT (IN DITCH)  
H:1'=1' V:1'=1'



**H** TURN OUT (ON SIDE OF DITCH)  
H:1'=1' V:1'=1'



NOTE:  
1. SEDIMENT CONTROL BARRIERS USED ON SLOPES, AS CHECK DAMS OR AS SEDIMENT TRAPS SHALL BE BIO-WATTLES AS DISTRIBUTED BY BON-TERRA AMERICA INC. OR APPROVED EQUAL AND INSTALLED AS RECOMMENDED BY THE MANUFACTURE.

**I** COIR LOG  
H:NTS V:NTS

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			Plotted Scale	0 1/2 1

**Cottonwood Creek Fish Passage Improvement Project**  
**Details Sheet 2**

Job Number  
500057  
Sheet Number  
**D2**  
Sheet 8 of 9



INSTALL SOLAR PANELS ON RESIDENTIAL ROOFTOP AND RESIDENTIAL UPGRADE SEE NOTE 1 THROUGH 6

RESIDENCE (E)

REMOVE TREES AND TRUNK (2) SEE NOTE #9

REMOVE TOP OF TREES (3) SEE NOTE #9

INSTALL 2500 GAL WATER TANK SEE DETAIL F ON SHEET D1

INSTALL SOLAR PUMP (10 GPM) INSTALL SUBMERSIBLE PUMP & POWER SUPPLY SEE NOTE 8

INSTALL 4" SCHEDULE 80 PVC WATER LINE & TURNOUTS SEE DETAIL D ON SHEET D1

INSTALL TURNOUT TO POND SEE DETAIL D ON SHEET D1

GARDEN & ORCHARD (E)

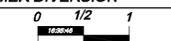
EXISTING POND

1. PV EXPANSION
  - ADD (24) NEW REC250 MODULES, (2) 4-CIRCUIT COMBINERS & LIGHTNING ARRESTORS TO EXISTING (12) 194W PV MODULES (BP-3195) AND COMBINER MOUNTED DIRECTLY ON THE RESIDENCE'S ROOF.
  - (2) NEW CHARGE CONTROLLERS (OUTBACK FM60) ADDED TO EXISTING CONTROLLER, OUTBACK HUB10 & FLEXNET DC INTERFACES, BREAKERS AND CONTROL PANEL. ADDS (2)60AMP AT 48V.
  - (4) NEW HUP SOLAR 1 BATTERIES (GRP27) 10 YEAR RATED LEAD-ACID 12V, 1,000 LBS EACH. REMOVE EXISTING BATTERY BANK FROM SITE. BUILD VENTED BATTERY BOX.
  - REUSE (2) INVERTER UNITS (OUTBACK BFX3648). 3.6 KW EACH.
2. CONNECT TO EXISTING HENSLEY HYDRO ELECTRIC LINES
  - ADD NEW CHARGE CONTROLLER (OUTBACK FM60), BRIDGE RECTIFIER, CIRCUIT BREAKERS, AND CONVERT TO 24V DC TO TIE DIRECTLY INTO EXPANDED RESIDENCE PV SYSTEM.
3. UPGRADE EXISTING RESIDENCE ELECTRIC
  - REPLACE FUSE- WITH BREAKER-BOXES; ADD GFIS, SMOKE AND CO2 DETECTORS; TIDY-UP WIRING AND CONNECTS TO PASS BUILDING INSPECTION. DISCONNECT AND CAP POWER-LINES FROM ABANDONED COTTONWOOD CREEK HYDRO PLANT.
4. UPGRADE RESIDENCE HVAC SYSTEMS
  - HVAC- ADD (3) NEW MITSUBISHI MR.SLIM-TYPE HVAC UNITS, CONDENSER PADS, CONTROLS, WIRING, MOUNTING, ACTIVATION AND OWNER INSTRUCTIONS.
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  - ENCLOSE AND INSULATE UNDER-FLOOR SPACE, ADD 2X6 STUD-FRAMED WALL WITH T1-11 PLYWOOD SIDING AND R19 BATT INSULATION OVER 12"x12" CONCRETE STRIP FOOTING, WITH PROVISION FOR NEW BATTERY BOX. ADD R-19 BATT INSULATION AND PROTECTION BELOW EXPOSED FLOOR ABOVE, FINISHES PER OWNER.
6. RESIDENCE ELECTRIC AND BUILDING PERMITTING/ INSPECTIONS
  - PE INSPECTION AND REPORT CONFIRMING EXISTING STRUCTURE SOUND.
  - COUNTY BUILDING PERMITS AND INSPECTIONS (RESIDENCE WORK ONLY).
7. ADD PROPANE WINTER BACKUP GENERATOR
  - ADD 8.5KW BACKUP GENERATOR, SOUND-ATTENUATED, DIRECT INVERTER FEED TIED TO EXPANDED RESIDENCE PV SYSTEM, REMOTE 2-WIRE START (KOHLER85).
  - ADD (2)14"DIAMETER, 25GAL, VERTICAL PROPANE BOTTLES AND MANIFOLD.
8. REMOTE PUMPING STATIONS
  - INSTALL (1) REC250 PV MODULE ATOP A POLE FOR DIRECT CONNECT TO (1) 30GPM DANKOFF SUNCENTRIC PUMP AND PERIPHERALS APPROXIMATELY 1,000' NW OF RESIDENCE AT TUNNEL ENTRANCE.
  - INSTALL (1) REC250 PV MODULE ATOP A POLE OR TANK FOR CONTROLLED CONNECT TO (1) 10GPM DANKOFF SUNCENTRIC PUMP AND PERIPHERALS AT NEW 2,500GAL STORAGE TANK (BY OTHERS) 400' SW OF RESIDENCE.
9. TREE TRIMMING AND REMOVAL:
  - FOR TREES MARKED FOR REMOVAL: REMOVE BRANCHES AND SAW OFF TREE TRUNK SUCH THAT NO MORE THAN 18 INCHES OF TREE TRUNK REMAIN ABOVE GROUND. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER TO STOCKPILE MATERIAL SUITABLE FOR FIREWOOD AT A DESIGNATED LOCATION. THE CONTRACTOR SHALL BE RESPONSIBLE TO REMOVE AND DISPOSE OF REFUSE MATERIAL FROM PROJECT SITE.
  - FOR TREES MARKED FOR TOPPING: REMOVE THE TREE BRANCHES AND LEAVES AS DIRECTED BY OWNER OR FIELD ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE TO REMOVE AND DISPOSE OF REFUSE MATERIAL FROM PROJECT SITE.

 **U.S. Fish & Wildlife Service**  
 Red Bluff Office  
 10950 Tyler Road  
 Red Bluff, California 96080  
 (530) 527-3043  
[www.fws.gov/redbluff](http://www.fws.gov/redbluff)

 **nhc**  
 northwest hydraulic consultants  
 3950 industrial boulevard, suite 100c  
 west sacramento, california 95691  
 phone: (916) 371-7400  
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 P.O. BOX 38  
 ASHLAND, OREGON 97520-0065  
 PHONE: (541) 864-0492  
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Revisions			Drawing Information	
No.	Date	Description	Date	03 FEBRUARY 2014
			Status	100% Submittal
			Designer	ljh/tvs
			Drafter	tvs
			Checked	ljh
			File Name	HAMMER DIVERSION
			Plotted Scale	

**Cottonwood Creek Fish Passage Improvement Project**  
**Residence Improvement Sheet**

Job Number  
500057  
 Sheet Number  
**D3**  
 Sheet 9 of 9

## **APPENDIX B**

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### Hammer Diversion Dam Removal Shot Plan



State of California – Natural Resources Agency  
DEPARTMENT OF FISH AND WILDLIFE  
Region 1 – Northern  
601 Locust Street  
Redding, CA 96001  
[www.wildlife.ca.gov](http://www.wildlife.ca.gov)

*EDMUND G. BROWN JR., Governor*  
*CHARLTON H. BONHAM, Director*



December 3, 2013

Mr. James G. Smith, Project Leader  
U.S. Fish and Wildlife Service  
10950 Tyler Road  
Red Bluff, CA 96080

Dear Mr. Smith:

This letter is in response to your November 5, 2013, correspondence (File 80270/R8) regarding the California Department of Fish and Wildlife's (CDFW) participation in the Hammer Diversion Dam Fish Passage Improvement Project. The design and implementation of this project are being funded through the U.S. Fish and Wildlife's Anadromous Fish Restoration Program (AFRP).

While this project is still in the early stages of design and permitting, it is our intent to provide the support for the demolition of the existing diversion dam and non-functional fish ladder when the project is ready for implementation. This support will include providing the necessary tools, equipment, materials, and personnel to demolish the dam through the use of explosives.

In your letter you describe a "second component" of the project which may involve CDFW Screen Shop staff. This component is described as the construction of the water intake foundation and associated components (presumably fish screen). Due to uncertainties with the proposed work and staffing considerations, CDFW cannot commit to performing this work element.

The attached document provides pertinent information regarding CDFW's role in the project and specifics concerning the demolition of the dam. Due to existing work commitments and scheduling needs, it will be important to work closely with CDFW to identify implementation dates as soon as possible. All questions and scheduling communications should be directed to Kevin Gale of my staff. He can be reached at (530) 225-2462, or by e-mail at [Kevin.Gale@wildlife.ca.gov](mailto:Kevin.Gale@wildlife.ca.gov).

We look forward to continued collaboration with the U.S. Fish and Wildlife Service in the successful implementation of this and future fishery restoration projects.

Sincerely,

**NEIL MANJI**, Regional Manager  
Region 1 – Northern

Attachment

cc: See Page 2  
ec: See Page 2

*Conserving California's Wildlife Since 1870*

Mr. James G. Smith  
December 3, 2013  
Page 2

cc: Tricia Parker Hamelberg, USFWS, 10950 Tyler Road, Red Bluff, CA 96080  
Ramon Martin, USFWS, 850 Guild Ave., Suite 105, Lodi, CA 95240  
Kim Webb, USFWS, 850 Guild Ave., Suite 105, Lodi, CA 95240

ec: Curt Babcock, Mike Berry, Patricia Bratcher, Curtis Milliron, Kevin Gale, Joseph  
Rightmier and Doug Killam  
California Department of Fish and Wildlife  
[Curt.Babcock@wildlife.ca.gov](mailto:Curt.Babcock@wildlife.ca.gov), [Mike.Berry@wildlife.ca.gov](mailto:Mike.Berry@wildlife.ca.gov),  
[Patricia.Bratcher@wildlife.ca.gov](mailto:Patricia.Bratcher@wildlife.ca.gov), [Curtis.Milliron@wildlife.ca.gov](mailto:Curtis.Milliron@wildlife.ca.gov),  
[Kevin.Gale@wildlife.ca.gov](mailto:Kevin.Gale@wildlife.ca.gov), [Joseph.Rightmier@wildlife.ca.gov](mailto:Joseph.Rightmier@wildlife.ca.gov),  
[Douglas.Killam@wildlife.ca.gov](mailto:Douglas.Killam@wildlife.ca.gov)

# **Hammer Diversion Dam Removal Shot Plan**

- **Objective** – Remove concrete diversion dam with explosives to improve fish passage on South fork of Cottonwood Creek, Tehama County.
- **History** – This diversion dam was installed over a period of time through the 1930's and 1940's and was used to provide hydroelectric power and irrigation through a 250' tunnel and approximately 1500' of open ditch to a nearby residence.
- **Method of Removal** – This dam will be removed with the use of explosives, specifically a binary explosive (two-part) called Helix. The use of time delays will minimize the level of ground vibration thus reducing the risk of damage to the nearby tunnel. A series of holes will be drilled into the dam and existing fish ladder steps with air powered drills. These holes will be deck loaded with 1/3 pound sticks of Helix (the number will vary with the depth of the hole but not to exceed 3 sticks per hole) which will have 50 gr. detonating cord attached to the stick and to one of three detonating cord trunk lines. Each trunk line will be initiated with a #8 time delay cap. Nonel shock tube will be used with a Sure Fire starter (209 primer backup) to initiate the shots from a safe location (to be determined) by a licensed blaster (Joseph Rightmier). The drilling operation should take approximately two days. The actual loading, blasting and cleanup will take place the following day.
- **Materials** – 2 cases of 1/3 lb. Helix, estimated to use 130 sticks  
1 roll Nonel Lead Line (2500'), estimated to use 1000'  
1 roll 50 gr. detonating cord (1000'), estimated to use 800'  
10 EZ Det 1.4b Nonel caps (25/350 msec delay)  
5 EZ TL 1.4b initiation caps (17msec delay)  
Stemming material (7 cubic feet of crushed angular rock)
- **Licensed blasting personnel** – Joseph Rightmier, License # 9812 (530-841-2553)
- **Storage** – Storage of the necessary materials will be at Siskiyou County's magazine until they are needed for the shot.
- **Transportation** – Due to the small quantities (less than 1001 lbs.) and packaging, the materials can be classified as 1.4 explosives and therefore do not have to be transported in a placarded vehicle, nor do any special route restrictions apply.
- **Personnel requirements** – The number of personnel needed on site will be determined by the number of drills which will be operated. With the air compressor at a potentially long distance from the actual drilling operation, the operation could be limited to one drill. The use of two drills would be preferred if feasible. Approximately 6-8 CDFW personnel will be on hand during this phase

of the project. During the actual hole loading and blasting portions of the project, the same personnel will be present. The drilling portion should take approximately 2 days and the loading, blasting and cleanup should take one additional day. The personnel that will be present for the drilling, loading and shooting will be determined closer to the actual date of the project.

- **Equipment placement** – Due to the weight of the equipment necessary to perform this task and the extreme difficulty that would be involved carrying this equipment to the site, helicopter support will be needed to transport the equipment on the first day of the project and out of the site on the last day. The explosives will be transported manually.
- **Set Up Area** - Mixing of the two part explosive and set up will be done at the site at the time of use. Public will be excluded from the area during this time.
- **County Permit** – A blasting permit will be acquired from the Tehama county Sheriff's department before the shot.
- **Safety, Hazards, and Emergency Plan** – Fly rock will be the main concern but with proper hole loading and shot guarding, personnel will not be exposed to fly rock.

Shot Guards (personnel) will be placed up and down the canyon and blasting signs on the road leading into the residence. Shot guards will ensure that all personnel are excluded from the blast site. Only personnel needed for the shot will be allowed at the site while it is being loaded. Once loaded, no one will be allowed back into the site until the "all clear" signal is given by the blaster in charge.

Safety equipment will include hard hats, gloves, hearing protection, safety glasses and a first aid kit.

Warning signals are as follows;

5 min. prior to blast – series of long audible signals

1 min. prior to blast – series of short audible signals

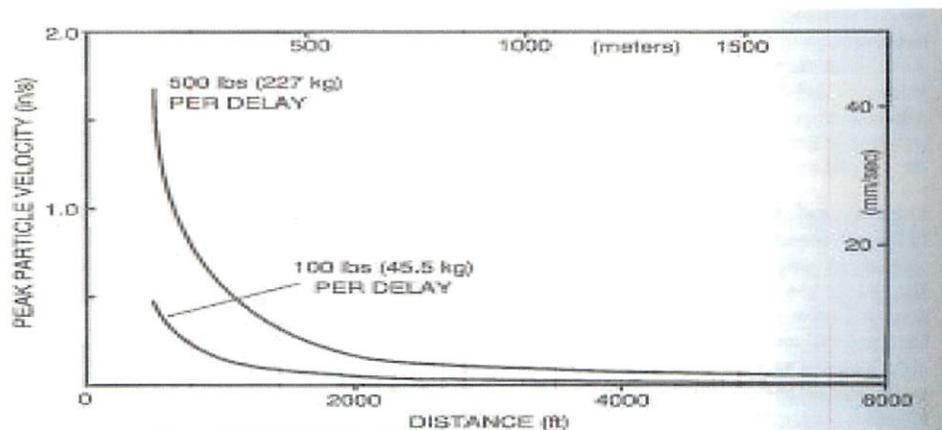
After the blast – one long audible signal (all clear)

No one will be allowed to return to the site until the "all clear" signal is given by the blaster in charge.

- **Hospital** – Mercy Medical Center is the nearest emergency facility and is located in Redding at 2175 Rosaline Ave (530-225-6000), Mercy Air Redding (530-225-6294). A satellite phone and Spot unit will be available at the seen in case of an emergency.

Emergency, Dial 911 Site Coordinates 40\*07'23.91"N, 122\*43'18.21"W

- When – Work will occur in late fall or early winter as creek flows and fire danger would be relatively low.
- Infrastructure Considerations – Ground vibration is the main concern since the 250 foot tunnel is only about 30 yards from the blast site. Vibration impacts have been researched through the Blaster's Handbook and the amount of explosives that will be detonated at a given point in time is far below the suggested limit for blasting around man-made structures (see supporting documentation. Air blast is another item of concern but do to the confinement of the canyon walls there should be very little noise escaping from the immediate area.
- Blaster's Handbook supporting documentation;



EXAMPLE OF DECAY OF VIBRATION INTENSITY WITH DISTANCE PLOTTED ON A LINEAR GRAPH

Figure 38.2 – A typical vibration decay plotted as a linear graph of vibration intensity versus distance.

### Confinement

The confinement of the charges affects the vibration intensity. If a charge is deeply buried with no free face nearby, the rock is not displaced (although damaged around the explosive) and more of the energy goes into seismic waves. Presplitting sometimes generates higher vibration levels for this reason, although the effect is sometimes offset by the **decoupling** of the charges (decoupling means that small-diameter charges in a larger hole are not in contact with the walls of the hole (that is, are decoupled). Lack of confinement has the opposite effect. If there is only a shallow cover above a charge or in front of the charge, it has less work to do, it is vented more easily, it loses some of its energy to the atmosphere, and less energy is expended in the development of seismic waves.

There is a considerable range in the ability of residences to withstand vibration. Although 2.0 ips (50.8 mm/s) has been accepted by most authorities as a safe limit for construction blasting and most quarry blasting (higher frequencies), the "average" house seems able to tolerate about 5.4 ips (137 mm/s) (Nicholls and others, 1971), and some houses require levels approaching 20 ips (508 mm/s) before incurring minor damage from nearby construction blasting (Wiss and Nicholls, 1974). Distance to the source is also a consideration for close-in blasting, where only a part of the structure might be affected (Oriard, 1991).

**EXAMPLES OF CHARGE ESTIMATES FOR DIFFERENT VIBRATION LIMITS AND A DECAY SLOPE OF -1.6**

$$\text{CHARGE} = (\text{DIST.} / \text{SCALED DIST.})^2$$

H = 160 FOR AN AVERAGE VIBRATION

H = 242 FOR A TYPICAL UPPER BOUND

H = 605 FOR HEAVILY CONFINED BLASTS, HIGH MODULI

**CHARGE PER DELAY IN LBS FOR VIBRATION LIMIT OF 2.0 IPS**

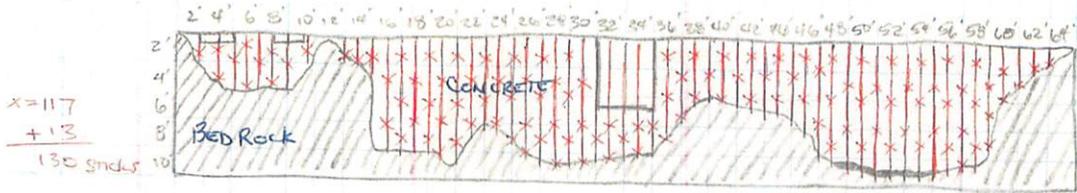
DISTANCE	SD = 15.47	SD = 20	SD = 35.5
	H = 160	H = 242	H = 605
20	1.7	1	0.3
40	6.7	4	1.3
60	15	9	2.9
80	27	16	5
100	42	25	8
150	94	56	18
200	167	100	32
300	376	225	71
400	669	400	127
600	1504	900	286
800	2674	1600	508
1000	4178	2500	793

**CHARGE PER DELAY IN LBS FOR VIBRATION LIMIT OF 1.0 IPS**

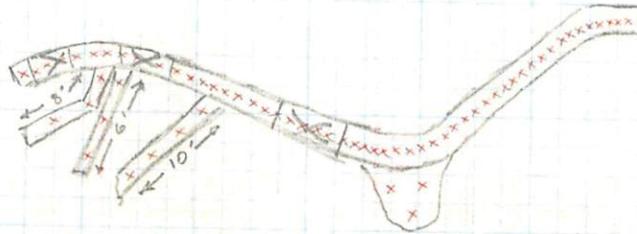
DISTANCE	SD = 23.85	SD = 30.9	SD = 54.8
	H = 160	H = 242	H = 605
20	0.7	0.4	0.1
40	2.8	1.7	0.5
60	6.3	3.8	1.2
80	11	6.7	2.1
100	18	11	3.3
150	40	24	7.5
200	70	42	13
300	158	94	30
400	281	168	53
600	633	377	120
800	1125	671	213
1000	1758	1048	333

As you can see in the above chart for 2.0 inches per second (IPS) vibration limit, even at 80 feet from the actual blast site (which is closer than the mouth of the tunnel) we could detonate 27 lbs. of explosive at once without exceeding this limit. This amount would be over half of the total explosive we will be using and with the delay sequence that will be used, we will only be detonating approximately 1/3 of this quantity at a given time.

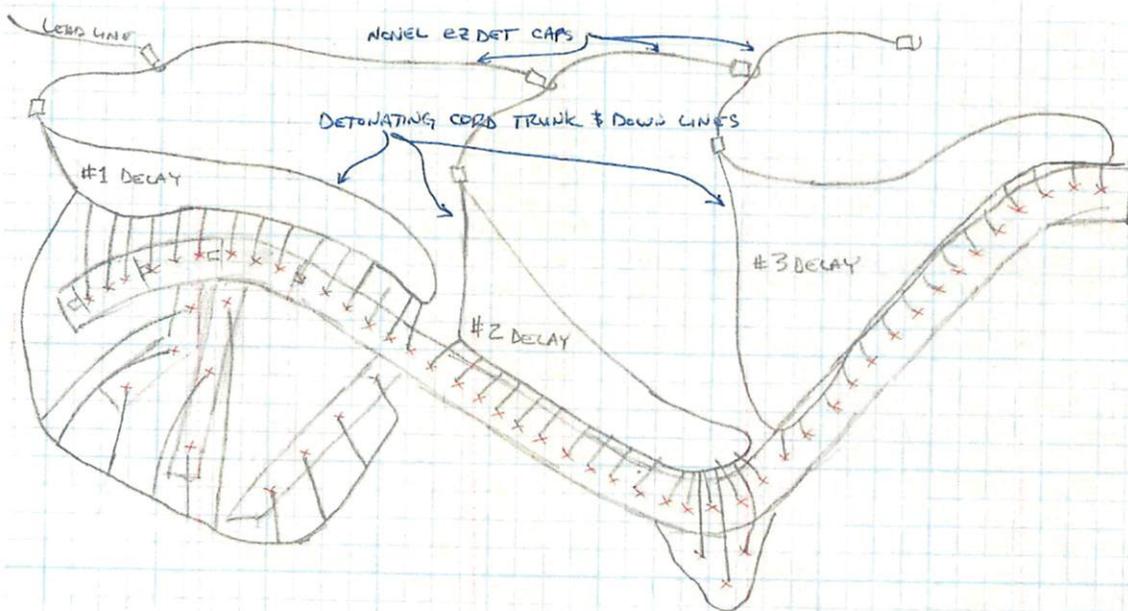
# VIEW LOOKING UPSTREAM



APPROX. 72 HOLES VARYING FROM 18" TO 10' DEEP

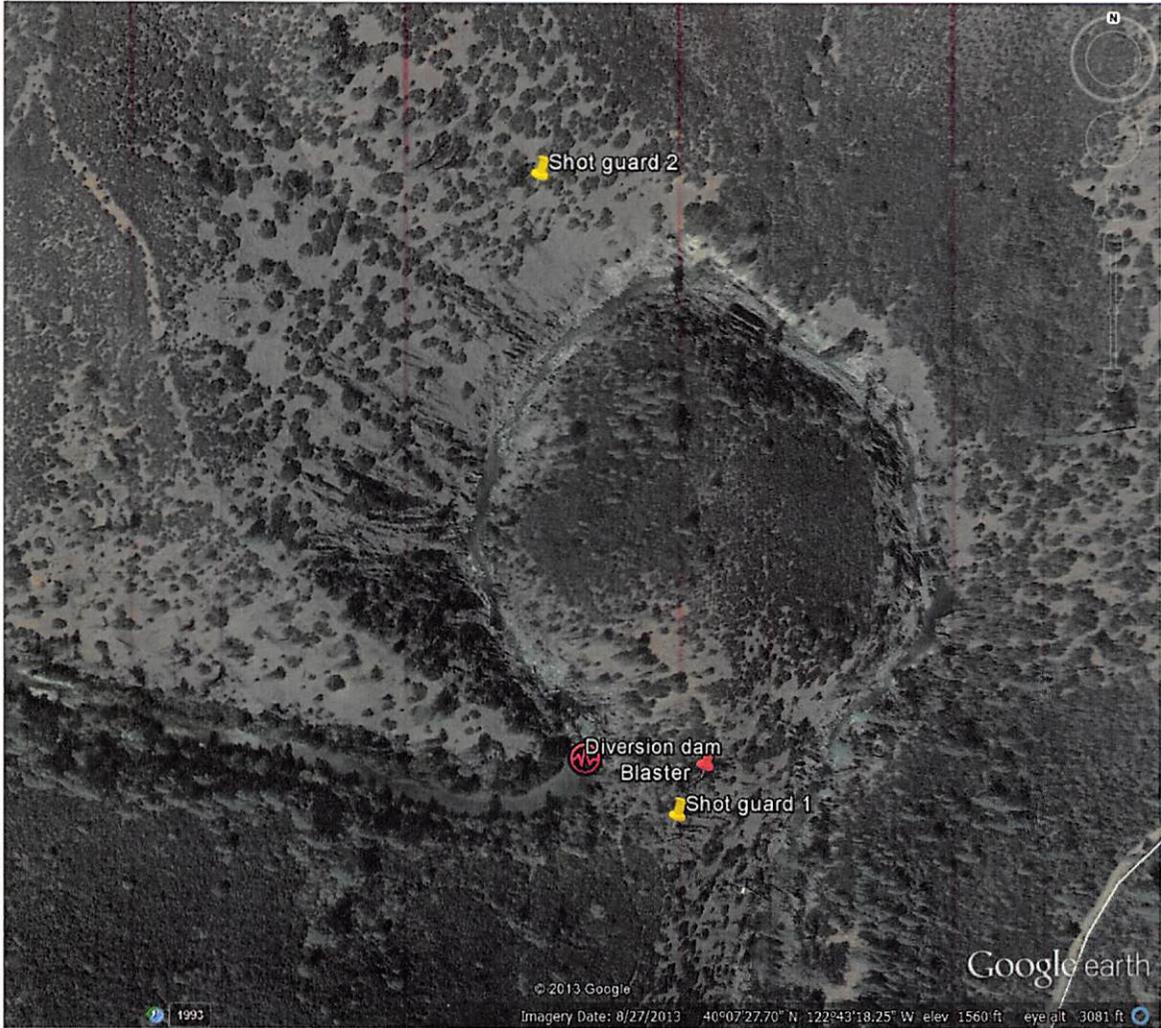


# HAMMER DIVERSION

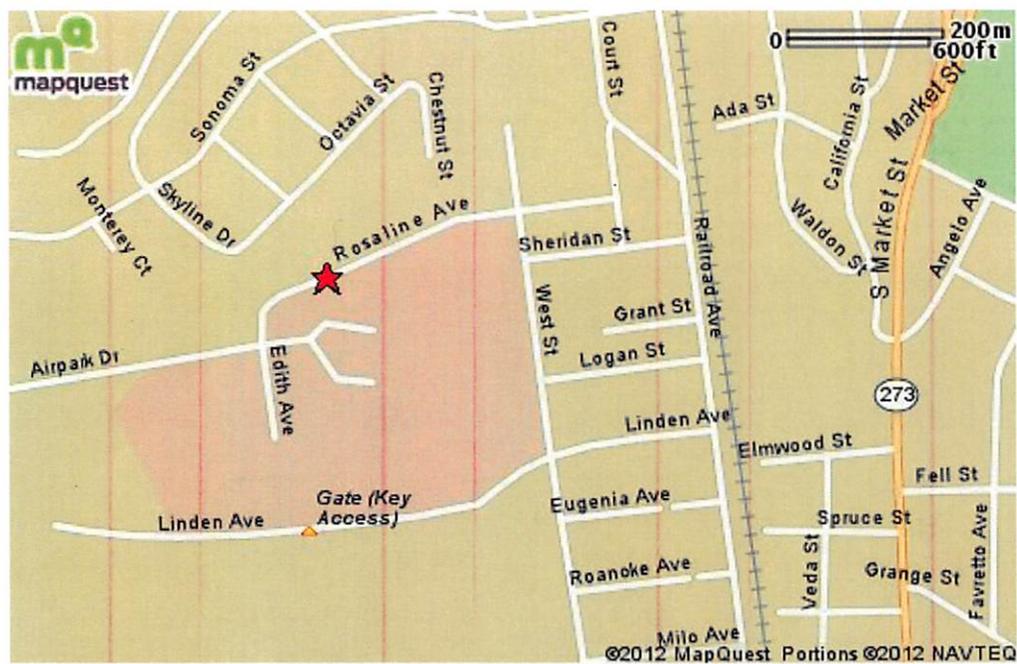
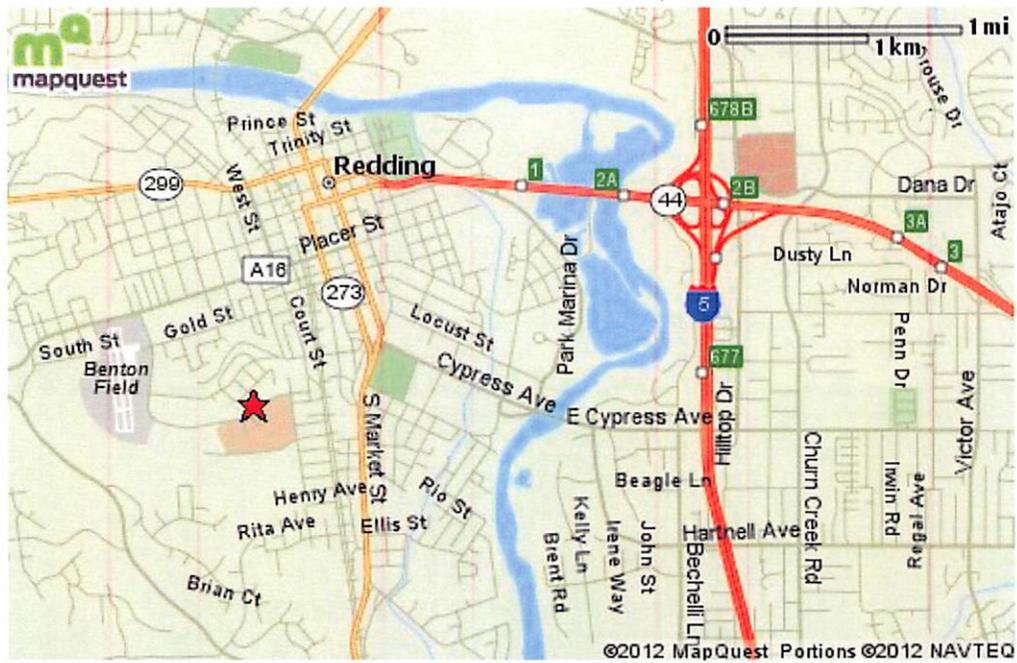


# OVER HEAD VIEW

# HAMMER DIVERSION



Directions to Mercy Hospital, Redding;



## **APPENDIX C**

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### Vascular Plant Species Observed Within or Near the Project Site

<i>Acmispon</i>	<i>americanus</i>	var.	<i>americanus</i>	N	Spanish Lotus	Fabaceae
<i>Adenostoma</i>	<i>fasciculatum</i>			N	Chamise	Rosaceae
<i>Adiantum</i>	<i>jordanii</i>			N	California Maidenhair	Pteridaceae
<i>Aesculus</i>	<i>californica</i>			N	California Buckeye	Sapindaceae
<i>Agrostis</i>	<i>stolonifera</i>			N	Creeping Bentgrass	Poaceae
<i>Aira</i> , disarticulated	sp.			I	European Hairgrass	Poaceae
<i>Alnus</i>	<i>rhombifolia</i>			N	White Alder	Betulaceae
<i>Amelanchier</i>	<i>utahensis</i>			N	Utah Service-berry	Rosaceae
<i>Apocynum</i>	<i>cannabinum</i>			N	Indian Hemp	Apocynaceae
<i>Arceuthobium</i>	<i>occidentale</i>			N	Gray Pine Dwarf-Mistletoe	Viscaceae
<i>Arctostaphylos</i>	<i>manzanita</i>	ssp.	<i>manzanita</i>	N	Big Manzanita	Ericaceae
<i>Artemisia</i>	<i>douglasiana</i>			N	Mugwort	Asteraceae
<i>Asclepias</i>	<i>eriocarpa</i>			N	Indian Milkweed	Apocynaceae
<i>Asclepias</i>	<i>fascicularis</i>			N	Narrow-leaved Milkweed	Apocynaceae
<i>Avena</i>	<i>fatua</i>			I	Wild Oat	Poaceae
<i>Baccharis</i>	<i>salicifolia</i>			N	Mule's-fat	Asteraceae
<i>Boechera</i>	<i>breweri</i>			N	Brewer's Rockcress	Brassicaceae
<i>Brachypodium</i>	<i>distachyon</i>			I	False Brome	Poaceae
<i>Brickellia</i>	<i>californica</i>			N	California Brickellbush	Asteraceae
<i>Bromus</i>	<i>Diandrus</i>			I	Ripgut	Poaceae
<i>Bromus</i>	<i>hordeaceus</i>			I	Soft Chess	Poaceae
<i>Bromus</i>	<i>laevipes</i>			N	Woodland Brome	Poaceae
<i>Bromus</i>	<i>madritensis</i>	ssp.	<i>rubens</i>	I	Red Brome	Poaceae
<i>Bromus</i>	<i>Sterilis</i>			I	Poverty-Brome	Poaceae
<i>Calycadenia</i>	<i>truncata</i>			N	Rosinweed	Asteraceae
<i>Calycanthus</i>	<i>occidentalis</i>			N	Western Spicebush	Calycanthaceae
<i>Carex</i>	<i>nudata</i>			N	Torrent Sedge	Cyperaceae
<i>Castilleja</i> , dried	sp. (prob. <i>affinis</i> )			N	Lay-and-Collie's Indian-Paintbrush	Orobanchaceae
<i>Ceanothus</i>	<i>cuneatus</i>	var.	<i>cuneatus</i>	N	Buckbrush	Rhamnaceae
<i>Ceanothus</i>	<i>integerrimus</i>	var.	<i>macrothyrsus</i>	N	Deerbrush	Rhamnaceae
<i>Centaurea</i>	<i>melitensis</i>			I	Tocalatloe	Asteraceae
<i>Centaurea</i>	<i>solstitialis</i>			I	Yellow Starthistle	Asteraceae
<i>Cercocarpus</i>	<i>betuloides</i>	var.	<i>betuloides</i>	N	Birch-leaved Mountain Mahogany	Rosaceae
<i>Chamaecyce serpyllifolia</i>		ssp.	<i>serpyllifolia</i>	N	Thyme-leaved Spurge	Euphorbiaceae
<i>Cirsium</i>	<i>occidentale</i>			N	Thistle	Asteraceae
<i>Cirsium</i>	<i>vulgare</i>			I	Bull Thistle	Asteraceae
<i>Clematis</i>	<i>ligusticifolia</i>			N	Virgin's-bower	Ranunculaceae
<i>Croton</i>	<i>setigerus</i>			N	Turkey-mullein	Euphorbiaceae
<i>Crucianella</i>	<i>angustifolia</i>			I	Crosswort	Rubiaceae
<i>Datisca</i>	<i>glomerata</i>			N	Durango-root	Datiscaceae
<i>Daucus</i>	<i>pusillus</i>			N	Rattlesnake-weed	Apiaceae
<i>Elymus</i>	<i>glaucus</i>	ssp.	<i>glaucus</i>	N	Blue Wild-rye	Poaceae
<i>Elymus</i>	<i>ponticus</i>			I	Tall Wheatgrass	Poaceae
<i>Epilobium</i>	<i>canum</i>	ssp.	<i>latifolium</i>	N	California Fuchsia	Onagraceae
<i>Epilobium</i>	<i>ciliatum</i>	ssp.	<i>ciliatum</i>	N	Fringed Willowherb	Onagraceae
<i>Epipactis</i>	<i>gigantea</i>			N	Stream Orchid	Orchidaceae
<i>Equisetum</i>	<i>hyemale</i>	ssp.	<i>affine</i>	N	Common Horsetail	Equisetaceae
<i>Equisetum</i>	<i>laevigatum</i>			N	Smooth Scouring-Rush	Equisetaceae
<i>Ericameria</i>	<i>linearifolia</i>			N	Interior Goldenbush	Asteraceae
<i>Eriodictyon</i>	<i>californicum</i>			N	California Yerba-santa	Boraginaceae
<i>Eriogonum</i>	<i>dasyanthemum</i>			N	Chaparral Buckwheat	
<i>Eriogonum</i>	<i>nudum</i>			N	Buckwheat	Polygonaceae
<i>Eriogonum</i>	<i>wrightii</i>	var.	<i>trachygonum</i>	N	Wright's Buckwheat	Polygonaceae
<i>Eriophyllum</i>	<i>lanatum</i>	var.	<i>grandiflorum</i>	N	Large-flowered Woolly-sunflower	Asteraceae
<i>Erigeron</i>	<i>canadensis</i>			I	Canadian Horseweed	Asteraceae

<i>Erigeron</i>	<i>divergens</i>			N	Spreading Daisy	Asteraceae
<i>Euthamia</i>	<i>occidentalis</i>			N	Western Goldenrod	Asteraceae
<i>Festuca</i>	<i>arundinacea</i> or <i>pratensis</i>			N	Tall or Meadow Fescue	Poaceae
<i>Festuca</i>	<i>myuros</i>			I	Rattail Fescue	Poaceae
<i>Ficus</i>	<i>carica</i>			I	Edible Fig	Moraceae
<i>Frangula</i>	<i>californica</i>	ssp.	<i>tomentella</i>	N	Hoary Coffeeberry	Rhamnaceae
<i>Galium</i>	sp. (no flws/fr)	prob.	<i>triflorum</i>	N	Bedstraw	Rubiaceae
<i>Gilia</i> , dried	<i>capitatus</i>			N	Globe Gilia	Polemoniaceae
<i>Heteromeles</i>	<i>arbutifolia</i>			N	Toyon	Rosaceae
<i>Juncus</i>	<i>balticus</i>	ssp.	<i>ater</i>	N	Baltic Rush	Juncaceae
<i>Juncus</i>	<i>covillei</i>			N	Blunt-Scale Rush	Juncaceae
<i>Juncus</i>	<i>exiguus</i>			N	Klamath Rush	Juncaceae
<i>Juncus</i>	<i>xiphioides</i>			N	Iris-Leaved Rush	Juncaceae
<i>Lactuca</i>	<i>serriola</i>			I	Prickly Lettuce	Asteraceae
<i>Leptosiphon</i>	<i>ciliatus</i>			N	Whiskerbrush	Polemoniaceae
<i>Logfia</i>	<i>gallica</i>			I	Narrow-Leaved Logfia	Asteraceae
<i>Lonicera</i>	<i>interrupta</i>			N	Chaparral Honeysuckle	Caprifoliaceae
<i>Lupinus</i>	<i>bicolor</i>			N	Bicolored Lupine	Fabaceae
<i>Lupinus</i>	<i>albifrons</i>	var.	<i>albifrons</i>	N	Silver Bush Lupine	Fabaceae
<i>Melica</i>	<i>californica</i>			N	California Melic	Poaceae
<i>Melica</i>	<i>torreyana</i>			N	Torrey's Melic	Poaceae
<i>Melilotus</i>	<i>albus</i>			I	White Sweet-clover	Fabaceae
<i>Mentha</i>	<i>arvensis</i>			N	American Wild Mint	Lamiaceae
<i>Mimulus</i>	<i>cardinalis</i>			N	Scarlet Monkey-flower	Phrymaceae
<i>Mimulus</i>	<i>pilosus</i>			N	Downy Mimetanthe	Phrymaceae
<i>Monardella</i>	<i>odoratissima</i>	ssp.	<i>pallida</i>	N	Pallid Mountain Monardella	Lamiaceae
<i>Muhlenbergia</i>	<i>rigens</i>			N	Deergrass	Poaceae
<i>Panicum</i>	<i>acuminatum</i>	var.	<i>acuminatum</i>	N	Western Panicgrass	Poaceae
<i>Pellea</i>	<i>andromedifolia</i>			N	Coffee Fern	Pteridaceae
<i>Pellea</i>	<i>mucronata</i>	var.	<i>californica</i>	N	California Bird's-foot Fern	Pteridaceae
<i>Pentagramma</i>	<i>triangularis</i>	ssp.	<i>triangularis</i>	N	Gold-backed Fern	Pteridaceae
<i>Petrorhagia</i>	<i>dubia</i>			I	Grass Pink	Caryophyllaceae
<i>Phacelia</i> , dried	sp.			N	Phacelia	Boraginaceae
<i>Pinus</i>	<i>sabiniana</i>			N	Gray Pine	Pinaceae
<i>Plantago</i>	<i>erecta</i>			N	California Plantain	Plantaginaceae
<i>Plantago</i>	<i>lanceolata</i>			I	English Plantain	Plantaginaceae
<i>Plectritis</i> , dried	sp.			N	Plectritis	Valerianaceae
<i>Poa</i>	<i>secunda</i>	ssp.	<i>secunda</i>	N	One-sided Bluegrass	Poaceae
<i>Polypogon</i>	<i>monspeliensis</i>			I	Annual Beardgrass	Poaceae
<i>Populus</i> (saplings)	<i>fremontii</i>	ssp.	<i>fremontii</i>	N	Fremont's Cottonwood	Salicaceae
<i>Potamogeton</i>	<i>crispus</i>			I	Wavy-Leaved Pondweed	Potamogetonaceae
<i>Pseudotsuga</i>	<i>menziesii</i>	var.	<i>menziesii</i>	N	Douglas Fir	Pinaceae
<i>Quercus</i>	<i>berberidifolia</i>			N	Scrub Oak	Fagaceae
<i>Quercus</i>	<i>chrysolepis</i>			N	Canyon Live Oak	Fagaceae
<i>Quercus</i>	<i>wislizenii</i>	var.	<i>wislizeni</i>	N	Interior Live Oak	Fagaceae
<i>Rhamnus</i>	<i>illcifolia</i>			N	Holly-leaved Redberry	Rhamnaceae
<i>Rhus</i>	<i>aromatica</i>			N	Skunkbrush	Anacardiaceae
<i>Rosa</i>	<i>californica</i>			N	California Rose	Rosaceae
<i>Rubus</i>	<i>armeniacus</i>			I	Himalayan Blackberry	Rosaceae
<i>Rubus</i>	<i>ursinus</i>			N	California Blackberry	Rosaceae
<i>Salix</i>	<i>exigua</i>			N	Sandbar Willow	Salicaceae
<i>Salix</i>	<i>laevigata</i>			N	Red Willow	Salicaceae
<i>Salix</i>	<i>lasiolepis</i>			N	Arroyo Willow	Salicaceae
<i>Salix</i>	<i>melanopsis</i>			N	Dusky Willow	Salicaceae
<i>Sedum</i>	<i>spathulifolium</i>			N	Broad-leaved Stonecrop	Crassulaceae
<i>Setaria</i>	<i>pumila</i>			I	Yellow Bristlegrass	Poaceae
<i>Solidago</i>	<i>velutina</i>	ssp.	<i>californica</i>	N	California Goldenrod	Asteraceae
<i>Stachys</i>	<i>stricta</i>			N	Sonoma Hedge-Nettle	Lamiaceae

<i>Stipa</i>	<i>miliaceum</i>	var.	<i>miliacea</i>	I	Smilgrass	Poaceae
<i>Tauschia</i>	<i>hartwegii</i>			N	Hartwegg's Tauschia	Apiaceae
<i>Torilis</i>	<i>arvensis</i>			I	Tall Sock-Destroyer	Apiaceae
<i>Toxicodendron</i>	<i>diversilobum</i>			N	Western Poison-oak	Anacardiaceae
<i>Trifolium</i>	<i>microcephalum</i>			N	Small-headed Clover	Fabaceae
<i>Trifolium</i>	<i>willdenovii</i>			N	Tomcat Clover	Fabaceae
<i>Trifolium</i> , dried	sp.			N	Clover (annual)	Fabaceae
<i>Typha</i>	<i>domingensis or angustifolia</i>			N	Southern/Narrow-Leaved Cattail	Typhaceae
<i>Verbascum</i>	<i>thapsus</i>			I	Woolly Mullein	Scrophulariaceae
<i>Vitis</i>	<i>californica</i>			N	California Wild Grape	Vitaceae

## **APPENDIX D**

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Potentially Occurring Special-Status Vascular Plant  
Species Within or Near the Project Site

**Special-status vascular plant species with potential to occur on the Hammer Property Fish Passage Improvement Project, Tehama County, California.**

<b>Common Name</b> <i>Scientific Name</i>	<b>Status*</b> (CNPS)	<b>Geographic Range</b> (CA counties)	<b>Plant community association<sup>†</sup></b> (elevation)	<b>Flowering period</b>
<b>Big-scale Balsamroot</b> <i>Balsamorhiza macrolepis</i>	1B.2	Alameda, Amador, Butte, Colusa, Eldorado, Lake, Mariposa, Napa, Placer, Santa Clara, Solano, Tehama and Tuolumne	Sometimes serpentinite; Chprl, CmWld and VFGrs (90 to 1,555 m)	Mar-Jun
<b>California Androsace</b> <i>Androsace elongata</i> ssp. <i>acuta</i>	4.2	Numerous California counties, from Oregon to Baja California	Chprl, CmWld, CoScr, Mdws/S, PJWld and VFGrs (150 to 1,200 m)	Mar-Jun
<b>Dimorphic Snapdragon</b> <i>Antirrhinum subcordatum</i>	4.3	Colusa, Glenn, Lake and Tehama	Sometimes serpentinite; Chprl and LmCFrs (185 to 800 m)	Apr-Jul
<b>Dwarf Soaproot</b> <i>Chlorogalum pomeridianum</i> var. <i>minus</i>	1B.2	Colusa, Lake, San Luis Obispo, Sonoma and Tehama	Chprl (serpentinite) 205 to 1,000 m)	May-Aug
<b>Jepson Milkvetch</b> <i>Astragalus rattanii</i> var. <i>jepsonianus</i>	1B.2	Colusa, Glenn, Lake, Mendocino, Napa, Tehama and Yolo	Often serpentinite; Chprl, CmWld and VFGrs (295 to 700 m)	Mar-Jun
<b>Klamath Carex</b> <i>Carex klamthensis</i>	1B.2	Colusa, Lake and Tehama. Also in Oregon	Serpentinite: Chprl, CmWld and Medws	-
<b>Stony Creek Spurge</b> <i>Chamaecyce ocellata</i> ssp. <i>rattanii</i>	1B.2	Glenn, Shasta and Tehama	Chprl and VFGrs (85 to 800 m)	May-Oct
<b>Tehama County Western Flax</b> <i>Hesperolinon tehamense</i>	1B.3	Alameda, Glenn, Lake, Napa, Stanislaus and Tehama	Serpentinite; Chprl and CmWld (100-1,250 m)	May-Jul
<b>Tracy's Eriastrum</b> <i>Eriastrum trayi</i>	3.2	Colusa(?), Fresno, Glenn(?), Kern, Lake, Santa Clara, Shasta, Stanislaus, Tehama, Trinity and Tulare	Chprl and CmWld 315 to 1,645 m)	May-Jul
<b>Woolly Meadowfoam</b> <i>Limnanthes floccosa</i> ssp. <i>floccosa</i>	4.2	Butte, Lake, Napa, Shasta, Siskiyou, Tehama, and Trinity. Also known from Oregon.	Vernally mesic; Chprl, CmWld, VFGrs and VnPls (mesic) (60 to 1,335 m)	Mar-Jun

**\* California Native Plant Society (CNPS) Status Codes:**

List **1B** = Plants Rare, Threatened, or Endangered in CA and elsewhere

List **2B** = Plants Rare, Threatened or Endangered in CA but more common elsewhere.

**List 3** = Plants about which more information is needed – a review list

List **4** = Plants of limited distribution in CA

Threat ranks: **0.1** = high; **0.2** = moderate; **0.3** = low

\* = May be extirpated from County

<sup>†</sup> **Plant Community Association Codes:** Chprl = Chaparral, CmWld = Cismontane woodland, CoScr = Coastal scrub, LmCFrs = Lower montane coniferous forest, Mdws/S = Meadows and seeps, VFGrs = Valley and foothill grassland, VnPls = Vernal pools,

## **APPENDIX E**

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### Faunal Species Observed Within or Near the Project Site

**APPENDIX E**  
**Faunal Species Observed Within or Near the Project Site**  
**Hammer Diversion on South Fork Cottonwood Creek**  
**Fish Passage Improvement Project**

COMMON NAME	SCIENTIFIC NAME	LISTING STATUS	
		Federal	State
<b>AMPHIBIANS &amp; REPTILES</b>			
Common King Snake	<i>Lampropeltis getula</i>		
Foothill Yellow-legged Frog	<i>Rana boylei</i>		CSC
Gopher Snake	<i>Pituophis melanoleucus</i>		
Oregon Garter Snake	<i>Thamnophis atratus hydrophilus</i>		
Pacific Chorus Frog	<i>Pseudacris regilla</i>		
Western Fence Lizard	<i>Sceloporus occidentalis</i>		
Western Pond Turtle	<i>Emys marmorata</i>		CSC
Western Rattlesnake	<i>Crotalus viridis</i>		
Western Skink	<i>Eumeces skiltonianus</i>		
Western Toad	<i>Bufo boreas</i>		
<b>BIRDS</b>			
American Dipper	<i>Cinclus mexicanus</i>		
American Robin	<i>Turdus migratorius</i>		
Anna's Hummingbird	<i>Calypte anna</i>		
Band-tailed Pigeon	<i>Patagioenas fasciata</i>		
Bewick's Wren	<i>Thryomanes bewickii</i>		
Black Phoebe	<i>Sayornis nigricans</i>		
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>		
Bullock's Oriole	<i>Icterus bullockii</i>		
Bushtit	<i>Psaltriparus minimus</i>		
California Quail	<i>Callipepla californica</i>		
Common Merganser	<i>Mergus merganser</i>		
Lazuli Bunting	<i>Passerina amoena</i>		
Mountain Quail	<i>Oreortyx pictus</i>		
Mourning Dove	<i>Zenaida macroura</i>		
Northern Flicker	<i>Colaptes auratus</i>		
Nuttall's Woodpecker	<i>Picoides nuttallii</i>		
Red-shouldered Hawk	<i>Buteo lineatus</i>		
Red-tailed Hawk	<i>Buteo jamaicensis</i>		
Spotted Towhee	<i>Pipilo maculatus</i>		
Steller's Jay	<i>Cyanocitta stelleri</i>		
Warbling Vireo	<i>Vireo gilvus</i>		
Western Scrub-Jay	<i>Aphelocoma californica</i>		
Western Tanager	<i>Piranga ludoviciana</i>		
Wrentit	<i>Chamaea fasciata</i>		
<b>FISH</b>			
Bass*	<i>Micropterus sp.</i>		
Bluegill*	<i>Lepomis macrochirus</i>		
Rainbow Trout (Steelhead)	<i>Oncorhynchus mykiss</i>	T	
Sacramento Sucker	<i>Catostomus occidentalis</i>		

**APPENDIX E**  
**Faunal Species Observed Within or Near the Project Site**  
**Hammer Diversion on South Fork Cottonwood Creek**  
**Fish Passage Improvement Project**

COMMON NAME	SCIENTIFIC NAME	LISTING STATUS	
		Federal	State
<b>INVERTEBRATES</b>			
Crayfish	<i>Unknown species</i>		
<b>MAMMALS</b>			
American Beaver (sign)	<i>Castor canadensis</i>		
Big Brown Bat	<i>Eptesicus fuscus</i>		
Black Bear (tracks, scat)	<i>Ursus americanus</i>		
Black-tailed Jackrabbit	<i>Lepus californicus</i>		
California Ground Squirrel	<i>Spermophilus beecheyi</i>		
California Bat	<i>Myotis californicus</i>		
Canyon Bat	<i>Parastrellus hesperus</i>		
Brazilian Free-tailed Bat	<i>Tadarida brasiliensis</i>		
Fringed Bat	<i>Myotis thysanodes</i>		
Long-legged Bat	<i>Myotis volans</i>		
Hoary Bat	<i>Lasiurus cinereus</i>		
Little Brown Bat	<i>Myotis lucifugus</i>		
Long-eared Bat	<i>Myotis evotis</i>		
Mule Deer (Black-tailed Deer)	<i>Odocoileus hemionus columbianus</i>		
Pallid Bat	<i>Antrozous pallidus</i>		CSC
Silver-haired Bat	<i>Lasionycteris noctivagans</i>		
Small-footed Bat	<i>Myotis ciliolabrum</i>		
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>		CSC
Western Gray Squirrel	<i>Sciurus griseus</i>		
Western Red Bat	<i>Lasiurus blossevillii</i>		CSC
Yuma Bat	<i>Myotis yumanensis</i>		
<b>LEGEND:</b>			
E = Endangered		FP = California Fully Protected	
T = Threatened		SC = NMFS Species of Concern	
C = Candidate for listing as Endangered or Threatened		D = Delisted	
P = Proposed for listing as Endangered or Threatened		PD = Proposed for Delisting	
CSC = California Species of Special Concern		* = Non-native Species	

## **APPENDIX F**

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### **Potentially Occurring Special-Status Faunal Species Within or Near the Project Site**

**APPENDIX F**  
**Potentially-occurring Special-status Species**  
**Hammer Diversion on South Fork Cottonwood Creek Fish Passage Improvement Project**

SPECIES	LISTING STATUS		TYPICAL HABITAT	POTENTIAL FOR OCCURRENCE
	Common Name (Scientific Name)	Federal		
<b>AMPHIBIANS &amp; REPTILES</b>				
Western Tailed Frog <i>(Ascaphus truei)</i>	---	CSC	Perennial montane streams in steep-walled valleys with dense vegetation. Tadpoles require cool streams with less than 15 degrees C.	Not likely to occur at the project site due to a lack of consistently cold water.
Western Pond Turtle <i>Emys marmorata</i>	---	CSC	In or near aquatic habitats in slow moving water. Often associated with basking substrate (eg. logs, large rocks, etc.) Use adjacent uplands to nest and overwinter.	Observed during site surveys.
California Red-legged Frog <i>(Rana draytonii)</i>	T	CSC	Slow moving or pooled aquatic habitats with overhanging vegetation.	Potential habitat present within the project site. Not observed during site surveys.
Foothill Yellow-legged Frog <i>(Rana boylei)</i>	---	CSC	In or near rocky streams in a variety of habitats. Rarely encountered far from permanent water.	Observed during site surveys.
<b>BIRDS</b>				
Northern Goshawk <i>(Accipiter gentilis)</i>	---	CSC	Dense mature conifer and deciduous forest interspersed with open spaces and riparian areas. Nests on north-facing slopes with high tree canopy cover near water.	Not likely to occur due to a lack of suitable habitat.
Tri-colored Blackbird <i>(Agelaius tricolor)</i>	---	CSC	Breeds in tall emergent vegetation. Forages in grassland, agricultural lands.	Not likely to occur due to a lack of suitable habitat.
Golden Eagle <i>(Aquila chrysaetos)</i>	---	FP	Uses rolling foothills and mountain terrain, wide arid plateaus deeply cut by streams and canyons, open mountain slopes, and cliffs and rock outcrops. Generally inhabit more open country.	Suitable nesting habitat not present within the project site. Low to moderate likelihood of foraging in the area due to a minimal amount of preferred open terrain.
Short-eared Owl <i>(Asio flammeus)</i>	---	CSC	Uses open areas with few trees including grasslands, prairies, dunes, meadows, irrigated areas and emergent wetlands.	Not likely to occur due to a lack of suitable habitat.
Long-eared Owl <i>(Asio otus)</i>	---	CSC	Riparian, live oak or conifer thickets with small, dense canopy trees used for roosting and nesting. Generally forages in open areas.	Not likely to occur due to a lack of suitable habitat (open foraging habitat).

**APPENDIX F**  
**Potentially-occurring Special-status Species**  
**Hammer Diversion on South Fork Cottonwood Creek Fish Passage Improvement Project**

SPECIES  Common Name (Scientific Name)	LISTING STATUS		TYPICAL HABITAT	POTENTIAL FOR OCCURRENCE
	Federal	State		
Swainson's Hawk ( <i>Buteo swainsoni</i> )	---	T	Open desert, grassland or cropland containing scattered large trees or small groves. Nests in open riparian habitat in scattered trees or small groves in sparsely vegetated flatlands.	Not likely to occur due to a lack of suitable nesting or foraging habitat. Project site is located outside of the known geographic range of the species.
Vaux's Swift ( <i>Chaetura vauxi</i> )	---	CSC	Nests in large hollow trees and snags in redwood, Douglas fir and other conifer habitats. Often nests in large colonies. Forages widely, but prefers rivers and lakes.	No suitable nesting habitat present. May forage within the project area, particularly during spring and fall migration periods.
Northern Harrier ( <i>Circus cyaneus</i> )	---	CSC	Open grassland, rangeland, meadow and emergent wetland.	Not likely to occur due to a lack of suitable nesting or foraging habitat.
Black Swift ( <i>Cypseloides niger</i> )	---	CSC	Breeds in small colonies on cliffs behind or adjacent to waterfalls in deep canyons and sea-bluffs above surf. Forages widely.	No suitable nesting habitat present. May forage within the project area, particularly during spring and fall migration periods.
Yellow Warbler ( <i>Dendroica petechia brewsteri</i> )	---	CSC	Nests in riparian habitats and open conifer forests.	May nest in riparian habitats within the project site. Likely to forage within the project site during spring and fall migration if nesting does not occur locally.
White-tailed Kite ( <i>Elanus caeruleus</i> )	---	FP	Nests in dense tree stands near open foraging areas. Forages in open grassland and agricultural areas.	Not likely to occur due to a lack of suitable habitat.
Little Willow Flycatcher ( <i>Empidonax traillii brewsteri</i> )	---	E	Nests in upper elevation riparian and wet meadow habitats.	Low to moderate likelihood of nesting due to the fact that this species is no longer known to nest in lower elevations. Likely to forage in the area during spring and fall migration.
American Peregrine Falcon ( <i>Falco peregrinus anatum</i> )	D	D/FP	Riparian areas, coastal and inland wetlands are important habitats. Breeds mostly in woodland, forest and coastal habitats on cliff ledges, occasionally in snag cavities and in other used raptor nests.	No suitable nesting habitat present within the project site. May forage within the project area if nesting habitat is present in the general area.
Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	D	E/FP	Nests in large trees with open branchwork, usually near permanent water including rivers, streams and lakes/reservoirs. Forages over large bodies of water with abundant fish.	Not likely to nest in the near vicinity of the project site. No large platform nests observed during site surveys. May forage along the South Fork of Cottonwood Creek.

**APPENDIX F**  
**Potentially-occurring Special-status Species**  
**Hammer Diversion on South Fork Cottonwood Creek Fish Passage Improvement Project**

SPECIES	LISTING STATUS		TYPICAL HABITAT	POTENTIAL FOR OCCURRENCE
	Common Name (Scientific Name)	Federal		
Yellow-breasted Chat ( <i>Icteria virens</i> )	---	CSC	Nests in dense shrubs along streams and rivers.	May nest and forage in riparian habitats within the protect site.
Loggerhead Shrike ( <i>Lanius ludovicianus</i> )	---	CSC	Prefers open habitats with scattered trees, shrubs, posts, fences and other perches. Found primarily in valley-foothill and desert habitats.	May nest and forage in the project area.
Purple Martin ( <i>Progne subis</i> )	---	CSC	Found in open forest and woodlands with snags. Forages over riparian area, forest and woodlands.	Not likely to nest due to a lack of suitable nesting habitat. May forage in the project area if nesting habitat is present in the region.
Bank Swallow ( <i>Riparia riparia</i> )	---	T	Nests in excavated burrows in fine-textured vertical stream banks.	Not likely to occur due to a lack of suitable nesting habitat.
Northern Spotted Owl ( <i>Strix occidentalis caurina</i> )	T	C	Occurs in mature second growth and late-successional forest, uses dense multi-layered canopy cover for roost selection.	Not likely to occur due to a lack of suitable habitat.
<b>FISH</b>				
Green Sturgeon (Southern DPS) ( <i>Acipenser medirostris</i> )	T	CSC	Requires cool fresh water for spawning in large cobble. Spawning takes place in deep, fast water.	Not likely to occur due to a lack of preferred habitat. Not known to occur in the Cottonwood Creek drainage.
River Lamprey ( <i>Lampetra ayresii</i> )		CSC	Adults spawn in gravelly riffles in river tributary streams. Ammocoetes (young) use silty backwaters and eddies.	Not known to occur in the Cottonwood Creek drainage but the species is not well studied.
Hardhead ( <i>Mylopharodon conocephalus</i> )	---	CSC	Low to mid-elevation streams in the Sacramento and San Joaquin drainage. Also present in the Russian River. Clear, deep pools with sand, gravel, and boulder substrate. Slow water velocity. Not found where exotic centrarchids predominate.	Known to occur in the South Fork of Cottonwood Creek.
Central Valley Steelhead ( <i>Oncorhynchus mykiss</i> )	T	---	Spawns in cool, clear water with clean spawning gravel in the Sacramento River and many tributaries.	Rainbow trout observed during site surveys. Known to occur in the South Fork of Cottonwood Creek.

**APPENDIX F**  
**Potentially-occurring Special-status Species**  
**Hammer Diversion on South Fork Cottonwood Creek Fish Passage Improvement Project**

SPECIES	LISTING STATUS		TYPICAL HABITAT	POTENTIAL FOR OCCURRENCE
	Common Name (Scientific Name)	Federal		
Central Valley Fall- / Late Fall-run Chinook Salmon ( <i>Oncorhynchus tshawytscha</i> )	SC	CSC	Spawn in cool, clear water with clean spawning gravel in the Sacramento River and many tributaries.	Not likely to occur in the project reach of the South Fork of Cottonwood Creek due to the elevation of the site and low flows during spawning periods. Known to occur in the main stem of Cottonwood Creek and, in some years, in the lower reaches of the South Fork of Cottonwood Creek.
Central Valley Spring-run Chinook Salmon ( <i>Oncorhynchus tshawytscha</i> )	T	T	Spawns in the late summer/early fall in cool, clear water with clean spawning gravel in the Sacramento River and some tributaries.	Likely to occur in the project reach of the South Fork of Cottonwood Creek.
Sacramento River Winter-run Chinook Salmon ( <i>Oncorhynchus tshawytscha</i> )	E	E	Spawns in the summer in cool, clear water with clean spawning gravel, almost exclusively in the mainstem of the Sacramento River.	Not known and not likely to occur in the South Fork of Cottonwood Creek.
<b>INVERTEBRATES</b>				
Vernal Pool Fairy Shrimp ( <i>Branchinecta lynchi</i> )	T	---	Vernal pool and vernal pool-like habitats.	No potential for occurrence due to the lack of vernal pool habitats.
Valley Elderberry Longhorn Beetle ( <i>Desmocerus californicus dimorphus</i> )	T	---	Elderberry shrubs with stems 1 inch or greater in diameter.	No potential for occurrence due to the lack of elderberry shrubs within the project site.
Vernal Pool Tadpole Shrimp ( <i>Lepidurus packardii</i> )	E	---	Vernal pool and ephemeral wetland habitats.	No potential for occurrence due to the lack of vernal pool habitats.
<b>MAMMALS</b>				
Pallid Bat ( <i>Antrozous pallidus</i> )	---	CSC	Uses a wide variety of habitats including grassland, shrubland, woodland and forest. Roosts in caves, mines, crevices, hollow trees and buildings.	Detected during acoustical surveys.
Ringtail ( <i>Bassariscus astutus</i> )	---	FP	Riparian habitats and forest and shrub habitats near rocky areas or riparian areas from low to middle elevations.	Likely to occur in riparian and upland habitats or in buildings within the project site.

**APPENDIX F**  
**Potentially-occurring Special-status Species**  
**Hammer Diversion on South Fork Cottonwood Creek Fish Passage Improvement Project**

SPECIES	LISTING STATUS		TYPICAL HABITAT	POTENTIAL FOR OCCURRENCE
	Common Name (Scientific Name)	Federal		
Townsend's Big-eared Bat ( <i>Corynorhinus townsendii</i> )	---	C	Roosts in caves, mines, tunnels and buildings. Very sensitive to human disturbance.	Two individuals observed roosting in the diversion tunnel during site surveys.
Spotted Bat ( <i>Euderma maculatum</i> )	---	CSC	Prefers to roost in rock crevices on cliffs but also roosts in caves and buildings. Forages over water in a variety of habitats.	Not likely to occur. The project site is outside of the known geographic range of the species. Suitable roosting habitat not present within the project site.
Western Mastiff Bat ( <i>Eumops perotis</i> )	---	CSC	Roosts in crevices in cliff faces, high buildings, trees and tunnels. Occurs in open arid to semi-arid habitats with abundant roost sites.	Not likely to occur. The project site is outside of the known geographic range of the species. Suitable roosting habitat not present within the project site.
Western Red Bat ( <i>Lasiurus blossevillii</i> )	---	CSC	Roosts primarily in trees, less often in shrubs. Roost sites often are in edge habitats adjacent to streams, fields, or urban areas. Prefers edges or habitat mosaics that have trees for roosting and open areas for foraging.	Detected during acoustical surveys.
American Marten ( <i>Martes americana</i> )	---	CSC	Uses cavities in large trees, snags, stumps and logs for denning. Requires a variety of different age stands, particularly mature conifers and snags. Small clearings, meadows and riparian areas provide foraging habitat.	Not likely to occur due to the lack of suitable conifer habitat.
Pacific Fisher ( <i>Martes pennanti pacifica</i> )	C	C	Large areas of mature, dense coniferous forest and riparian forest stands with snags and high percent canopy cover.	Low to moderate likelihood of occurrence. The project site lacks preferred conifer habitat, however animals may migrate downslope from coniferous habitat and occupy the project area, particularly during winter months.

**LEGEND:**

E = Endangered  
T = Threatened  
C = Candidate for listing as Endangered or Threatened  
P = Proposed for listing as Endangered or Threatened  
**CSC** = California Species of Special Concern  
**FP** = California Fully Protected  
**SC** = NMFS Species of Concern

D = Delisted  
**PD** = Proposed for Delisting  
**1A** = Plants presumed to be extinct in California  
**1B** = Plants rare, threatened or endangered in California and elsewhere  
**2** = Plants rare, threatened or endangered in California but more common elsewhere  
**3** = Plants about which we need more information, a review list  
**4** = Plants of limited distribution, a watch list

## **APPENDIX G**

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### Mitigation Monitoring and Reporting Program

## Appendix G - Mitigation Monitoring and Reporting Program

### G.1 Introduction

In accordance with the National Environmental Policy Act (NEPA) (42 U.S.C. 4331 *et seq.*), the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000 *et seq.*) and the State CEQA Guidelines (14 California Code of Regulations [CCR] Section 15000 *et seq.*), the U.S. Fish and Wildlife Service (USFWS) in conjunction with the Central Valley Regional Water Quality Control Board (RWQCB) prepared a joint Environmental Assessment / Initial Study (EA / IS) that identifies potential significant environmental impacts related to a fish passage improvement project on the South Fork of Cottonwood Creek at a site known as the Hammer Diversion. The project includes removal of the existing diversion dam and implementing improvements to meet the landowner's water and power needs. The EA / IS also identifies mitigation measures that would reduce these impacts to a less-than-significant level. CEQA Guidelines require public agencies "to adopt a reporting and monitoring program for changes to the project which it has adopted or made a condition of project approval in order to mitigate or avoid significant effects on the environment." A Mitigation Monitoring and Reporting Program (MMRP) is required for the proposed project because the EA / IS identifies potentially significant adverse impacts related to project implementation, and mitigation measures have been identified to reduce those impacts. Adoption of the MMRP occurs along with approval of the proposed project.

### G.2 Purpose of Mitigation Monitoring and Reporting Program

This MMRP has been prepared in order to ensure mitigation measure implementation. Measures will occur before, during and after project construction and operation. The MMRP may be modified during project implementation, as necessary, in response to changing conditions or other refinements. Table G-1 will assist the responsible parties with measure implementation. The table identifies individual mitigation measures, timing of implementation, responsible parties for implementing the measure, and space to confirm compliance of the mitigation measures. The listing sequence of mitigation measures follows the sequence found in the EA / IS.

### G.3 Roles and Responsibilities

Unless otherwise specified, the USFWS is responsible for mitigation measure implementation and demonstrating their successful completion. The USFWS, at its discretion, may delegate implementation responsibility or portions thereof to a licensed contractor or other designated agent. The USFWS is responsible for overall MMRP administration and verifying completion. The USFWS will designate a project manager to oversee implementation of the MMRP

### G.4 Mitigation Monitoring and Reporting Plan Table

The categories identified in Table G-1 are described below.

- Measure Number – The listing sequence of mitigation measures follows the sequence found in the EA / IS.
- Mitigation Measure – Provides mitigation measure text identified in the EA / IS.
- Timing of Implementation – The time frame in which the mitigation will take place.
- Responsible Parties – The party responsible for enforcing the mitigation measure requirements. If more than one party has responsibility under a given mitigation measure, the tasks of each individual party is identified parenthetically (e.g., "implementation" or "monitoring").
- Compliance – This column is to be dated and signed by the person (either project manager or designee) responsible for verifying compliance with the requirements of the mitigation measure.

Table G-1. Mitigation Monitoring and Reporting Program Summary

Measure Number	Mitigation Measure	Timing of Implementation	Responsible Parties	Verification of Completion	
				Initials	Date
<b>3.3 Air Quality</b>					
AIR-1	Soil-disturbing activities will minimize disturbance to reduce the amount of bare soil exposed at any one time.	Throughout Construction	USFWS		
	Travel on unpaved dirt roads will be limited to 10 miles per hour, to minimize dust emissions.	Throughout Construction	USFWS		
AIR-2	Maintain all construction equipment in proper tune according to manufacturer's specifications.	Throughout Construction	USFWS		
	Maximize to the extent feasible, the use of diesel construction equipment meeting the California Air Resources Board's (CARB) 1996 or newer certification standard for off-road heavy-duty diesel engines.	Throughout Construction	USFWS		
	If required by the Tehama County Air Pollution Control District (TCAPCD), verify that owners or operators of vehicles are registered with the California Air Resources Board Diesel Off-Road On-Line Reporting System (DOORS) program: ( <a href="http://www.arb.ca.gov/msprog/ordiesel/ordiesel.htm">www.arb.ca.gov/msprog/ordiesel/ordiesel.htm</a> ). The Diesel Off-Road On-Line Reporting System program assists fleet owners in reporting their off-road diesel vehicle inventories to reduce vehicle emissions, as required by the In-Use Off-Road Diesel Regulation.	Pre-construction	USFWS		
	If required by the Tehama County Air Pollution Control District, verify that owners or operators of portable engines and certain other types of equipment are registered under the California Air Resources Board's Statewide Portable Equipment Registration Program (PERP) in order to operate their equipment throughout California without having to obtain individual permits from local air districts: ( <a href="http://www.arb.ca.gov/portable/portable.htm">www.arb.ca.gov/portable/portable.htm</a> ).	Pre-construction	USFWS		
<b>3.3 Biological Resources</b>					
VEGETATION-1	Disturbance to existing vegetation will be avoided or minimized to the extent possible.	Throughout Construction	USFWS		
VEGETATION-2	Disturbance to riparian vegetation will be avoided or minimized to the extent possible.	Throughout Construction	USFWS		
VEGETATION-3	All heavy equipment shall be thoroughly cleaned prior to mobilization onsite to remove any soil, weed seeds and plant parts to reduce the importation and spread of invasive exotic plant species.	Pre-construction	USFWS		
VEGETATION-4	Only certified weed-free straw shall be used for erosion control or other purposes to reduce the importation and spread of invasive exotic plant species.	Throughout Construction	USFWS		
VEGETATION-5	A riparian wetland planting plan will be prepared to replace impacted riparian wetlands by a measure of quantity and quality equal to or exceeding impacts of the project using appropriate native riparian trees and shrubs.	Post-construction	USFWS		
VEGETATION-6	Following the initial winter flows after dam removal, the area along the new low water line upstream of the former dam, and new point bars formed immediately downstream of the former dam will be revegetated in accordance with the riparian wetland planting plan.	Post-construction	USFWS		
WILDLIFE-1	Prior to dam removal and any dewatering/water diversion activities, water bodies shall be surveyed by a qualified biologist to determine if any foothill yellow-legged frogs or western pond turtles are present. If any individuals of these species are found, a qualified and permitted biologist shall determine and implement appropriate relocation procedures. Herpetological exclusion fencing shall be erected around the perimeter of the in-stream work area prior to construction initiation. Fencing shall remain until work in sensitive areas is complete.	Pre-construction and Throughout Construction	USFWS		
WILDLIFE-2	A biologist experienced in the identification of amphibian species (particularly Rana species) will ensure that no California red-legged frogs are present within any of the disturbance areas. If any California red-legged frogs are found to be present, all potentially disturbing construction activities will be suspended until appropriate protective measures can be developed in consultation with U.S. Fish and Wildlife Service (USFWS) Endangered Species Act (ESA) staff.	Pre-construction	USFWS		
WILDLIFE-3	Measures VEGETATION-2, VEGETATION-5 and VEGETATION-6 associated with the avoidance and restoration of riparian vegetation will be fully implemented.	Throughout Construction and Post-construction	USFWS		
WILDLIFE-4	Measures WATER-4 through WATER-6 associated with minimizing impacts to water quality will be fully implemented.	Pre-construction and Throughout Construction	USFWS		
WILDLIFE-5	Any tree removal, vegetation disturbance and/or the onset of potentially disturbing construction activities should occur between August 1 and February 1 (outside of the combined breeding season for songbirds, raptors and other migratory bird species).	Throughout Construction	USFWS		
WILDLIFE-6	If tree removal, vegetation clearing, or the onset of potentially disturbing construction activities must occur during the nesting season, a nesting survey of the construction area and adjacent suitable habitat should be conducted by a qualified biologist no more than seven days prior to the initiation of the onset of these activities. If active bird nests are found to be present, tree removal, vegetation clearing and the onset of potentially disturbing construction activities shall be suspended until a qualified biologist, in consultation with California Department of Fish and Wildlife (CDFW), can establish an appropriate protective buffer area to minimize impacts to the nesting birds. No construction activities should commence within the buffer area until the qualified biologist determines that the young birds have fledged or the nest is no longer active.	Pre-construction	USFWS		
WILDLIFE-7	Prior to any construction work at the diversion tunnel inlet, a bat survey of the diversion tunnel shall be conducted by a qualified biologist to ensure that pallid bats or Townsend's big-eared bats are not roosting in the tunnel.	Pre-construction	USFWS		
WILDLIFE-8	If pallid bats or Townsend's big-eared bats are found to be roosting in the diversion tunnel, a qualified biologist shall be on site during all construction activities at the diversion tunnel inlet to observe the roosting bat's behavior and ensure that construction activities are not causing the bats to be significantly disturbed. If the biologist determines that construction activities are causing the bats to be significantly disturbed, all construction activities at the diversion tunnel inlet shall be suspended until the biologist, in consultation with the California Department of Fish and Wildlife, can establish appropriate measures to minimize impacts to these species.	Pre-construction	USFWS		
WILDLIFE-9	A construction worker education program shall be implemented that includes an explanation of all special-status animal species, identification, avoidance measures, and federal and state laws that protect the species. This shall include, at a minimum, those species described above.	Pre-construction	USFWS		
WETLAND-1	Measures VEGETATION-2, VEGETATION-5 and VEGETATION-6 associated with the avoidance and restoration of riparian vegetation will be fully implemented.	Throughout Construction and Post-construction	USFWS		
WETLAND-2	Project activities will avoid impacts to wetlands to the extent possible.	Throughout Construction	USFWS		

Table G-1. Mitigation Monitoring and Reporting Program Summary

Measure Number	Mitigation Measure	Timing of Implementation	Responsible Parties	Verification of Completion	
				Initials	Date
WETLAND-3	High-visibility fencing will be installed in areas where equipment will be working near any wetlands and/or riparian habitat that are not to be disturbed	Pre-construction	USFWS		
WETLAND-4	Construction crews will be informed about the importance of avoiding sensitive areas, including wetlands.	Pre-construction	USFWS		
FISH-1	Dam removal shall be conducted between June 15 and October 1 to minimize impacts to anadromous fish by working when water temperatures are warmer and anadromous fish are less likely to be present.	Throughout Construction	USFWS		
FISH-2	All shock tubes, explosive packaging and wires from the blasting operations will be removed from the site.	Post-construction	USFWS		
FISH-3	Measure SOIL / GEO-3 regarding use time delays for blasting operations will be fully implemented to minimize the level of blast-induced overpressure rises.	Throughout Construction	USFWS		
FISH-4	Measures VEGETATION-2, VEGETATION-5 and VEGETATION-6 associated with the avoidance and restoration of riparian vegetation will be fully implemented.	Throughout Construction and Post-construction	USFWS		
FISH-5	Measures WATER-4 through WATER-6 associated with minimizing impacts to water quality will be fully implemented.	Pre-construction and Throughout Construction	USFWS		
FISH-6	Prior to dam removal, exclusionary fish netting shall be installed approximately 500 feet upstream and 500 feet downstream of the diversion structure. U.S. Fish and Wildlife Service, in coordination and consultation with National Marine Fisheries Service (NMFS) and California Department of Fish and Wildlife, will ensure that qualified fish biologists are onsite to implement fish rescue operations through the use of herding, seining and/or electrofishing, if necessary. Best professional determination will be used to decide which method(s) of rescue is most appropriate. Biologists will first try to haze and herd fish out of the fish exclusion area. If fish biologists determine that the use of electrofishing is necessary for the efficient and successful removal of fish, the National Marine Fisheries Service electrofishing guidelines (NMFS 2000) will be strictly followed. The fish rescue team will be comprised of fishery biologists with professional experience using seines and electrofishing equipment.	Pre-construction	USFWS		
<b>3.5 Cultural Resources</b>					
CULTURAL-1	An individual knowledgeable in identifying cultural resource will be present during any ground-disturbing activities. In the event subsurface cultural remains over 45 years of age are encountered, the project will cease work at the general area of discovery and the contractor consult with a professional archaeologist on staff with the U.S. Fish and Wildlife Service. A field exam by the professional will likely be necessary and further steps considered in the evaluation, including mitigation and contacting the Native American Indian community if human remains are encountered (following Native American Graves Protection and Repatriation Act procedures).	Throughout Construction	USFWS		
<b>3.8 Soils / Minerals and Geology</b>					
SOIL / GEO-1	After ground-disturbing activities are complete, all disturbed areas (outside of the active stream channel and the ditch bottom) shall be seeded with native plant species and mulched.	Post-construction	USFWS		
SOIL / GEO-2	Construction of all project actions shall comply with Central Valley Regional Water Quality Control Board (RWQCB) Basin Plan Objectives and an erosion control plan. Standard Best Management Practices (BMPs) will be incorporated into the project designs.	Pre-construction and Throughout Construction	USFWS		
SOIL / GEO-3	Time delays will be used for the blasting operations during dam demolition to minimize the level of ground vibration and reduce the risk of damage to the nearby tunnel.	Throughout Construction	USFWS		
<b>3.9 Hazards and Hazardous Wastes</b>					
HAZ-1	Measures WATER-4 through WATER-6 associated with potential petroleum product spills will be fully implemented.	Pre-construction and Throughout Construction	USFWS		
HAZ-2	Blasting operations will be isolated from flammable materials / vegetation. Weather conditions such as wind / humidity related to a threat of wildfire will be monitored and blast timing will be adjusted accordingly. A shovel and an operational full five-gallon backpack pump or a 4A fire extinguisher will be readily accessible at several strategic locations surrounding the blast site. Fire watchers will remain in the area for at least one hour following detonation.	Throughout Construction	USFWS		
<b>3.10 Hydrology and Water Quality</b>					
WATER-1	Ditch piping shall occur when the ditch is not flowing.	Throughout Construction	USFWS		
WATER-2	Dam demolition shall be conducted in the summer / early fall during the low flow period.	Throughout Construction	USFWS		
WATER-3	Monitoring of water turbidity and settleable materials shall be conducted in accordance with the Clean Water Act Section 401 Certification through consultation with the Central Valley Regional Water Quality Control Board.	Throughout Construction	USFWS		
WATER-4	All equipment and machinery that contains fuel, oil or other petroleum products used during dam demolition shall be checked for petroleum leaks immediately prior to being mobilized to the project site and again each day prior to use.	Pre-construction and Throughout Construction	USFWS		
WATER-5	All equipment and machinery that contains fuel, oil or other petroleum products used during dam demolition will be operated and stored within an impervious secondary containment structure. All refueling and/or maintenance shall take place within the secondary containment structure.	Throughout Construction	USFWS		
WATER-6	An emergency spill kit and absorbent oil booms will be onsite during dam demolition preparation activities.	Throughout Construction	USFWS		
WATER-7	Measures SOIL / GEO-1 and SOIL / GEO-2 regarding erosion control will be fully implemented.	Pre-construction, Throughout Construction, Post-construction	USFWS		

## **APPENDIX H**

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### **CEQA Environmental Checklist Form**

## ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a “Less Than Significant with Mitigation Incorporated” or “Less Than Significant” as indicated by the checklist on the following pages. Each of the environmental topics listed have been discussed in the joint Environmental Assessment and Initial Study.

Aesthetics	Agriculture Resources	Air Quality
Biological Resources	Cultural Resources	Geology/Soils
Hazards & Hazardous Materials	Hydrology/Water Quality	Land Use/Planning
Mineral Resources	Noise	Population/Housing
Public Services	Recreation	Transportation/Traffic
Utilities/Service Systems	Mandatory Findings of Significance	

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial evaluation:

I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

- I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

 _____ Signature	<u>4/1/14</u> _____ Date
Jeff Souza _____ Printed Name	_____ For

# Environmental Checklist Form

Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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## I. AESTHETICS (See EA/IS Section 3.1)

- Would the project:

- a) Have a substantial adverse effect on a scenic vista?
- b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?
- c) Substantially degrade the existing visual character or quality of the site and its surroundings?
- d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

## II. AGRICULTURE RESOURCES (See EA/IS Section 3.2)

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:

- a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non- agricultural use?
- b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?
- c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?

## III. AIR QUALITY (See EA/IS Section 3.3)

Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:

- a) Conflict with or obstruct implementation of the applicable air quality plan?
- b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?
- c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?
- d) Expose sensitive receptors to substantial pollutant concentrations?
- e) Create objectionable odors affecting a substantial number of people?

# Environmental Checklist Form

Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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## IV. BIOLOGICAL RESOURCES (See EA/IS Section 3.4)

- Would the project:

- a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?
- b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?
- c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?
- d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?
- e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?
- f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

## V. CULTURAL RESOURCES (See EA/IS Section 3.5)

- Would the project:

- a) Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5?
- b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?
- c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?
- d) Disturb any human remains, including those interred outside of formal cemeteries?

# Environmental Checklist Form

Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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## VI. GEOLOGY AND SOILS (See EA/IS Section 3.8)

- Would the project:

- a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.
  - ii) Strong seismic ground shaking?
  - iii) Seismic-related ground failure, including liquefaction?
  - iv) Landslides?
- b) Result in substantial soil erosion or the loss of topsoil?
- c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?
- d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?
- e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

## VII. HAZARDS AND HAZARDOUS MATERIALS (See EA/IS Section 3.9)

- Would the project:

- a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?
- b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?
- c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?
- d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?
- e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

# Environmental Checklist Form

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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- f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?
- g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?
- h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

## VIII. HYDROLOGY AND WATER QUALITY (See EA/IS Section 3.10)

- Would the project:

- a) Violate any water quality standards or waste discharge requirements?
- b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?
- c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?
- d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?
- e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?
- f) Otherwise substantially degrade water quality?
- g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?
- h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?

# Environmental Checklist Form

Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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- i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?
- j) Inundation by seiche, tsunami, or mudflow?

## IX. LAND USE AND PLANNING (See EA/IS Section 3.11)

- Would the project:

- a) Physically divide an established community?
- b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?
- c) Conflict with any applicable habitat conservation plan or natural community conservation plan?

## X. MINERAL RESOURCES (See EA/IS Section 3.8)

- Would the project:

- a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?
- b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

## XI. NOISE (See EA/IS Section 3.12)

- Would the project result in:

- a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?
- b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?
- c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?
- d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

# Environmental Checklist Form

Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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- e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?
- f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

## XII. POPULATION AND HOUSING (See EA/IS Section 3.13)

- Would the project:

- a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?
- b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?
- c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

## XIII. PUBLIC SERVICES (See EA/IS Section 3.14)

- a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:
  - Fire protection?
  - Police protection?
  - Schools?
  - Parks?
  - Other public facilities?

## XIV. RECREATION (See EA/IS Section 3.15)

- a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

# Environmental Checklist Form

Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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- b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

## XV. TRANSPORTATION/TRAFFIC (See EA/IS Section 3.16)

- Would the project:

- a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?
- b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?
- c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?
- d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?
- e) Result in inadequate emergency access?
- f) Result in inadequate parking capacity?
- g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?

## XVI. UTILITIES AND SERVICE SYSTEMS (See EA/IS Section 3.14)

- Would the project:

- a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?
- b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?
- c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?
- d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

# Environmental Checklist Form

Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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- e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?
- f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?
- g) Comply with federal, state, and local statutes and regulations related to solid waste?

## XVII. MANDATORY FINDINGS OF SIGNIFICANCE

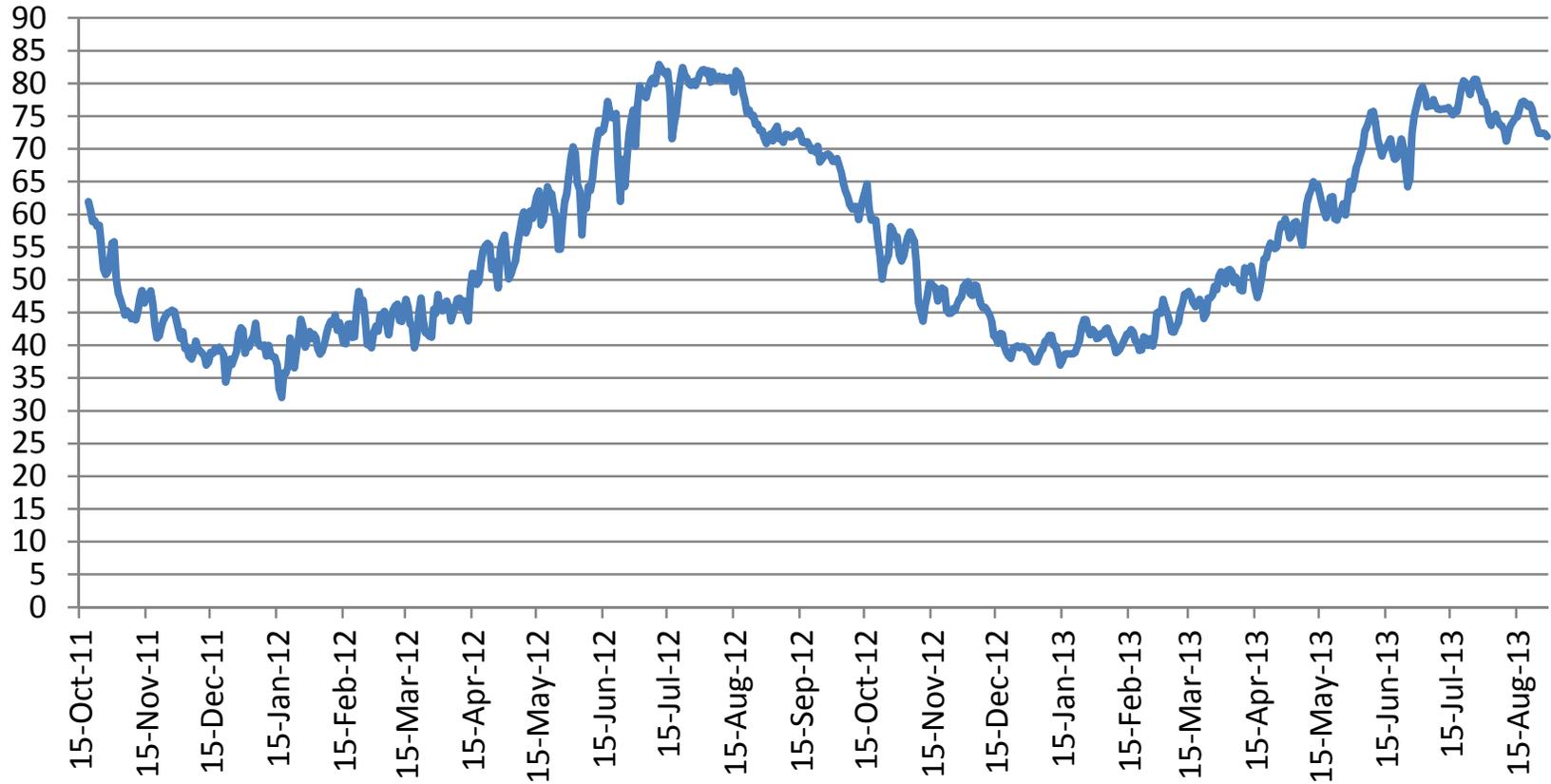
- a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?
- b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?
- c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

## **APPENDIX I**

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Maximum Stream Temperatures  
Hammer Diversion Site

## Maximum Stream Temperatures Hammer Diversion Site



Data Source: California Department of Fish and Wildlife

## **APPENDIX J**

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Public Comments

## Appendix J - Public Comments

### J.1 Introduction

This appendix contains comments received on the Draft Hammer Fish Passage Improvement Project EA / IS. Table J-1 lists the commenters and their associated agencies or groups. Appendix K includes responses to comments by letter number.

### J.2 List of Commenters

Table J-1. List of Commenters

Table J-1. List of Commenters		
Commenter	Agency/Group	Letter Number
Michael R. Harris	State of California Department of Fish and Wildlife	1

### J.3 Comments

The full text of the received comment letters is included below.



April 30, 2014

James Smith  
Patricia Parker Hamelberg  
U.S. Fish and Wildlife Service  
Red Bluff Fish and Wildlife Office  
10950 Tyler Road  
Red Bluff, CA 96080

**Subject: Environmental Assessment/Initial Study/Mitigated Negative Declaration, Hammer Diversion on South Fork Cottonwood Creek, Fish Passage Improvement Project. State Clearinghouse Number 2014042011**

Dear Mr. Smith and Ms. Hamelberg,

The California Department of Fish and Wildlife (Department) has received and reviewed the request for comments for the above referenced project. The proposed project is located in the foothills at the eastern base of the North Coast Range, approximately 35 miles west of Red Bluff, in Tehama County, California. The project site is located on private property in the canyon of South Fork Cottonwood Creek, in Section 12, Township 26 North, Range 8 West. The project as described includes removal of the existing diversion dam, installing a fish screen, and implementing improvements to meet the landowner's water and power needs. Improving fish passage at this site will restore anadromous fish access to an additional five miles of historic spawning, rearing and holding stream habitat. The Department is providing equipment, supplies and agency personnel to implement the dam demolition portion of the project.

Based on the information provided and Department review, the Department has no comment at this time. If the Project description changes in any way the Department should be notified and provided an opportunity to offer comments regarding the updated information.

{1-1

We appreciate the opportunity to review this Project. If you have any questions, please contact Patricia Bratcher at (530) 225-3845, or by email at [Patricia.Bratcher@wildlife.ca.gov](mailto:Patricia.Bratcher@wildlife.ca.gov).

Sincerely,

Michael R. Harris  
Supervisor, Senior Environmental Scientist

cc: Guy Chetelat  
Central Valley Regional Water Quality Control Board  
364 Knollcrest Drive, Suite 205  
Redding, CA 96002  
[Guy.Chetelat@waterboards.ca.gov](mailto:Guy.Chetelat@waterboards.ca.gov)

State Clearinghouse  
P.O. Box 3011  
Sacramento, CA 95814

ec: Ms. Patricia Bratcher, Doug Killam, and Kevin Gale  
California Department of Fish and Wildlife  
[Patricia.Bratcher@wildlife.ca.gov](mailto:Patricia.Bratcher@wildlife.ca.gov); [Doug.Killam@wildlife.ca.gov](mailto:Doug.Killam@wildlife.ca.gov);  
[Kevin.Gale@wildlife.ca.gov](mailto:Kevin.Gale@wildlife.ca.gov)

APPENDIX K

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Response to Public Comments

## **Appendix K – Responses to Comments**

### **K.1 Introduction**

This appendix contains responses to comments received on the Draft Hammer Fish Passage Improvement Project EA / IS and proposed Mitigated Negative Declaration. The comments received did not result in changes to the Draft EA / IS or the proposed Mitigated Negative Declaration. However several minor changes were made to the text of the EA / IS to clarify and update the document. State CEQA guidelines require recirculation of a negative declaration when a document must be substantially revised following public comment. The minor revisions made do not change the project scope or any findings or conclusions. Therefore, recirculation of the Mitigated Negative Declaration is not required.

### **K.1 Response to Comments**

#### **Letter 1 – Michael Harris, California Department of Fish and Wildlife**

##### **Comment 1-1**

If the project description changes significantly, the Department of Fish and Wildlife will be notified and provided the opportunity to offer comments regarding the revised project.