

# Delineation of Waters of the U.S.

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

Tehama County, California  
January 2014



Prepared for:

**nhc**  
northwest hydraulic consultants

3950 Industrial Boulevard, Suite 100C  
West Sacramento, CA 95691

Prepared by:

**TEHAMA**  
ENVIRONMENTAL SOLUTIONS, INC.

910 Main Street, Suite D, Red Bluff, CA 96080  
(530) 528-8272

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## INTRODUCTION

This Delineation of Waters of the U.S. (delineation) was conducted for Northwest Hydraulic Consultants (NHC) by Tehama Environmental Solutions, Inc. (TES) for the Hammer Diversion on South Fork Cottonwood Creek Fish Passage Improvement Project (project). TES was retained by NHC under subcontract to prepare this delineation for the U.S. Fish and Wildlife Service – Pacific Southwest Region.

The purpose of this delineation is to identify and quantify “Waters of the United States” that may fall within the jurisdiction of the United States Army Corps of Engineers (Corps) under Section 404 of the Clean Water Act. This report follows the *Minimum Standards for Acceptance of Preliminary Wetland Delineations* (U.S. Army Corps of Engineers 2001). This delineation should be considered preliminary until the results are reviewed and verified by the Corps.

### Study Area Location and Directions

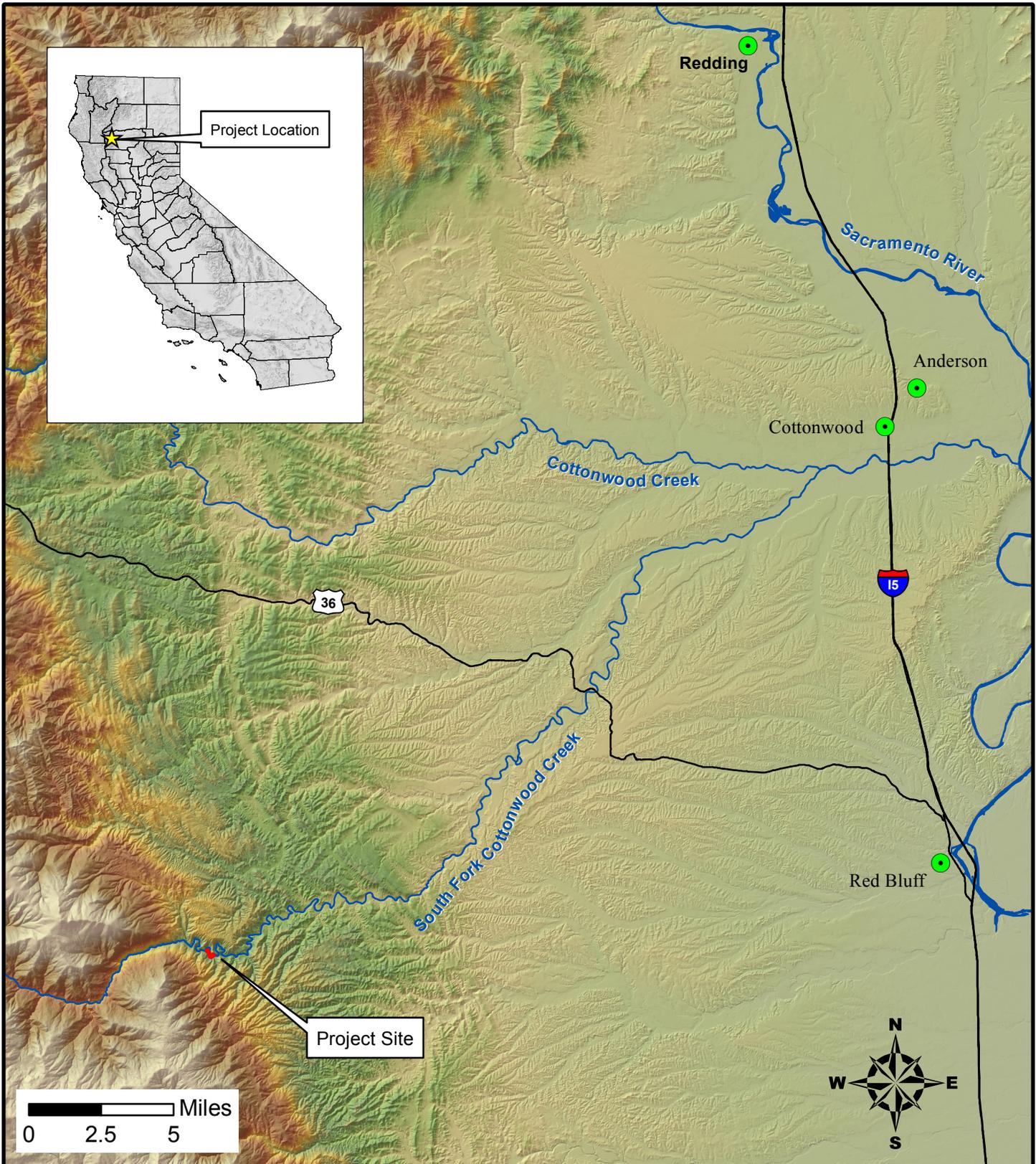
The study area is located approximately 35 miles west of Red Bluff, in Tehama County, California (Figure 1). Specifically, the study area is located in Section 12, Township 26 North, Range 8 West MDBM, within the 7.5-minute USGS Raglin Ridge quadrangle map (Figure 2). The study area includes the approximate footprint of the proposed project.

To access the site from Interstate 5 in Red Bluff, travel west 0.6 miles on Antelope Blvd. to Main Street and turn right. Proceed 0.1 miles to Walnut Street and turn left. Travel 2.3 miles to Wilder Road and then turn left and travel 0.2 miles to Reeds Creek Road and turn right. Proceed 14.4 miles and turn left on Pettyjohn Road/Pope Drive. On Pettyjohn Road/Pope Drive, travel 13.7 miles and then turn left on Hammer Loop Road and travel 2.9 miles to a private access road located on the left which provides entry to the Hammer property. Public access to the private access road is restricted by a locked gate. A key is required to access the property.

### Proposed Project

The purpose of the proposed project is to improve passage for anadromous fish in the South Fork of Cottonwood Creek. The removal of the Hammer diversion dam will provide access for fish to the upper reaches of historic spawning and rearing habitat. Improving fish passage at this site (stream mile 43.85) will enable anadromous fish access to an additional five miles of stream habitat. The project includes the removal of an existing diversion dam, the installation of a new wet well diversion pump and National Marine Fisheries Service (NMFS)-approved fish screen, the replacement of a hydro-electric generating system with a solar electric system, and improvements to an irrigation system including a more efficient water conveyance and storage system.

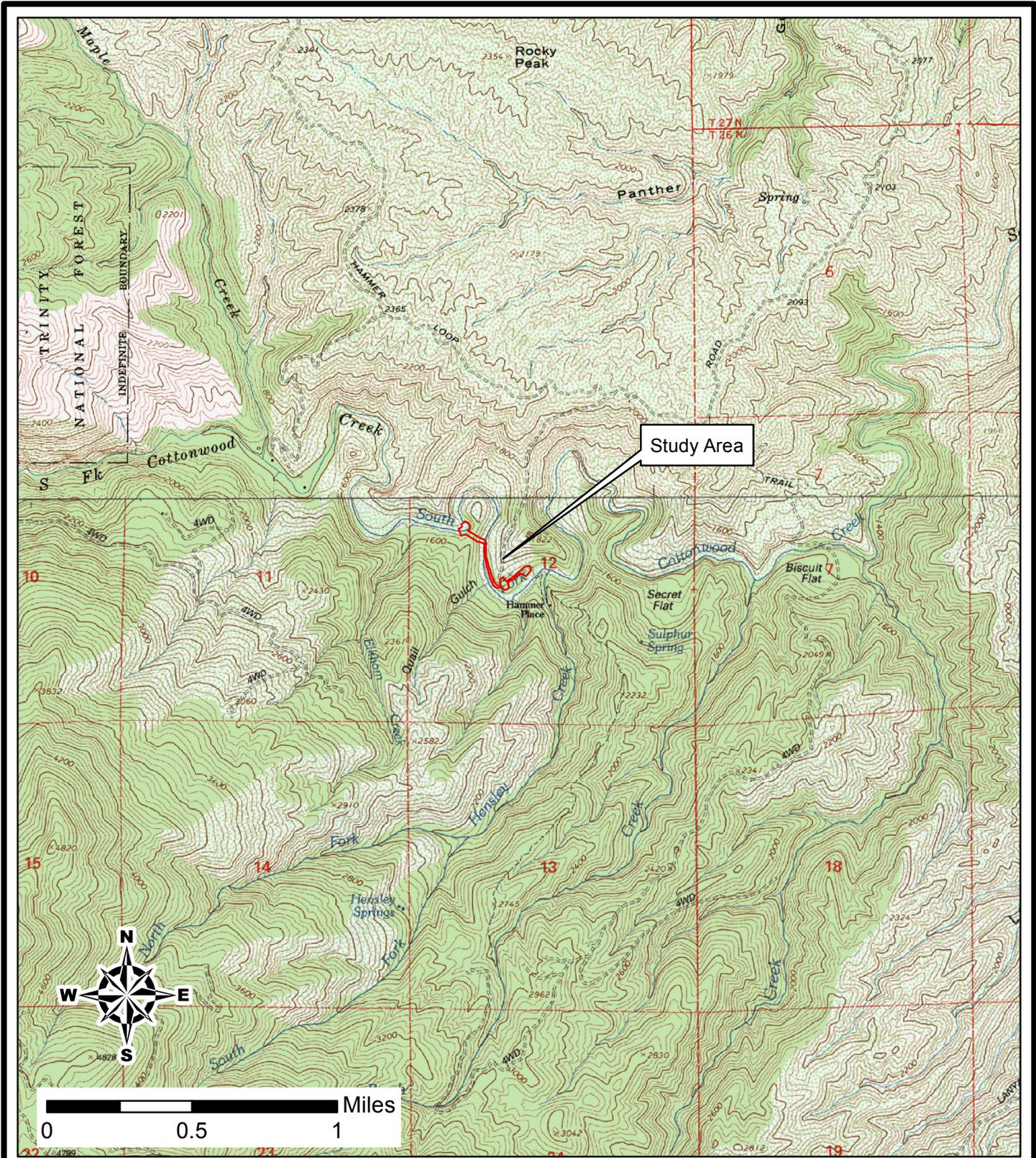
The project is being implemented by the U.S. Fish and Wildlife Service (USFWS) in cooperation with the private landowner and the Hammer Project Technical Team, which includes representatives from the USFWS, the U.S. Bureau of Reclamation, NMFS, the California Department of Fish and Wildlife, the California Department of Water Resources and several private consulting firms.



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**FIGURE 1**  
 Site Vicinity Map



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**FIGURE 2**  
 Site Location Map

January, 2014

## Contact Information

### Project Applicant

U.S. Fish and Wildlife Service  
10950 Tyler Road  
Red Bluff, California 96080

### Property Owner

Mr. Harold Hammer  
8855 Hammer Loop Road  
Tehama County, California

### Contact

Ms. Patricia Parker Hamelberg  
Fish Biologist / Habitat Restoration Coordinator  
U.S. Fish and Wildlife Service  
10950 Tyler Road  
Red Bluff, California 96080  
(530) 527-3043 x 248

## ENVIRONMENTAL SETTING

### General Site Characteristics

The study area is located in the foothills of the Coastal Range within the property boundary of a private landowner. The site is comprised of terrain varying from gradually sloping to very steep and varying aspects associated with a perennial creek which is the main drainage. The site has a general southern and eastern aspect and drains to the east. The elevation of the site ranges from approximately 1501 feet above mean sea level at the diversion dam on the South Fork of Cottonwood Creek, to 1480 feet at the residence. The study area has been developed over many years as a residence with a stream diversion system that supplies electricity and irrigation water for an orchard/garden and landscaping. The stream diversion system includes an in-stream concrete diversion dam, a constructed conveyance tunnel, a suspension bridge-supported culvert, an unlined ditch system and a constructed storage pond.

### Land Use

The project area is used as a rural residence with associated infrastructure for power and water. The property is not used for any type of livestock grazing. The main structures on the site include the diversion dam, two suspension bridges, a residence and numerous outbuildings.

### Hydrology

The South Fork of Cottonwood Creek is a perennial stream which is a tributary to the main stem of Cottonwood Creek that eventually flows into the Sacramento River. The Cottonwood Creek watershed includes a total area of 938 square miles and drains from west to east to the Sacramento River. The South Fork of Cottonwood Creek joins Cottonwood Creek approximately 12 miles west of the confluence with the Sacramento River. No other streams are present within the study area, however there are a number of perennial, intermittent and ephemeral streams in the general area.

The Hammer diversion has an appropriative water right for three cubic feet per second for the purpose of generating hydroelectric energy. Water from the diversion is then conveyed through a constructed tunnel that directs water to a hydro-electric generator and a culvert that conveys irrigation water across the canyon to the unlined ditch. From there, the water is diverted and pumped from the ditch for irrigation and conveyed to a small storage pond.

## Soils

One soil map unit occurs within the study area (Figure 3) according to the local soil survey (USDA-SCS et al. 1967). The one identified map unit is listed below:

### Maymen and Lodo gravelly loams, 30 to 65 percent slopes (MbgE)

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 soil is not listed as hydric on the state hydric soils list (USDA-NRCS 1995). The soil is also not listed as hydric on the local hydric soils list (USDA-NRCS unknown date). The series is not classified taxonomically by higher categories in the soil survey. According to the USDA-Natural Resources Conservation Service (NRCS) Official Soil Series Descriptions (USDA-NRCS website), the Maymen soil series is classified as a loamy, mixed, active, mesic, shallow Typic Dystrochrept. The Lodo soil series is classified as a loamy, mixed, superactive, thermic Lithic Haploxeroll.

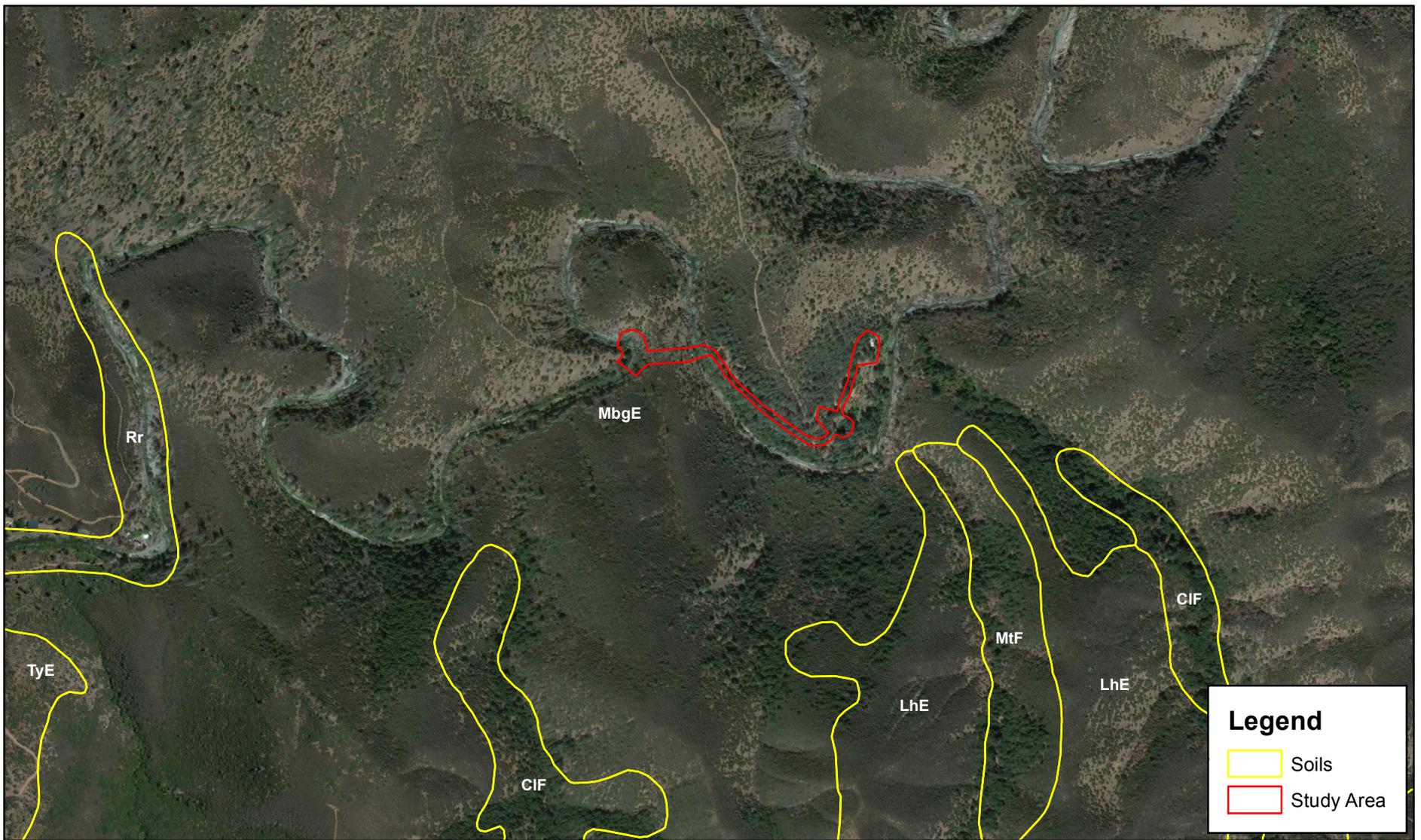
## Vegetation / Plant Communities

Four habitat types generally occur within the study area 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 mixed chaparral is comprised of a variety of shrub species including chamise (*Adenostoma fasciculatum*), manzanita (*Arctostaphylos sp.*), mountain-mahogany (*Cercocarpus betuloides*), buck brush (*Ceanothus cuneatus*), poison oak (*Toxicodendron diversilobum*), western redbud (*Cercis occidentalis*) and a mix of other shrub species. Scattered foothill pines (*Pinus sabiniana*) are also present.

Valley foothill riparian habitat is present along the banks of the South Fork of Cottonwood Creek. In some reaches of the creek, the riparian habitat is scattered and discontinuous, while in other areas, such as immediately upstream of the diversion dam, it exists as a corridor on both banks. The dominant woody plant species is white alder with several other species including narrow-leaved willow (*Salix exigua*), red willow (*Salix laevigata*), Fremont cottonwood (*Populus fremontii*), mulefat (*Baccharis salicifolia*), California grape (*Vitis californica*), arroyo willow (*Salix lasiolepis*) and Himalayan blackberry (*Rubus armeniacus*). The herbaceous layer includes deer grass, torrent sedge and mugwort (*Artemisia douglasiana*).

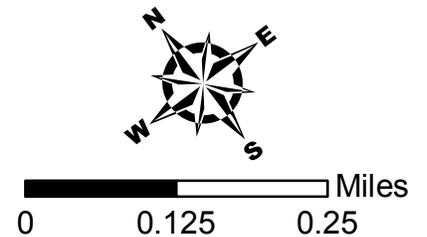
Riverine habitat is present within the channel of the South Fork of Cottonwood Creek. The creek channel is primarily devoid of vegetation, but the exposed barren rock and gravel along both banks of the stream support scattered woody and herbaceous species such as willows (*Salix spp.*), white alder (*Alnus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



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FIGURE 3  
 Soil Survey Map



Fresh emergent wetland habitat is present in a small pond fed by the irrigation ditch. The dominant species is narrow-leaved cattail (*Typha angustifolia*). Torrent sedge is also present along the fringe of the pond as well as a few scattered willows and white alders. Approximately 1/3 of the pond is too deep for emergent vegetation and exists as open water. The irrigation ditch is regularly maintained but supports cattails and a few scattered woody riparian plants in several reaches.

## METHODS

A delineation of waters of the U.S. was conducted within the study area from August 14 to August 16, 2013, by TES staff including Mr. Jeff Souza, Senior Biologist and Mr. Ben Myhre, Associate Biologist. The delineation of wetlands 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. Two data points were characterized to determine the presence or absence of the three wetland parameters (vegetation, soils and hydrology). The data forms for the two data points are included in Appendix A. The wetland indicator status of plant species was based on the *Arid West 2013 Regional Wetland Plant List* (Lichvar 2013). Soil colors were measured using the *Munsell Soil Color Charts* (Munsell Color 2000). The boundaries of other waters of the U.S. were delineated based on the observed Ordinary High Water Mark (OHWM) using the methods outlined in *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Lichvar and McColley 2008).

Once delineated, the boundaries of all identified wetlands and other waters of the U.S. were then marked in the field with pin flags or field flagging, along with the location of all data points. The boundaries of all identified wetlands and other waters, and the locations of all data points, were then mapped using a Trimble GeoExplorer 6000 series Global Positioning System (GPS) unit, capable of sub-meter accuracy. All area features less than two meters in width/diameter were collected as points or lines. Point features were physically measured to determine area data, while line features were assigned an average width and multiplied by the GPS-measured distance. These features and measurements are shown in Figure 4.

It should be noted that the collection of accurate GPS data for several features including D-2, D-3 and FEW/OW-1 proved to be difficult, likely due to the combination of the location of these features in the bottom of a steep canyon and under heavy vegetation canopy cover which limited satellite access. Multiple GPS polygon and line features were collected and manually adjusted using aerial photography to reflect the actual conditions as accurately as possible. For this reason, the location and acreage information for these features is likely less than the sub-meter accuracy normally achieved with resource-grade GPS equipment.

It should also be noted that the Riparian Wetland features were delineated by mapping the drip line of riparian vegetation within the boundaries of the OHWM. While the entire area within the Riparian Wetland features are likely jurisdictional due to the fact that they lie within the OHWM boundaries, the entire mapped area may not meet the definition of a wetland in that all three wetland parameters may not be present in areas nearest the OHWM boundary.

## RESULTS

Based on the presence/absence of indicators of wetland hydrology, hydrophytic vegetation and hydric soils, 0.78 acres of potentially jurisdictional wetlands were identified and delineated within the study area.

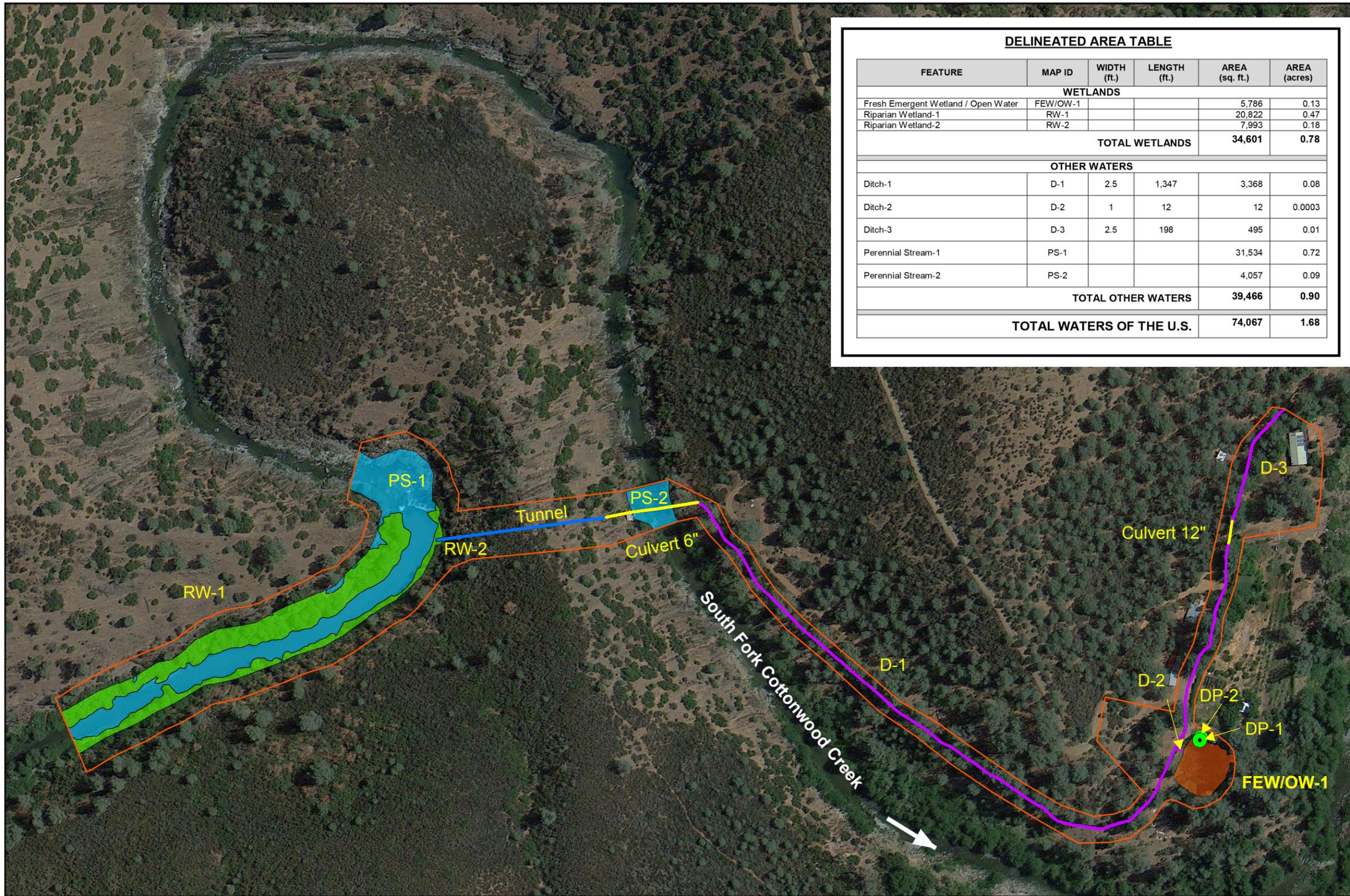
Based on the presence of an OHWM, 0.90 acres of potentially jurisdictional other waters of the U.S. were also identified and delineated within the study area. Table 1 presents a summary of the total acreage of each type of jurisdictional waters of the U.S. The classification of wetland communities is based primarily on the descriptions found in *Common Wetland Plants of Central California* (Fiedler 1996). Site photos of the delineated waters and associated data points are included as Appendix B.

The vegetation types in Riparian Wetland features 1 and 2 are dominated by white alder [FACW] and red willow [FACW]. Other woody species include Fremont cottonwood, mulefat [FAC], narrow-leaved willow [FACW], California grape [FACU], arroyo willow [FACW] and Himalayan blackberry [FACU]. Herbaceous species include deergrass [FAC], torrent sedge [FACW] and mugwort [FAC]. The Fresh Emergent Wetland/Open Water feature is dominated by narrow-leaved cattail [OBL], torrent sedge [FACW] and deergrass [FAC].

<b>TABLE 1</b>	
<b>SUMMARY OF PRELIMINARY DELINEATED WATERS OF THE U. S.</b>	
<b>Hammer Diversion on South Fork Cottonwood Creek</b>	
<b>Fish Passage Improvement Project</b>	
<b>Wetlands</b>	<b>Total Acreage</b>
Fresh Emergent Wetland / Open Water (FEW/OW-1)	0.13
Riparian Wetland 1 (RW-1)	0.47
Riparian Wetland 2 (RW-2)	0.18
<b>Total Wetlands</b>	<b>0.78</b>
<b>Other Waters</b>	<b>Total Acreage</b>
Perennial Stream 1 (PS-1)	0.72
Perennial Stream 2 (PS-2)	0.09
Ditch 1 (D-1)	0.08
Ditch 2 (D-2)	0.0003
Ditch 3 (D-3)	0.01
<b>Total Other Waters</b>	<b>0.90</b>
<b>TOTAL WATERS OF THE U. S.</b>	<b>1.68</b>

### Jurisdictional Considerations

Features PS-1 and PS-2 (Figure 4) meet the definition of a Relatively Permanent Water (RPW) as defined by the *U.S. Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook* (guidebook) (U.S. Army Corps of Engineers and Environmental Protection Agency 2007) and the revised Rapanos/Carabell guidance (U.S. Army Corps of Engineers and Environmental Protection Agency 2008). The constructed tunnel may not be jurisdictional as it is essentially the equivalent of a culvert. Features D-1, D-2, D-3 and FEW/OW-1 may, or may not be jurisdictional. All of these features are connected at the upstream end to the South Fork of Cottonwood Creek, however it is unclear whether these features surface flow directly back to the South Fork of Cottonwood Creek.



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			7,993	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 4**  
Preliminary Delineation Map

DELINEATION/GPS SURVEY

Jeff Souza  
Ben Myhre  
Tehama Environmental Solutions, Inc.

CLIENT

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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



SCALE

0  320 Feet

1 in = 160 ft (11" X 17" paper)

January 2014

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

PHOTO SOURCE: Google Earth, July, 2012

## REFERENCES

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## **APPENDIX A**

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### Routine Wetland Delineation Forms

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Hammer Diversion on South Fork Cottonwood Creek Fish Passage Improvement Project City/County: Red Bluff/Tehama Sampling Date: 8/16/2013  
 Applicant/Owner: USFWS / Harold Hammer State: CA Sampling Point: DP-1  
 Investigator(s): J. Souza / B. Myhre Section, Township, Range: Section 12, Township 26 North, Range 8 West MDBM  
 Landform (hillslope, terrace, etc.): created pond Local relief (concave, convex, none): concave Slope (%): 3  
 Subregion (LRR): C: Mediterranean California Lat: 40° 07' 13.85" N Long: 122° 43' 08.58" W Datum: NAD83  
 Soil Map Unit Name: Maymen and Lodo gravelly loams, 30 to 65 percent slopes (MbgE) NWI classification: \_\_\_\_\_  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Remarks: <u>U( a/A) • d' &amp; c' A A [ ] a A ^ c [ ] ^ a A A d : ^ A a a a ) A a : E</u>					

**VEGETATION – Use scientific names of plants.**

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:																
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)  Total Number of Dominant Species Across All Strata: <u>2</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)																
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
50% = _____, 20% = _____	<u>0</u>	= Total Cover		<b>Prevalence Index worksheet:</b>  <table style="width: 100%; border: none;"> <tr> <td style="text-align: center;"><u>Total % Cover of :</u></td> <td style="text-align: center;"><u>Multiply by:</u></td> </tr> <tr> <td>OBL species _____</td> <td>x1 = _____</td> </tr> <tr> <td>FACW species _____</td> <td>x2 = _____</td> </tr> <tr> <td>FAC species _____</td> <td>x3 = _____</td> </tr> <tr> <td>FACU species _____</td> <td>x4 = _____</td> </tr> <tr> <td>UPL species _____</td> <td>x5 = _____</td> </tr> <tr> <td>Column Totals: _____ (A)</td> <td>_____ (B)</td> </tr> <tr> <td colspan="2" style="text-align: center;">Prevalence Index = B/A = _____</td> </tr> </table>	<u>Total % Cover of :</u>	<u>Multiply by:</u>	OBL species _____	x1 = _____	FACW species _____	x2 = _____	FAC species _____	x3 = _____	FACU species _____	x4 = _____	UPL species _____	x5 = _____	Column Totals: _____ (A)	_____ (B)	Prevalence Index = B/A = _____	
<u>Total % Cover of :</u>	<u>Multiply by:</u>																			
OBL species _____	x1 = _____																			
FACW species _____	x2 = _____																			
FAC species _____	x3 = _____																			
FACU species _____	x4 = _____																			
UPL species _____	x5 = _____																			
Column Totals: _____ (A)	_____ (B)																			
Prevalence Index = B/A = _____																				
<b>Sapling/Shrub Stratum</b> (Plot size: _____)				<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.																
1. _____	_____	_____	_____																	
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
5. _____	_____	_____	_____																	
50% = _____, 20% = _____	<u>0</u>	= Total Cover																		
<b>Herb Stratum</b> (Plot size: 0.5 m <sup>2</sup> )																				
1. <u><i>Typha a) gustifolia</i></u>	<u>75</u>	<u>yes</u>	<u>OBL</u>																	
2. <u><i>Carex nudata</i></u>	<u>4</u>	<u>no</u>	<u>FACW</u>																	
3. <u><i>Muhlenbergia rigens</i></u>	<u>30</u>	<u>yes</u>	<u>FAC</u>																	
4. <u><i>Equisetum laevigatum</i></u>	<u>10</u>	<u>no</u>	<u>FACW</u>																	
5. <u><i>Epilobium ciliatum</i></u>	<u>1</u>	<u>no</u>	<u>FACW</u>																	
6. _____	_____	_____	_____																	
7. _____	_____	_____	_____																	
8. _____	_____	_____	_____																	
50% = <u>60</u> , 20% = <u>24</u>	<u>120</u>	= Total Cover																		
<b>Woody Vine Stratum</b> (Plot size: _____)																				
1. _____	_____	_____	_____																	
2. _____	_____	_____	_____																	
50% = _____, 20% = _____	<u>0</u>	= Total Cover																		
% Bare Ground in Herb Stratum <u>0</u>		% Cover of Biotic Crust <u>0</u>																		
<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>																				
Remarks: Hydrologic conditions are very dry for this time of the year due to record dry winter and spring. However, the pond surface water elevation appear to be at normal level.																				

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-1	2.5Y 3/2	100	_____	_____	_____	_____	mucky peat	no mottles
1-3	various	100	_____	_____	_____	_____	vry crse snd	many live roots/single grain structure
3-6	5Y 3/1	100	_____	_____	_____	_____	sandy loam	single grain structure
6-7	5Y 3/1	50	5YR	50	C	PL	loam	some clay
7+	cobble	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils <sup>3</sup> :	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input checked="" type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input checked="" type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input checked="" type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b> Type: _____ Depth (Inches): _____	<b>Hydric Soils Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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Remarks: Constructed pond. Cobble layer at 7 inches precluded deeper excavation.

**HYDROLOGY**

Wetland Hydrology Indicators:	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input checked="" type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input checked="" type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)
	<input type="checkbox"/> Water Marks (B1) (Riverine)
	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
	<input type="checkbox"/> Drainage Patterns (B10)
	<input type="checkbox"/> Dry-Season Water Table (C2)
	<input type="checkbox"/> Crayfish Burrows (C8)
	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
	<input type="checkbox"/> Shallow Aquitard (D3)
	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b> Surface Water Present?    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present?    Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>surface</u> Saturation Present? (includes capillary fringe)    Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>surface</u>	<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Inundated area created by berm/road with culvert.

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Hammer Diversion on South Fork Cottonwood Creek Fish Passage Improvement Project City/County: Red Bluff/Tehama Sampling Date: 8/16/2013  
 Applicant/Owner: USFWS / Harold Hammer State: CA Sampling Point: DP-2  
 Investigator(s): J. Souza / B. Myhre Section, Township, Range: Section 12, Township 26 North, Range 8 West MDBM  
 Landform (hillslope, terrace, etc.): created pond Local relief (concave, convex, none): concave Slope (%): 15  
 Subregion (LRR): C: Mediterranean California Lat: 40° 07' 13.85" N Long: 122° 43' 08.58" W Datum: NAD83  
 Soil Map Unit Name: Maymen and Lodo gravelly loams, 30 to 65 percent slopes (MbgE) NWI classification: \_\_\_\_\_  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Remarks: <u>Small dammed pond developed to store irrigation water.</u>					

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:																
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)  Total Number of Dominant Species Across All Strata: <u>3</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>33</u> (A/B)																
2. _____	_____	_____	_____																	
3. _____	_____	_____	_____																	
4. _____	_____	_____	_____																	
50% = _____, 20% = _____	<u>0</u>	= Total Cover		<b>Prevalence Index worksheet:</b>  <table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">Total % Cover of:</td> <td style="text-align: center;">Multiply by:</td> </tr> <tr> <td>OBL species <u>0</u></td> <td>x1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>30</u></td> <td>x2 = <u>60</u></td> </tr> <tr> <td>FAC species <u>0</u></td> <td>x3 = <u>0</u></td> </tr> <tr> <td>FACU species <u>50</u></td> <td>x4 = <u>200</u></td> </tr> <tr> <td>UPL species <u>30</u></td> <td>x5 = <u>150</u></td> </tr> <tr> <td>Column Totals: <u>110</u> (A)</td> <td><u>410</u> (B)</td> </tr> <tr> <td colspan="2" style="text-align: center;">Prevalence Index = B/A = <u>3.73</u></td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species <u>0</u>	x1 = <u>0</u>	FACW species <u>30</u>	x2 = <u>60</u>	FAC species <u>0</u>	x3 = <u>0</u>	FACU species <u>50</u>	x4 = <u>200</u>	UPL species <u>30</u>	x5 = <u>150</u>	Column Totals: <u>110</u> (A)	<u>410</u> (B)	Prevalence Index = B/A = <u>3.73</u>	
Total % Cover of:	Multiply by:																			
OBL species <u>0</u>	x1 = <u>0</u>																			
FACW species <u>30</u>	x2 = <u>60</u>																			
FAC species <u>0</u>	x3 = <u>0</u>																			
FACU species <u>50</u>	x4 = <u>200</u>																			
UPL species <u>30</u>	x5 = <u>150</u>																			
Column Totals: <u>110</u> (A)	<u>410</u> (B)																			
Prevalence Index = B/A = <u>3.73</u>																				
<b>Sampling/Shrub Stratum (Plot size: _____)</b> 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 50% = _____, 20% = _____ <u>0</u> = Total Cover																				
<b>Herb Stratum (Plot size: 0.5 m<sup>2</sup>)</b> 1. <u>Equisetum laevigatum</u> <u>30</u> <u>yes</u> <u>FACW</u> 2. <u>Bromus hordeaceus</u> <u>50</u> <u>yes</u> <u>FACU</u> 3. <u>Crucianella angustifolia</u> <u>5</u> <u>no</u> <u>NL (UPL)</u> 4. <u>Elymus ponticus</u> <u>30</u> <u>yes</u> <u>NL (UPL)</u> 5. _____ 6. _____ 7. _____ 8. _____ 50% = <u>57.5</u> , 20% = <u>23</u> <u>115</u> = Total Cover																				
<b>Woody Vine Stratum (Plot size: _____)</b> 1. _____ 2. _____ 50% = _____, 20% = _____ <u>0</u> = Total Cover % Bare Ground in Herb Stratum <u>0</u> % Cover of Biotic Crust <u>0</u>																				
<b>Hydrophytic Vegetation Indicators:</b> <input type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.																				
<b>Hydrophytic Vegetation Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>																				
Remarks: <u>Hydrologic conditions are very dry for this time of the year due to record dry winter and spring. However, the pond water surface elevation appears to be at normal level.</u>																				

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-16	7.5YR 4/4	100	_____	_____	_____	_____	clay loam	structure is massive
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) ( <b>LRR C</b> )	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) ( <b>LRR B</b> )	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) ( <b>LRR C</b> )	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) ( <b>LRR D</b> )	<input type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b> Type: _____ Depth (Inches): _____	<b>Hydric Soils Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Remarks: Constructed pond levee. Appears to be compacted soil. Cobble layer at 16 inches precluded further excavation.

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)
<input type="checkbox"/> Water Marks (B1) ( <b>Nonriverine</b> )	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Sediment Deposits (B2) ( <b>Nonriverine</b> )	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Drift Deposits (B3) ( <b>Nonriverine</b> )	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Water Marks (B1) ( <b>Riverine</b> )	<input type="checkbox"/> Water Marks (B1) ( <b>Riverine</b> )
<input type="checkbox"/> Sediment Deposits (B2) ( <b>Riverine</b> )	<input type="checkbox"/> Sediment Deposits (B2) ( <b>Riverine</b> )
<input type="checkbox"/> Drift Deposits (B3) ( <b>Riverine</b> )	<input type="checkbox"/> Drift Deposits (B3) ( <b>Riverine</b> )
<input type="checkbox"/> Drainage Patterns (B10)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Dry-Season Water Table (C2)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Crayfish Burrows (C8)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Shallow Aquitard (D3)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> FAC-Neutral Test (D5)	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>	<b>Wetland Hydrology Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Constructed pond levee

## **APPENDIX B**

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Site Photos



**Photo 1.** View of the Hammer diversion, looking southwest. Features RW-1 and RW-2 can be seen along the stream banks upstream of the dam. Photo date: August 9, 2013.



**Photo 2.** View of the area downstream of the Hammer diversion, looking northwest. Feature PS-1 can be seen in the channel upstream and downstream of the dam. Photo date: August 9, 2013.



**Photo 3.** View of feature PS-1 below the Hammer diversion, looking northeast. The arrow indicates the delineated OHWM. Photo date: August 14, 2013.



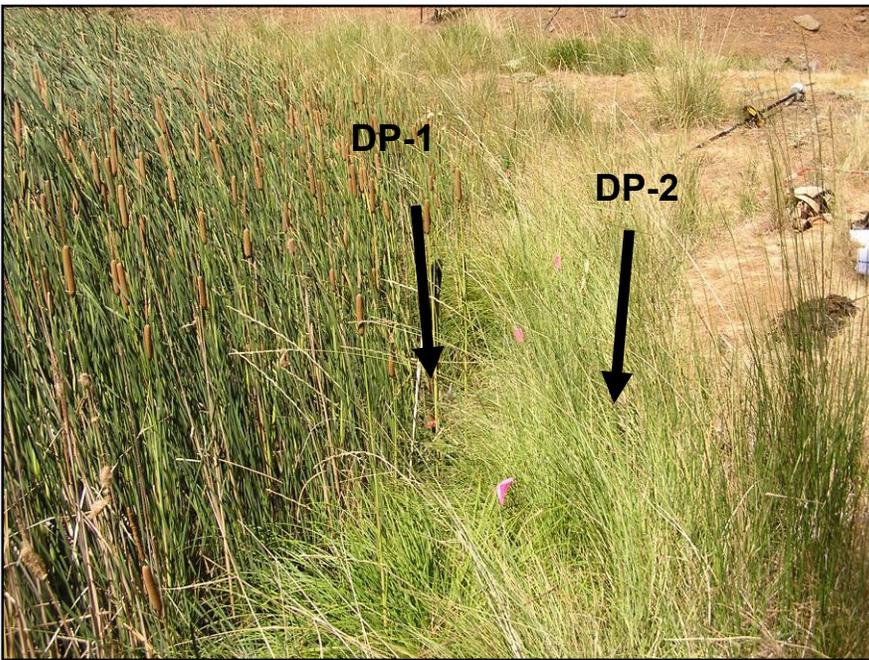
**Photo 4.** View of suspension bridge that supports an attached 6-inch culvert that carries irrigation water from the tunnel to feature D-1, looking northwest. Photo date: August 9, 2013.



**Photo 5.** View inside of the water conveyance tunnel, looking northwest. Photo date: August 9, 2013.



**Photo 6.** View of feature PS-2 below the suspension bridge, looking southeast. Photo date: August 16, 2013.



**Photo 7.** View of feature FEM/OW-1. The pink flags show the delineated wetland boundary. The arrows indicate the locations of DP-1 and DP-2. Photo date: August 16, 2013.



**Photo 8.** View of open water portion of feature FEW/OW-1. Photo date: August 29, 2013.



**Photo 9.** View of feature D-1. The pink flags indicate the delineated OHWM. Photo date: August 16, 2013.