Delineation of Waters of the U.S.

Mill Creek Fish Passage Restoration Project

Tehama County, California

March 2015

Prepared for:

nhc
northwest hydraulic consultants

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

Prepared by:

TEHAMA
ENVIRONMENTAL SOLUTIONS, INC.

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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 Mill Creek Fish Passage Restoration Project (project). TES was retained by NHC under subcontract to prepare this delineation for the U.S. Fish and Wildlife Service (USFWS).

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 proposed project is located at three separate sites on Mill Creek, at approximately River Miles 1.9 (Exposed Siphon), 2.6 (Ward Dam), and 5.0 (Upper Dam), upstream of the confluence with the Sacramento River, east of Los Molinos, Tehama County, California (Figure 1). Specifically, the study area for the Exposed Siphon is located in Section 1, Township 25 North, Range 2 West Mount Diablo Base and Meridian (MDBM); the Ward Dam is located in Section 3, Township 25 North, Range 2 West MDBM, and the Upper Dam is located in Section 1, Township 25 North, Range 2 West MDBM and Sections 35 and 36, Township 26 North, Range 2 West MDBM, within the 7.5-minute USGS Los Molinos quadrangle map (Figure 2).

To access the site from Interstate 5 north of Corning and south of Red Bluff, travel east 5.2 miles on Gyle Road to the town of Tehama and turn right on C Street. Proceed 1.4 miles to Highway 99 East and turn left. To access the Exposed Siphon and Ward Dam, travel 0.9 miles north to Millrace Avenue, and then turn right and travel 0.2 miles to Sherwood Avenue, and turn left. Proceed 0.3 miles to stop sign and proceed straight ahead on Ward Street. Proceed 0.5 miles to the Exposed Siphon or 1.2 miles to the Ward Dam. Both are located on the north side of the road and are located on private property and permission from the landowner is required for access. To access the Upper Dam, proceed north from Los Molinos approximately two miles on Highway 99 and turn right on to Third Avenue. Then travel 1.5 miles east to a locked access gate which provides entry to the private property where the Upper Dam is located. Public access to the private access road is restricted by a locked gate and a combination is required to access the property. The Upper Dam is located approximately 2.4 miles from the locked gate.

Proposed Project

The purpose of the proposed project is to improve passage for anadromous fish in Mill Creek. The retrofitting of the dams and siphon will improve upstream and downstream passage conditions for adult and juvenile anadromous fish and other native fish species. The proposed project includes the modification of two existing diversion dams and their associated fish ladders and screens, and the modification of a siphon which impedes fish passage.

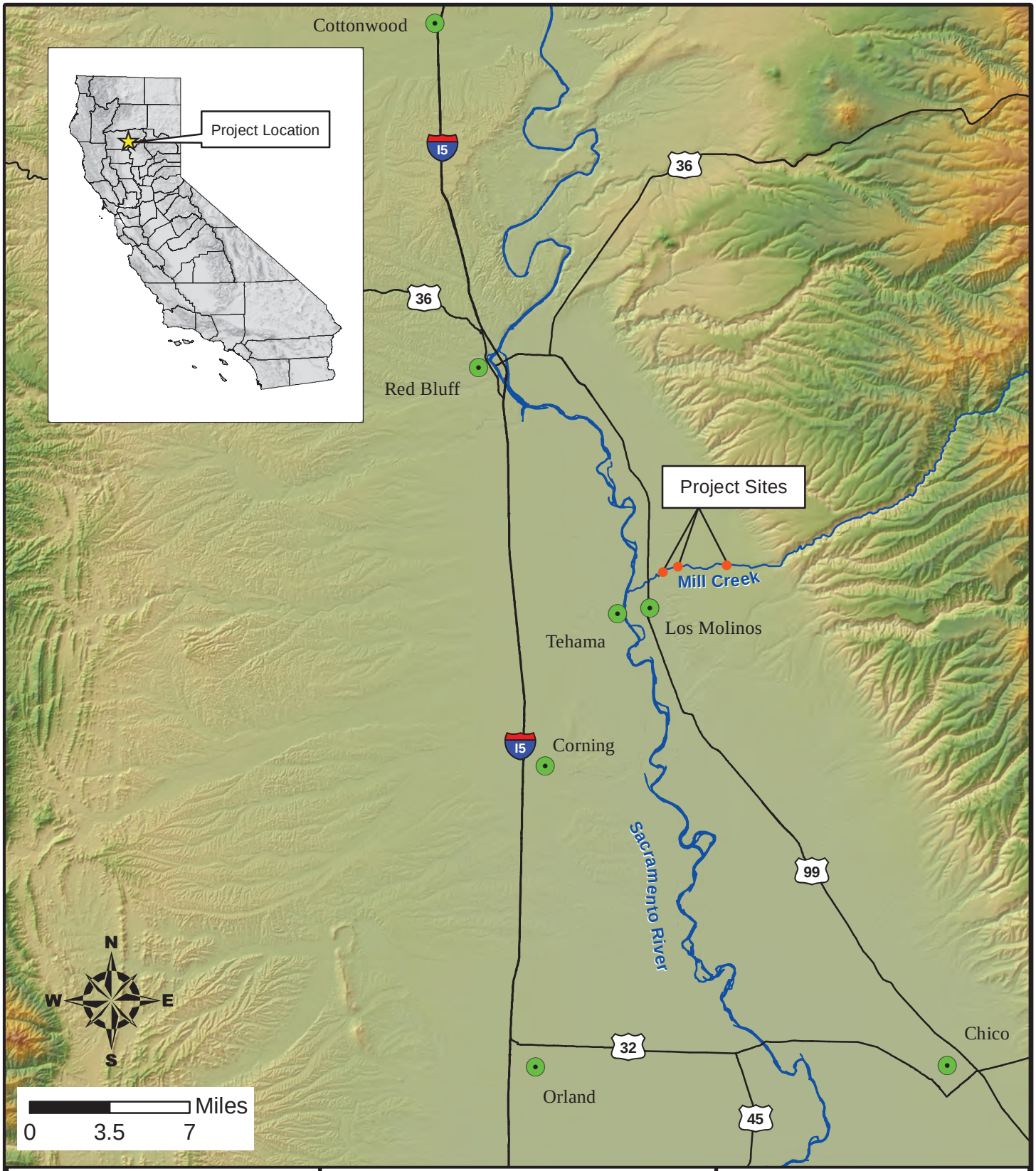

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FIGURE 1

Site Vicinity Map

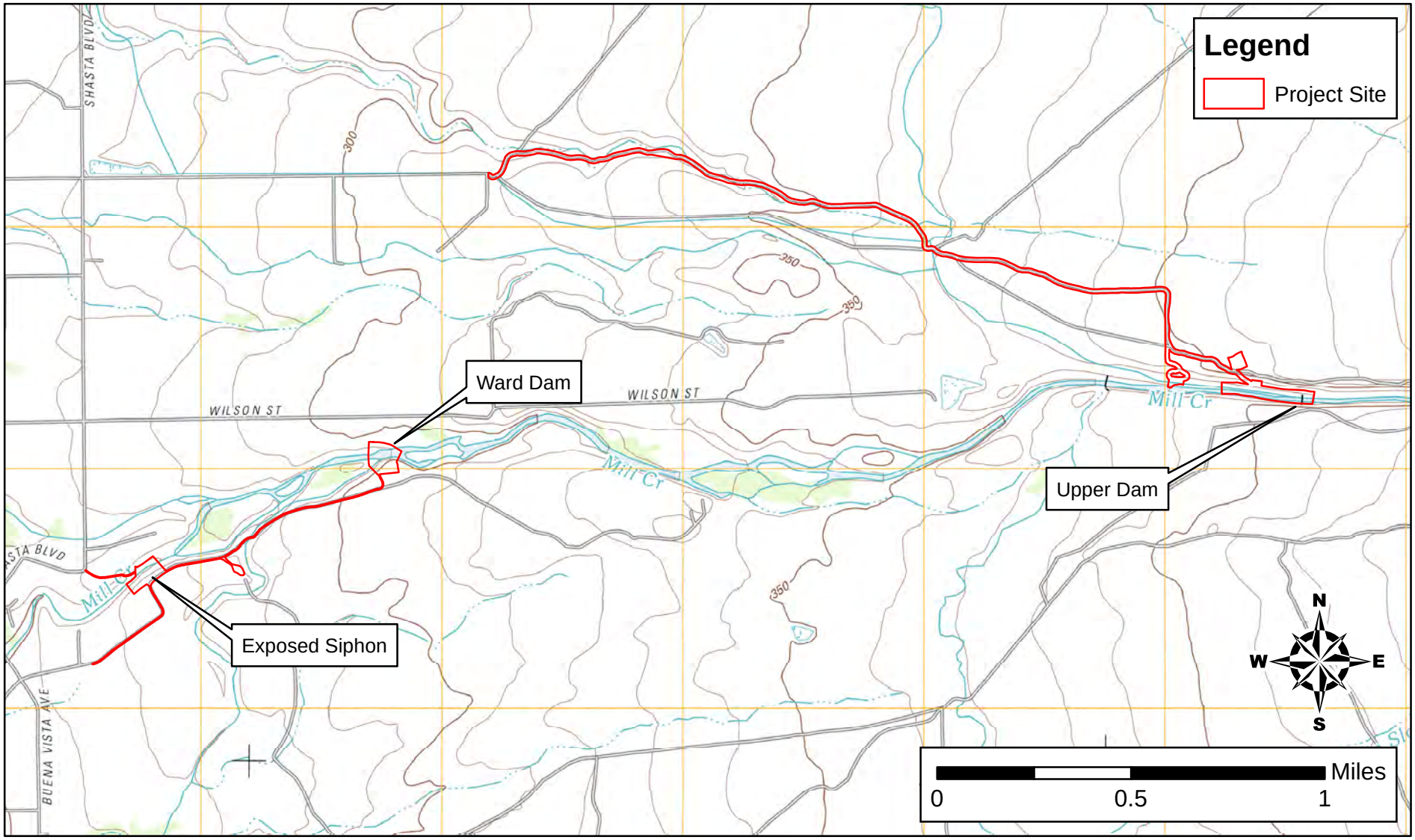

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FIGURE 2

Site Location Map

Contact Information

Project Applicant

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

Property Owners
Los Molinos Mutual Water Company
Mr. Darrell Mullins, Manager
25162 Josephine Street
Los Molinos, California 96055
(530) 384-2737

Mill Creek Ranch
Mr. Flint Stumbaugh, Ranch Manager
25420 Tehama-Vina Road
Los Molinos, California 96055

Dye Creek Preserve
Ms. Andrea Craig, Preserve Manager
11010 Foothill Blvd.
Los Molinos, California 96055
(530) 527-4261

ENVIRONMENTAL SETTING

General Site Characteristics

The study area is located in the foothills of the Cascade Range and on the Sacramento Valley floor within the property boundaries of several private landowners. Mill Creek is a tributary to the Sacramento River in Tehama County. The proposed project includes three components: the Exposed Siphon, the Ward Dam and the Upper Dam. The site is comprised of terrain which is generally gradually sloping and with steep slopes and varying aspects associated with a perennial creek which is the main drainage. The site has a general western aspect and drains to the west. The elevation of the site ranges from approximately 275 feet above mean sea level at the Exposed Siphon, 285 feet at Ward Dam, and 380 feet at the Upper Dam. The study area vegetation is relatively sparse along the banks at the Upper Dam with very dense vegetation along the banks of Ward Dam and the Exposed Siphon.

The project is being implemented by the USFWS in cooperation with the private landowners and the Mill Creek Fish Passage Restoration Project Technical Team, which includes representatives from the USFWS, U.S. Bureau of Reclamation (Reclamation), National Marine Fisheries Service (NMFS), California Department of Fish and Wildlife (CDFW), California Department of Water Resources (DWR), Mill Creek Conservancy, Los Molinos Mutual Water Company (LMMWC) and several private consulting firms.

Land Use

The project area is a working ranch, (Mill Creek Ranch) on the property south of Mill Creek and the Dye Creek Preserve managed by The Nature Conservancy on the north side of the creek. The Mill Creek Ranch includes several ranch houses and associated infrastructure for power and water. Livestock grazing occurs in portions of the project but mainly on adjacent lands. Many residences and outbuildings are in the general vicinity of the Exposed Siphon and Ward Dam project sites. The 37,540-acre Dye Creek Preserve serves as a site for the research, development and demonstration of ecological management and restoration techniques, outdoor education and also operates as a working ranch leasing grazing rights to a private rancher and hunting rights to a commercial outfitter.

Hydrology

Mill Creek is an approximately 60-mile long perennial stream flowing generally southwest, originating from the southern-facing slopes of Lassen Peak and eventually flowing into the Sacramento River near the towns of Tehama and Los Molinos, California. The Mill Creek watershed includes a total area of 134 square miles and drains from northeast to southwest into the Sacramento River. Below Mill Creek canyon, the creek flows for about eight miles before reaching the Sacramento River. No other streams are present within the study area, however there are a number of perennial and intermittent streams in the general area.

The Exposed Siphon is downstream of the Ward Dam. The Exposed Siphon crosses Mill Creek at approximately 0.5 miles above the Shasta Boulevard Bridge and approximately 4,000 feet downstream from the Ward Dam. The Exposed Siphon is an underground pipe with a concrete cap which was exposed during a large flood event. The concrete cap is now about two feet higher in elevation than the channel bed elevation. A scour hole downstream of the Exposed Siphon near the south bank, formed as a result of the skewed alignment of the exposed pipe and concrete cap, directs flows towards this bank.

The Ward Dam diversion has an appropriative water right for 52.5 cubic feet per second (cfs). Water from the Ward Dam diversion is conveyed through a constructed canal which has a fish screen. A bypass return pipe allows for some water and any fish entrapped in the canal to return to Mill Creek. Diverted water that is passed through the screen is conveyed through a series of unlined ditches to deliver irrigation and stock water to a number of LMMWC customers.

The Upper Dam diversion has an appropriative water right for 90 cfs. Water from the Upper Dam diversion is conveyed through a constructed canal which has a fish screen. A bypass return pipe allows for some water and any fish entrapped in the canal to return to Mill Creek. Diverted water that is passed through the screen is conveyed through a series of unlined ditches until it reaches a number of LMMWC customers as irrigation and stock water.

Soils

Nine different soil map units occur within the study area (Figure 3) according to the local soil survey (U.S. Department of Agriculture [USDA] – Soil Conservation Service et al. 1967). The nine identified map units are listed below:

Berrendos clay loam, 0 to 3 percent slopes (Bg)
These soils are located east of the Sacramento River on narrow floodplains and are formed in alluvium, derived from basic volcanic rock. These soils are usually six feet deep, but in some areas there is a cemented layer at approximately three feet. This soil is moderately well drained, and permeability and runoff are slow. The soil is not listed as hydric on the state hydric soils list (USDA-Natural Resources

Conservation Service [NRCS] 1995). The soil is listed as hydric as a component and an inclusion on the local hydric soils list (USDA-NRCS 2001). According to the California Soil Resource Lab (CSRL) website (UC Davis 2015), the taxonomy of the series is fine, montmorillonitic, thermic, Chromic Pelloxerents.

Inks cobbly loam, 3 to 30 percent slopes (IcD)
This soil is located on low rounded hills east of the Sacramento River and is formed of sediments washed from areas of volcanic rocks which are mostly andesite and basalt. The soil is well drained and permeability is moderate through the profile, but is slow through the underlying material. Runoff is slow to medium. 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 2001). According to the USDA-NRCS Official Soil Series Descriptions website (USDA-NRCS 2015), the taxonomy of the series is loamy-skeletal, mixed, superactive, thermic, Lithic Argixerolls.

Keefers loam, 0 to 3 percent slopes (Kf)
This soil map unit is located on the eastern side of the Sacramento River on old stream terraces. The soils are formed on old alluvium, derived from basic igneous rock, mainly andesite and basalt. Roots and water are restricted due to the clay subsoil. The soil is well drained with slow runoff and permeability. 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 2001). According to the USDA-NRCS Official Soil Series Descriptions website (USDA-NRCS 2015), the taxonomy of the series is clayey-skeletal, smectitic, thermic, Mollic Haploxeralfs.

Molinos complex, channeled (Mzt)
These soils are located along active streams east of the Sacramento River between 200 and 1,000 feet in elevation. The soils are from recent alluvium which is derived from basic igneous rocks, mainly andesite and basalt. This nearly level complex consists of well drained to somewhat excessively drained soils with very low runoff. This complex can consist of any of the Molinos soils. The soil is not listed as hydric on the state hydric soils list (USDA-NRCS 1995). The soil is listed as hydric as a component and inclusion on the local hydric soils list (USDA-NRCS 2001). According to the CSRL website (UC Davis 2015), the taxonomy of the series is coarse-loamy, mixed, nonacid, thermic, Aquic Xerofluvents.

Molinos gravelly fine sandy loam (Mzs)
These soils are located along active streams east of the Sacramento River between 200 and 1,000 feet in elevation. The soils are from recent alluvium which is derived from basic igneous rocks, mainly andesite and basalt. Molinos fine sandy loam is well drained to excessively drained. Runoff is very slow and permeability is moderately rapid. 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 2001). According to the CSRL website (UC Davis 2015), the taxonomy of the series is, coarse-loamy, mixed, nonacid, thermic, Typic Xerorthents.

Riverwash (Rr)
This soil map unit is made up of deposits of sand and gravel. It consists of channels of intermittent streams and of active streams where the water is high. The soil is not listed as hydric on the state hydric soils list (USDA-NRCS 1995). The soil is listed as hydric in drainageways on the local hydric soils list (USDA-NRCS 2001). The series is not classified by higher categories in the soil survey.

Tehama loam, 3 to 8 percent slopes (TaB)
These soils are located along the edges of terraces, mostly west of the Sacramento River in elevations ranging from 200 to 1,000 feet. Tehama loam is formed in mixed alluvium, chiefly from sedimentary rock. These soils are well drained with medium runoff and slow permeability. The soil is not listed as

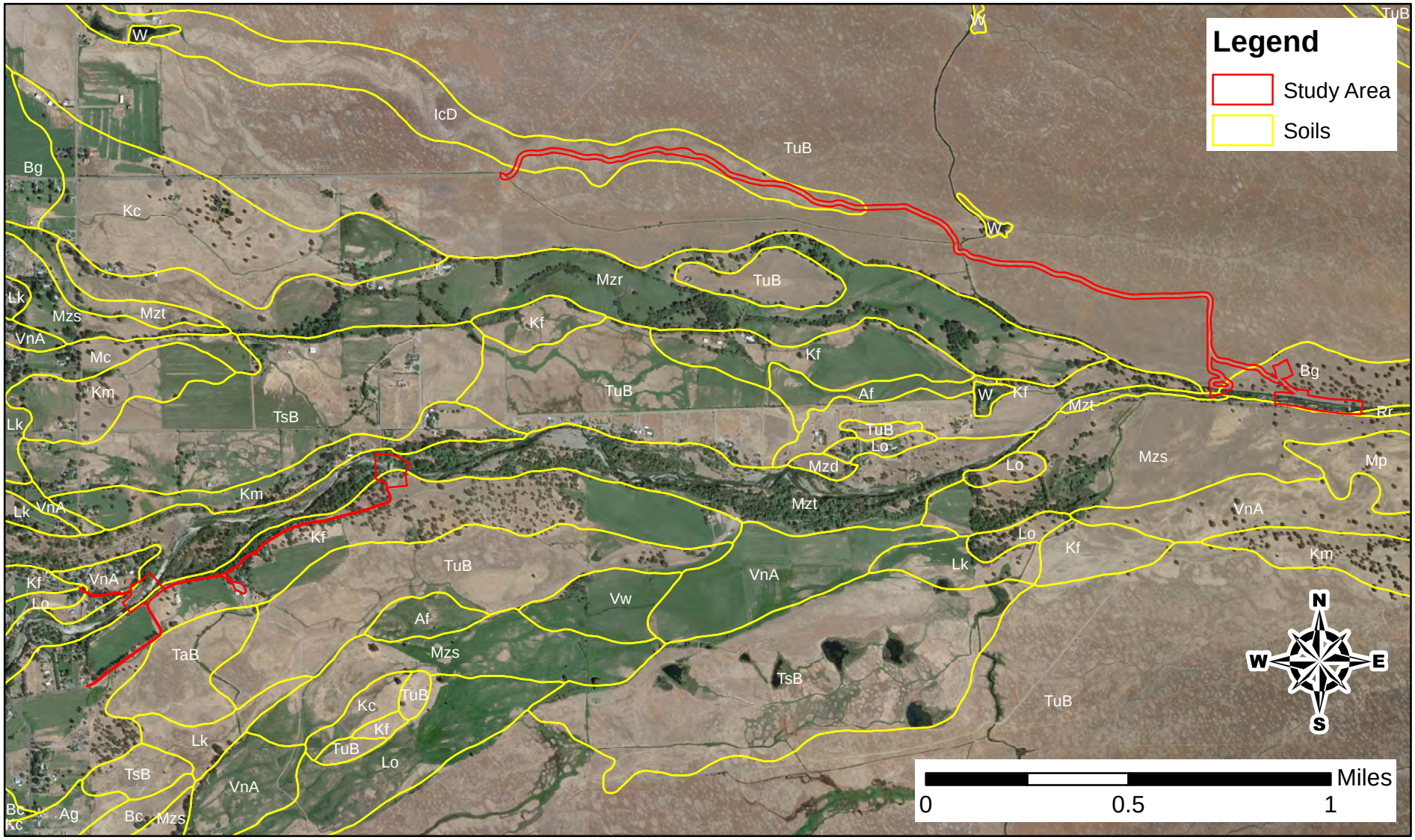

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FIGURE 3

Soil Survey Map

DATA SOURCE: USDA Natural Resources Conservation Service, January, 2015

PHOTO SOURCE: Google Earth, 8/27/2013

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 2001). According to the USDA-NRCS Official Soil Series Descriptions website (USDA-NRCS 2015), the taxonomy of the series is fine-silty, mixed, superactive, thermic, Typic Haploxeralfs.

Tuscan cobbly loam, 1 to 5 percent slopes (TuB)
This series is located on the tops of old gently sloping terraces east of the Sacramento River. The soils are formed from old alluvium washed from areas of volcanic rock. The subsoil is underlain by a hardpan layer located at 10 to 20 inches in depth. The soil is well drained and permeability is very slow. Runoff is slow. 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 2001). According to the USDA-NRCS Official Soil Series Descriptions website (USDA-NRCS 2015), the taxonomy of series is clayey, smectitic, thermic, shallow Typic Durixeralfs.

Vina loam, 0 to 3 percent slopes (VnA)
This soil is found east of the Sacramento River from 200 to 1,000 feet in elevation and was formed from recent alluvium washed from areas of volcanic rock. This soil is well drained and permeability is moderate. Runoff is very slow. The soil is not listed as hydric on the state hydric soils list (USDA-NRCS 1995). The soil is not listed as hydric on the local hydric soils list (USDA-NRCS 2001). According to the USDA-NRCS Official Soil Series Descriptions website (USDA-NRCS 2015), the taxonomy of the series is coarse-loamy, mixed, superactive, thermic, Pachic Haploxerolls.

Vegetation / Plant Communities

Six habitat types generally occur within the study area as defined by the California Wildlife-Habitat Relationships classification system (Mayer and Laudenslayer 1988). The habitat types include: Valley Foothill Riparian, Annual Grassland, Blue Oak Woodland, Valley Oak Woodland, Riverine and Fresh Emergent Wetland habitats.

Valley foothill riparian habitat is present along the banks of Mill Creek at the Exposed Siphon, Ward Dam and the Upper Dam. In some reaches of the creek, the riparian habitat is scattered and discontinuous, while in other areas, such as immediately upstream of the diversion dams and Exposed Siphon, it exists as a corridor on one or both banks.

At the Exposed Siphon, valley foothill riparian habitat occurs on both banks upstream and downstream of the siphon; however, it is patchy and less dense downstream of the siphon on the north bank of the creek. The dominant woody plant species at the Exposed Siphon site are white alder (*Alnus rhombifolia*), Fremont cottonwood (*Populus fremontii*), valley oak (*Quercus lobata*) and California sycamore (*Platanus racemosa*), with several other species including narrow-leaved willow (*Salix exigua),* red willow (*Salix laevigata*), mulefat (*Baccharis salicifolia*), fig (*Ficus carica*), California grape (*Vitis californica*), arroyo willow (*Salix lasiolepis*), California blackberry (*Rubus ursinus*) and Himalayan blackberry (*Rubus armeniacus*). Blue elderberry *(Sambucus mexicana)* shrubs are also found on the south bank downstream of the Exposed Siphon. The herbaceous layer includes native species such as deer grass (*Muhlenbergia rigens*), horsetail *(Equisetum sp.)* and mugwort (*Artemisia douglasiana*) along with other native and non-native grasses and forbs.

At the Ward Dam, valley foothill riparian habitat occurs on both banks upstream and downstream of the dam; however, it is patchy and less dense upstream of the Ward Dam on the south bank of the creek. The dominant woody plant species at the Ward Dam site are white alder, Fremont cottonwood, valley oak and California sycamore, with several other species including Oregon ash (*Fraxinus latifolia*), California grape and arroyo willow. The herbaceous layer includes native species such as deer grass, horsetail and

mugwort along with other native and non-native grasses and forbs. Scattered species throughout the site include red willow, narrow-leaved willow, mulefat, California blackberry and Himalayan blackberry.

At the Upper Dam, valley foothill riparian habitat occurs on both banks upstream and downstream of the dam; however patches of dense habitat are only found on the north bank downstream of the dam near the fish screen and upstream of the dam on the south bank of the creek. The dominant woody plant species at the Upper Dam site are white alder and arroyo willow. The herbaceous layer includes mostly non-native grasses and forbs. Scattered species throughout the site include Himalayan blackberry, mare's tail (*Hippuris vulgaris)*, torrent sedge (*Carex nudata*), buckwheat (*Eriogonum sp.*), California wild grape, horsetail, California blackberry, and deer grass.

Annual grassland habitat occurs along the haul roads to access the Upper Dam project site. All vernal pools / swales within the study area have been created along the access haul road prism, due to continual road traffic and disturbance, and are devoid of vegetation. Dominant herbaceous species here include native and non-native annual grasses and forbs. Several vernal pools, swales and ephemeral streams are present along the road. A corridor along a small portion of the Upper Dam access haul road, near the dam on the north high terrace, would be classified as blue oak woodland. The woody component is entirely blue oak. Dominant herbaceous species here include non-native annual grasses and forbs, along with some natives.

Valley oak woodland habitat occurs along the upper southern bank of the Exposed Siphon and along the upper southern bank of Upper Dam. The dominant woody plant species at this location includes Valley oak, poison oak (*Toxicodendron diversilobum*), hoary coffee berry (*Frangula californica ssp. tomentella*) and buckbrush (*Ceanothus cuneatus*). Blue elderberry shrubs were also found along the south bank of the Upper Dam site.

Fresh emergent habitat, where present, occurs in thin discontinuous bands along the creek channel margin and along the exposed barren rock, and gravel along banks of the stream. Islands in the channel support scattered woody and herbaceous species such as torrent sedge and willows *(Salix spp.).*

METHODS

A delineation of waters of the U.S. was conducted within the study area on various days during the months of May, June and July, 2014, by TES staff including Mr. Jeff Souza, Senior Biologist, Mr. Ben Myhre, Associate Biologist, and Mr. John Dittes, Senior Botanist of Dittes and Guardino Consulting. 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. Four data points were characterized to determine the presence or absence of the three wetland parameters (vegetation, soils and hydrology). The data forms for the four 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 determined 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 Figures 4 - 10.

RESULTS

Based on the presence / absence of indicators of wetland hydrology, hydrophytic vegetation and hydric soils, 2.77 acres of potentially jurisdictional wetlands were identified and delineated between the three separate sites. Based on the presence of an OHWM, 4.06 acres of potentially jurisdictional other waters of the U.S. were also identified and delineated within the three separate sites. Tables 1, 2 and 3 present a summary of the total acreage of the jurisdictional waters of the U.S. for each site. The Exposed Siphon has 0.67 acres of potentially jurisdictional wetlands. Ward Dam has 0.78 acres of potentially jurisdictional wetlands and the Upper Dam has 1.32 acres of potentially jurisdictional wetlands. The Exposed Siphon has 0.93 acres of potentially jurisdictional other waters of the U.S. The Ward Dam has 0.95 acres of potentially jurisdictional other waters of the U.S. and the Upper Dam has 2.18 acres of potentially jurisdictional other 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.

Exposed Siphon

The vegetation types in the Riparian Wetland features of the Exposed Siphon are dominated by white alder [FACW], and narrow-leaved willow [FACW]. Other woody species include Fremont cottonwood [FACW], valley oak [FACU], mulefat [FAC], California grape [FACU], arroyo willow [FACW] and Himalayan blackberry [FACU]. Herbaceous species include deergrass [FAC], horsetail [FAC] and mugwort [FAC].

Ward Dam

The vegetation types in the Riparian Wetland features of the Ward Dam are dominated by white alder [FACW] and Oregon ash [FACW]. Other woody species include Fremont cottonwood [FACW], valley oak [FACU], California sycamore [FAC], California grape [FACU] and arroyo willow [FACW]. Herbaceous species include deer grass [FAC], horsetail [FAC] and mugwort [FAC] along with other native and non-native grasses and forbes.

Upper Dam

The vegetation types in the Riparian Wetland features of the Upper Dam are dominated by white alder [FACW] and arroyo willow [FACW]. The herbaceous layer includes mostly non-native grasses and forbs.

TABLE 1 SUMMARY OF PRELIMINARY DELINEATED WATERS OF THE U. S. Mill Creek Fish Passage Restoration Project Exposed Siphon	
Wetlands	**Total Acreage**
Riparian Wetland (Multiple Polygons)	0.67
Total Wetlands	**0.67**
Other Waters	**Total Acreage**
Ditch	0.022
Perennial Stream	0.90
Total Other Waters	**0.93**
TOTAL WATERS OF THE U. S.	**1.60**

TABLE 2 SUMMARY OF PRELIMINARY DELINEATED WATERS OF THE U. S. Mill Creek Fish Passage Restoration Project Ward Dam	
Wetlands	**Total Acreage**
Riparian Wetland	0.78
Total Wetlands	**0.78**
Other Waters	**Total Acreage**
Ditch	0.05
Perennial Stream	0.90
Total Other Waters	**0.95**
TOTAL WATERS OF THE U. S.	**1.73**

TABLE 3 SUMMARY OF PRELIMINARY DELINEATED WATERS OF THE U. S. Mill Creek Fish Passage Restoration Project Upper Dam	
Wetlands	**Total Acreage**
Vernal Pool	0.15
Disturbed Vernal Pool	0.10
Vernal Swale	0.35
Disturbed Vernal Swale	0.05
Ephemeral Stream	0.09
Disturbed Ephemeral Stream	0.02
Wet Meadow	0.03
Riparian Wetland	0.53
Total Wetlands	**1.32**
Other Waters	**Total Acreage**
Ditch	0.61
Perennial Stream	1.57
Total Other Waters	**2.18**
TOTAL WATERS OF THE U. S.	**3.50**

Jurisdictional Considerations

Exposed Siphon

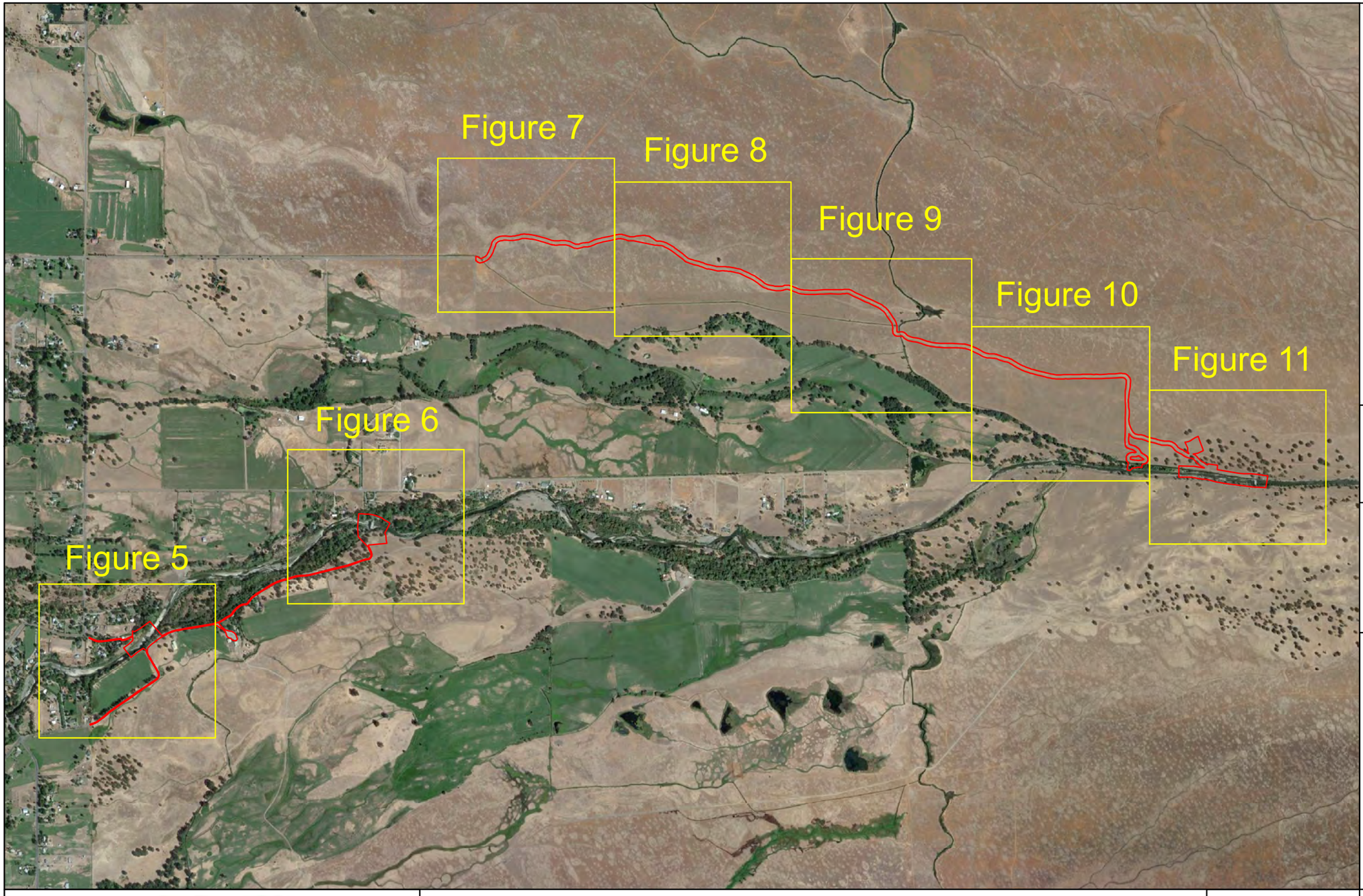
Feature PS 1 (Figure 5) meets the definition of a Relatively Permanent Water (RPW) as defined by the *U.S. Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook* (guidebook) (U.S. Army Corps of Engineers and Environmental Protection Agency 2007) and the revised Rapanos/Carabell guidance (U.S. Army Corps of Engineers and Environmental Protection Agency 2008). Features D 1, D 2, and D 3 may, or may not be jurisdictional.

Ward Dam

Features PS 1 and PS 2 (Figure 6) meet the definition of a Relatively Permanent Water (RPW) as defined by the 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). Feature D 1 may, or may not be jurisdictional.

Upper Dam

Feature PS 1 (Figure 11) meets the definition of a Relatively Permanent Water (RPW) as defined by the 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). Features D 1, D 2, D 3, D 4 and D 5 may, or may not be jurisdictional.



Legend

Study Area

FIGURE 4

Preliminary Delineation Map
Overview

DELINEATION/GPS SURVEY

Jeff Souza
Ben Myhre
Tehama Environmental Solutions, Inc.
&
John Dittes
Dittes & Guardino Consulting

CLIENT

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Delineation of Waters of the U.S.

Mill Creek Fish Passage Restoration Project

Tehama County, California

N
W E
S

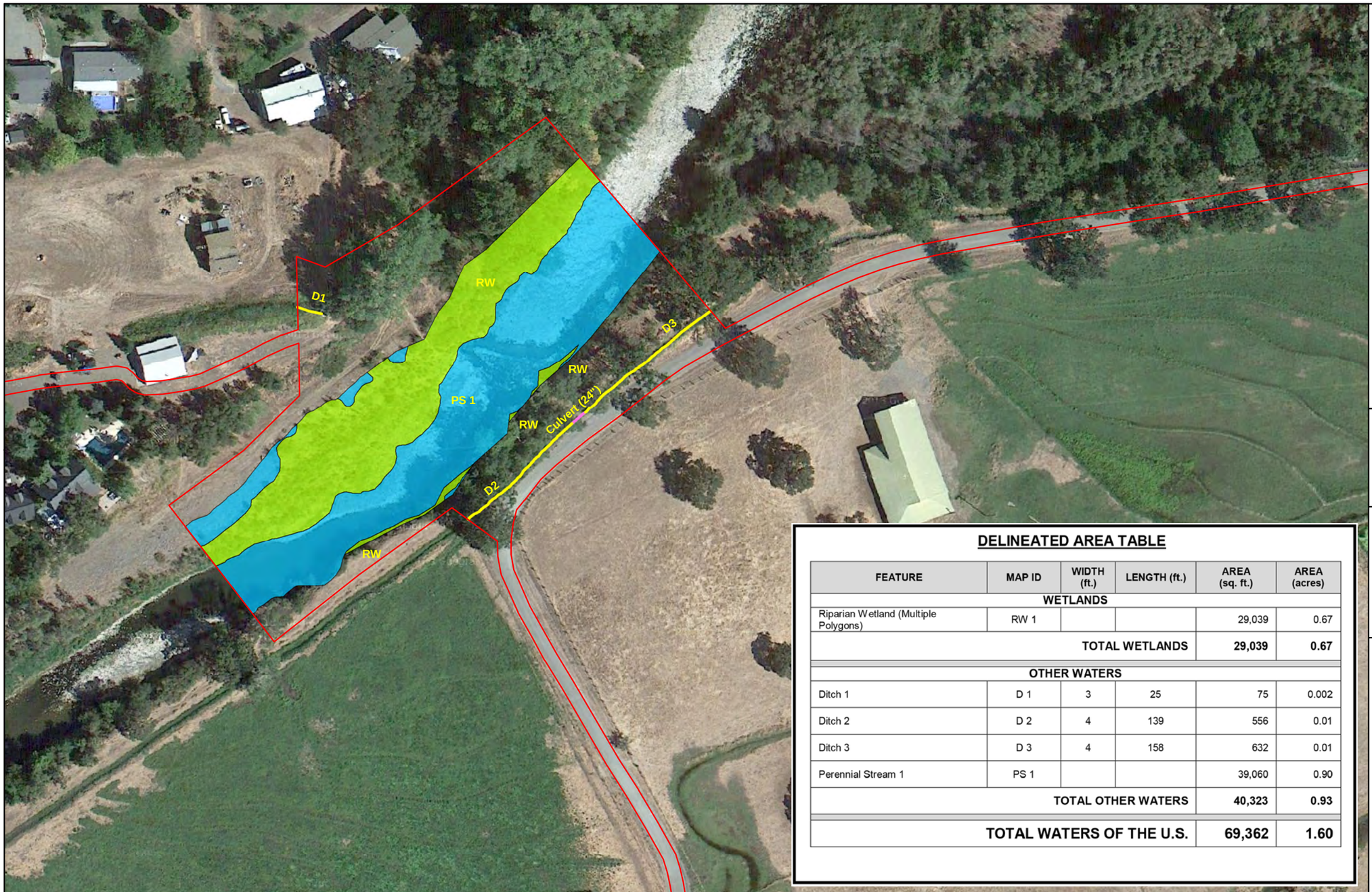
SCALE

0 1,400 2,800 Feet

1 in = 1,444 ft (11" X 17" paper)

March 2015

NOTE: DELINEATION SHOULD BE CONSIDERED PRELIMINARY UNTIL VERIFIED BY THE U.S. ARMY CORPS OF ENGINEERS. PHOTO SOURCE: Google Earth, August, 2013



Legend

- Study Area
- Perennial Stream
- Riparian Wetland
- Ditch
- Culvert

FIGURE 5

Preliminary Delineation Map
Exposed Siphon

DELINEATED AREA TABLE

FEATURE	MAP ID	WIDTH (ft.)	LENGTH (ft.)	AREA (sq. ft.)	AREA (acres)
WETLANDS					
Riparian Wetland (Multiple Polygons)	RW 1			29,039	0.67
TOTAL WETLANDS				**29,039**	**0.67**
OTHER WATERS					
Ditch 1	D 1	3	25	75	0.002
Ditch 2	D 2	4	139	556	0.01
Ditch 3	D 3	4	158	632	0.01
Perennial Stream 1	PS 1			39,060	0.90
TOTAL OTHER WATERS				**40,323**	**0.93**
TOTAL WATERS OF THE U.S.				**69,362**	**1.60**

DELINEATION/GPS SURVEY

Jeff Souza
Ben Myhre
Tehama Environmental Solutions, Inc.
&
John Dittes
Dittes & Guardino Consulting

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Delineation of Waters of the U.S.

Mill Creek Fish Passage Restoration Project

Tehama County, California

N W E S

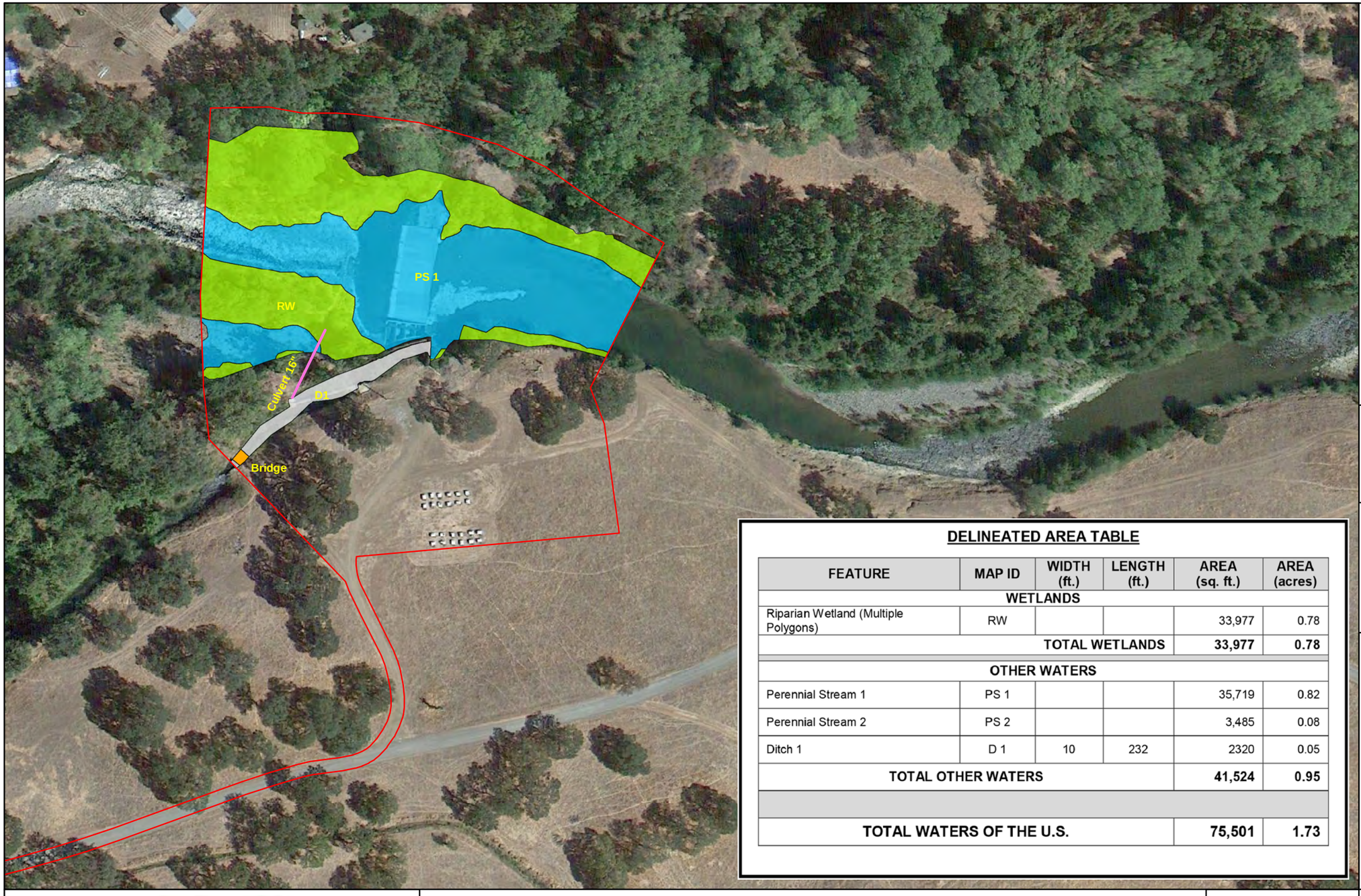
SCALE

0 100 200 Feet

1 in = 100 ft (11" X 17" paper)

March 2015

NOTE: DELINEATION SHOULD BE CONSIDERED PRELIMINARY UNTIL VERIFIED BY THE U.S. ARMY CORPS OF ENGINEERS. PHOTO SOURCE: Google Earth, August, 2013



Legend

- Study Area
- Perennial Stream
- Riparian Wetland
- Bridge
- Ditch
- Culvert

FIGURE 6

Preliminary Delineation Map
Ward Dam

DELINEATED AREA TABLE

FEATURE	MAP ID	WIDTH (ft.)	LENGTH (ft.)	AREA (sq. ft.)	AREA (acres)
WETLANDS					
Riparian Wetland (Multiple Polygons)	RW			33,977	0.78
TOTAL WETLANDS				**33,977**	**0.78**
OTHER WATERS					
Perennial Stream 1	PS 1			35,719	0.82
Perennial Stream 2	PS 2			3,485	0.08
Ditch 1	D 1	10	232	2320	0.05
TOTAL OTHER WATERS				**41,524**	**0.95**
TOTAL WATERS OF THE U.S.				**75,501**	**1.73**

DELINEATION/GPS SURVEY

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N W E S

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March 2015

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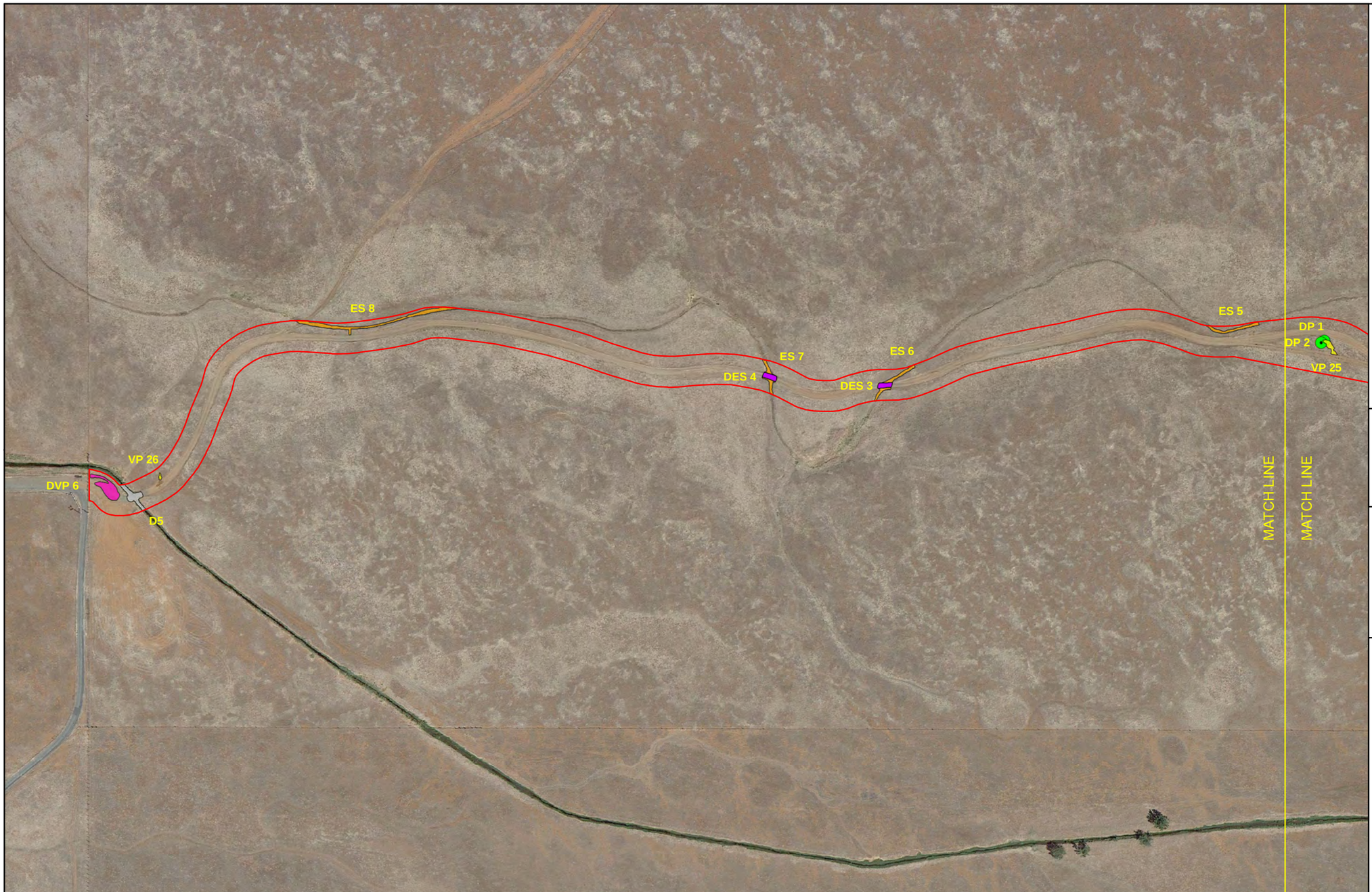

Legend

- Study Area
- Perennial Stream
- Riparian Wetland
- Wet Meadow
- Vernal Swale
- Vernal Pool
- Ephemeral Stream
- Disturbed Vernal Swale
- Disturbed Vernal Pool
- Disturbed Ephemeral Stream
- Bridge
- Ditch
- Data Points

FIGURE 7

Preliminary Delineation Map
Upper Dam

DELINEATION/GPS SURVEY

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Mill Creek Fish Passage Restoration Project

Tehama County, California

N W E S

SCALE

0 200 400 Feet

1 in = 200 ft (11” X 17” paper)

March 2015

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Legend

- Study Area
- Perennial Stream
- Riparian Wetland
- Wet Meadow
- Vernal Swale
- Vernal Pool
- Ephemeral Stream
- Disturbed Vernal Swale
- Disturbed Vernal Pool
- Disturbed Ephemeral Stream
- Bridge
- Ditch
- Data Points

FIGURE 8

Preliminary Delineation Map
Upper Dam

DELINEATION/GPS SURVEY

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N W E S

SCALE

0 200 400 Feet

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March 2015

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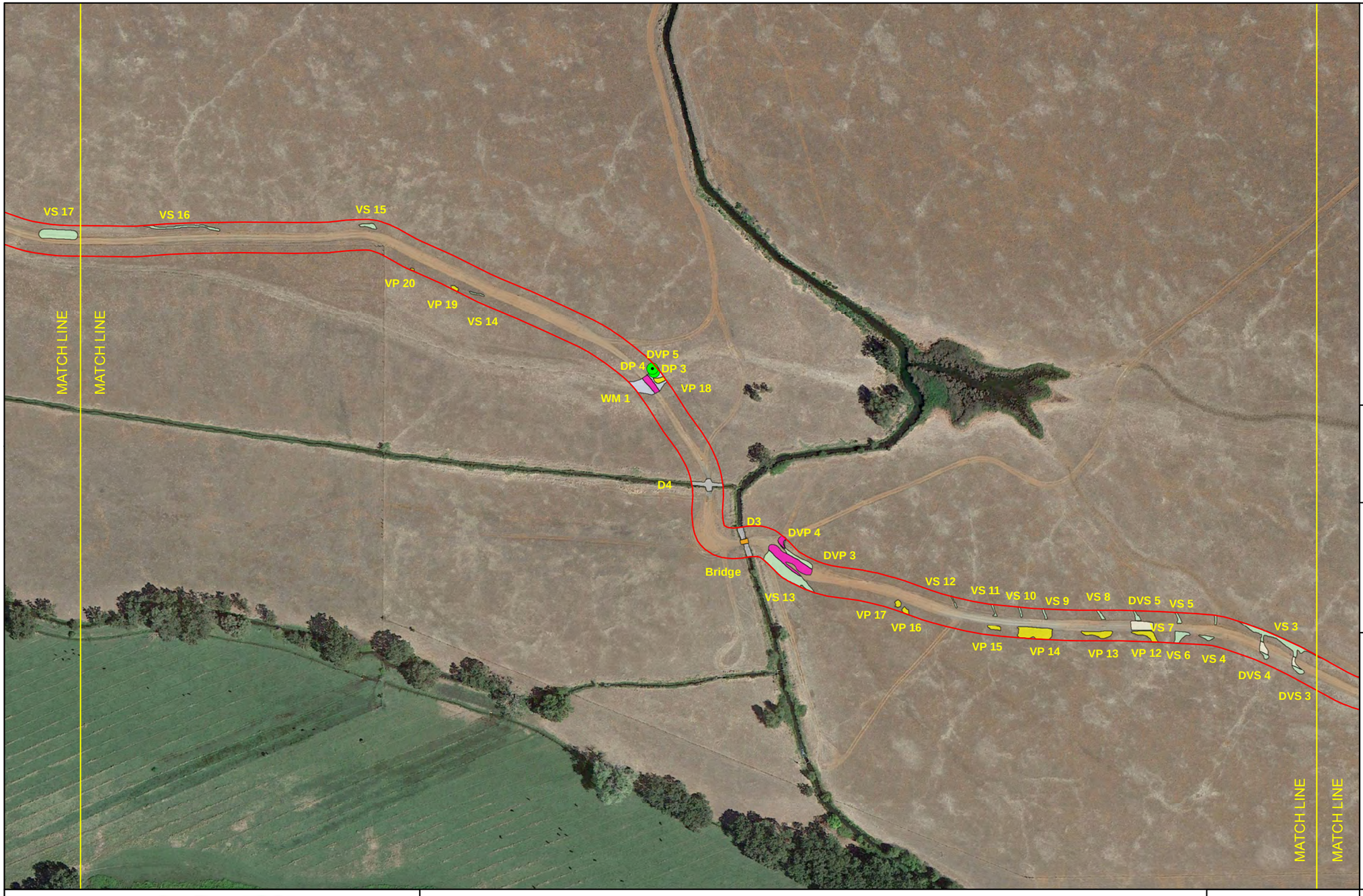

Legend

- Study Area
- Perennial Stream
- Riparian Wetland
- Wet Meadow
- Vernal Swale
- Vernal Pool
- Ephemeral Stream
- Disturbed Vernal Swale
- Disturbed Vernal Pool
- Disturbed Ephemeral Stream
- Bridge
- Ditch
- Data Points

FIGURE 9

Preliminary Delineation Map
Upper Dam

DELINEATION/GPS SURVEY

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N
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SCALE

0 200 400 Feet

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March 2015

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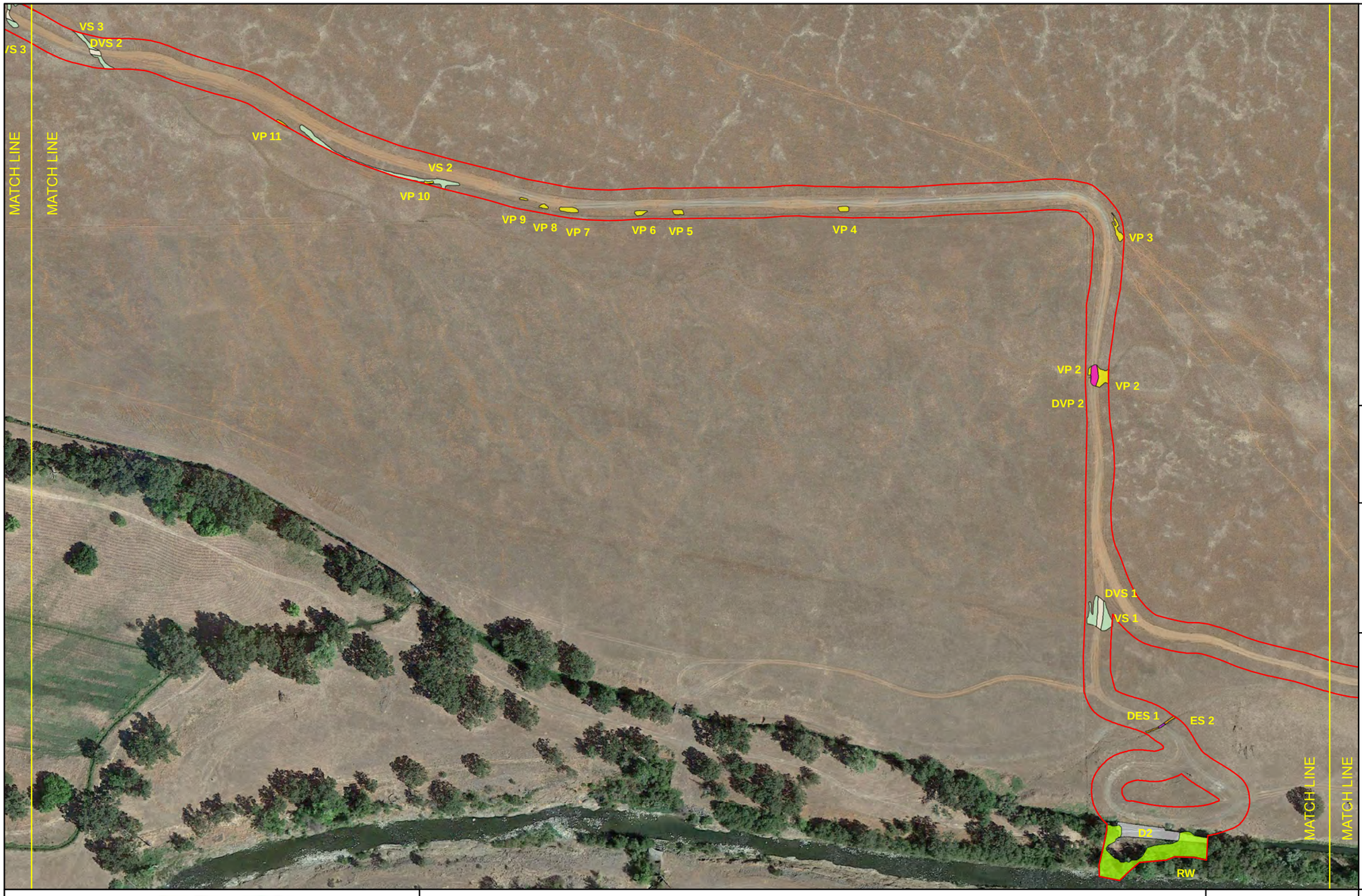

Legend

- Study Area
- Perennial Stream
- Riparian Wetland
- Wet Meadow
- Vernal Swale
- Vernal Pool
- Ephemeral Stream
- Disturbed Vernal Swale
- Disturbed Vernal Pool
- Disturbed Ephemeral Stream
- Bridge
- Ditch
- Data Points

FIGURE 10

Preliminary Delineation Map
Upper Dam

DELINEATION/GPS SURVEY

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W E
S

SCALE

0 200 400 Feet

1 in = 200 ft (11” X 17” paper)

March 2015

NOTE: DELINEATION SHOULD BE CONSIDERED PRELIMINARY UNTIL VERIFIED BY THE U.S. ARMY CORPS OF ENGINEERS. PHOTO SOURCE: Google Earth, August, 2013

DELINEATED AREA TABLE

FEATURE	MAP ID	WIDTH (ft.)	LENGTH (ft.)	AREA (sq. ft.)	AREA (acres)
WETLANDS					
Vernal Pool 1	VP 1			198	0.005
Vernal Pool 2	VP 2			739	0.02
Vernal Pool 3	VP 3			410	0.01
Vernal Pool 4	VP 4			203	0.005
Vernal Pool 5	VP 5			185	0.004
Vernal Pool 6	VP 6			179	0.004
Vernal Pool 7	VP 7			323	0.01
Vernal Pool 8	VP 8			119	0.003
Vernal Pool 9	VP 9			59	0.001
Vernal Pool 10	VP 10			74	0.002
Vernal Pool 11	VP 11			94	0.002
Vernal Pool 12	VP 12			485	0.01
Vernal Pool 13	VP 13			544	0.01
Vernal Pool 14	VP 14			1,385	0.03
Vernal Pool 15	VP 15			195	0.004
Vernal Pool 16	VP 16			136	0.003
Vernal Pool 17	VP 17			137	0.003
Vernal Pool 18	VP 18			198	0.005
Vernal Pool 19	VP 19			104	0.002
Vernal Pool 20	VP 20			40	0.001
Vernal Pool 21	VP 21			199	0.01
Vernal Pool 22	VP 22			93	0.002
Vernal Pool 23	VP 23			172	0.004
Vernal Pool 24	VP 24			84	0.002
Vernal Pool 25	VP 25			308	0.01
Vernal Pool 26	VP 26			51	0.001
Disturbed Vernal Pool 1	DVP 1			127	0.003
Disturbed Vernal Pool 2	DVP 2			510	0.01
Disturbed Vernal Pool 3	DVP 3			1,681	0.04
Disturbed Vernal Pool 4	DVP 4			220	0.005
Disturbed Vernal Pool 5	DVP 5			458	0.01
Disturbed Vernal Pool 6	DVP 6			1,183	0.03
Vernal Swale 1	VS 1			1,506	0.03
Vernal Swale 2	VS 2			2,139	0.05
Vernal Swale 3	VS 3			2,523	0.06
Vernal Swale 4	VS 4			166	0.004
Vernal Swale 5	VS 5			120	0.003
Vernal Swale 6	VS 6			401	0.01
Vernal Swale 7	VS 7			133	0.003
Vernal Swale 8	VS 8			120	0.003
Vernal Swale 9	VS 9			81	0.002
Vernal Swale 10	VS 10			69	0.002
Vernal Swale 11	VS 11			89	0.002
Vernal Swale 12	VS 12			61	0.001
Vernal Swale 13	VS 13			2,550	0.06
Vernal Swale 14	VS 14			88	0.002
Vernal Swale 15	VS 15			234	0.01
Vernal Swale 16	VS 16			550	0.01
Vernal Swale 17	VS 17	1.5	59	89	0.002
Vernal Swale 18	VS 18	2	381	762	0.02
Vernal Swale 19	VS 19			282	0.01
Vernal Swale 20	VS 20			3,401	0.08
Disturbed Vernal Swale 1	DVS 1			646	0.01
Disturbed Vernal Swale 2	DVS 2			212	0.005
Disturbed Vernal Swale 3	DVS 3			144	0.03
Disturbed Vernal Swale 4	DVS 4			271	0.01
Disturbed Vernal Swale 5	DVS 5			809	0.02
Ephemeral Stream 1	ES 1			163	0.004
Ephemeral Stream 2	ES 2			169	0.004
Ephemeral Stream 3	ES 3			125	0.003
Ephemeral Stream 4	ES 4			296	0.01
Ephemeral Stream 5	ES 5			534	0.01
Ephemeral Stream 6	ES 6			576	0.01
Ephemeral Stream 7	ES 7			412	0.01
Ephemeral Stream 8	ES 8			1,723	0.04
Disturbed Ephemeral Stream 1	DES 1			53	0.001
Disturbed Ephemeral Stream 2	DES 2			183	0.04
Disturbed Ephemeral Stream 3	DES 3			255	0.01
Disturbed Ephemeral Stream 4	DES 4			284	0.01
Wet Meadow 1	WM 1			1,382	0.03
Riparian Wetland (multiple polygons)	RW			22,986	0.53
TOTAL WETLANDS				**57,480**	**1.32**
OTHER WATERS					
Ditch 1	D 1			21,042	0.48
Ditch 2	D 2			3,645	0.08
Ditch 3	D 3			549	0.01
Ditch 4	D 4			674	0.02
Ditch 5	D 5			779	0.02
Perennial Stream 1	PS 1			68,366	1.57
TOTAL OTHER WATERS				**95,055**	**2.18**
TOTAL WATERS OF THE U.S.				**152,535**	**3.50**

Legend

- Study Area
- Perennial Stream
- Riparian Wetland
- Wet Meadow
- Vernal Swale
- Vernal Pool
- Ephemeral Stream
- Disturbed Vernal Swale
- Disturbed Vernal Pool
- Disturbed Ephemeral Stream
- Bridge
- Ditch
- Data Points

FIGURE 11

Preliminary Delineation Map
Upper Dam

DELINEATION/GPS SURVEY

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March 2015

NOTE: DELINEATION SHOULD BE CONSIDERED PRELIMINARY UNTIL VERIFIED BY THE U.S. ARMY CORPS OF ENGINEERS. PHOTO SOURCE: Google Earth, August, 2013

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APPENDIX A

Routine Wetland Delineation Forms

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Mill Creek Fish Passage Restoration Project City/County: Los Molinos/Tehama Sampling Date: 5/22/2014

Applicant/Owner: U.S. Fish and Wildlife Service / The Nature Conservancy State: CA Sampling Point: DP-1

Investigator(s): J. Souza / B. Myhre / J. Dittes Section, Township, Range: Section 35, Township 26 North, Range 2 West MDBM

Landform (hillslope, terrace, etc.): drainage Local relief (concave, convex, none): concave Slope (%): 3

Subregion (LRR): C- Mediterranean California Lat: 40° 03' 51.38" N Long: 122° 03' 46.09" W Datum: NAD83

Soil Map Unit Name: Inks Cobbly Loam, 3 to 30% slopes (IcD) 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 ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐	**Is the Sampled Area within a Wetland?**	**Yes ☒ No ☐**
Wetland Hydrology Present?	Yes ☒	No ☐		

Remarks: **Drainage through access road. Hydrologic conditions are very dry for this time of the year due to record dry winter and spring.**

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:_____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
50% = _____, 20% = _____	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:_____)			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
50% = _____, 20% = _____	0	= Total Cover	
Herb Stratum (Plot size:0.5 m²)			
1. *Navarretia leucocephala*	15	yes	OBL
2. *Hordeum marinum*	15	yes	FAC
3. *Eryngium castrense*	10	yes	OBL
4. *Lasthenia fremontii*	5	no	OBL
5. *Plagiobothrys stipitatus*	5	no	FACW
6. *Veronica peregrina*	3	no	OBL
7. *Deschampsia danthonioides*	2	no	FACW
8. *Lythrum hyssopifolium*	3	no	OBL
50% = 29, 20% = 11.6	58	= Total Cover	
Woody Vine Stratum (Plot size:_____)			
1. _____	0	_____	_____
2. _____	_____	_____	_____
50% = _____, 20% = _____	0	= Total Cover	
% Bare Ground in Herb Stratum 0	% Cover of Biotic Crust 0		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

	Total % Cover of :	Multiply by:	
OBL species	36	x1 =	36
FACW species	7	x2 =	14
FAC species	15	x3 =	45
FACU species	_____	x4 =	_____
UPL species	_____	x5 =	_____
Column Totals:	58 (A)		95 (B)

Prevalence Index = B/A = 1.68

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☒ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ☒ No ☐**

Remarks:

Also present
Hypochaeris glabra < 1
Juncus bufonius < 1
Crassula aquatica < 1

Project Site: Mill Creek Fish Passage Assessment Project

SOIL

Sampling Point: DP-1

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 -1	7.5YR 2.5/3	90	5YR 4/4	10	C	PL	clay loam	granular structure, many fine roots
1- 4	10YR 3/4	100					clay loam	sub angular structure
4 - 12	5YR 3/3	100					sandy clay	massive structure, manganese con.
12 - 17	10YR 3/3	100					sandy clay	massive structure, manganese con.

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☒ Redox Depressions (F8)
- ☒ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Clay hardpan

Depth (Inches): 17

Hydric Soils Present? **Yes** ☒ **No** ☐

Remarks: Some cobble throughout soil pit

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☒ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☒ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Shallow Aquitard (D3)
- ☒ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☒ **No** ☐

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

Remarks: Hydrologic conditions are very dry for this time of the year due to record dry winter and spring.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Mill Creek Fish Passage Restoration Project City/County: Los Molinos/Tehama Sampling Date: 5/21/2014

Applicant/Owner: U.S. Fish and Wildlife Service / The Nature Conservancy State: CA Sampling Point: DP-2

Investigator(s): J. Souza / B. Myhre / J. Dittes Section, Township, Range: Section 35, Township 26 North, Range 2 West MDBM

Landform (hillslope, terrace, etc.): drainage Local relief (concave, convex, none): concave Slope (%): 3

Subregion (LRR): C- Mediterranean California Lat: 40° 03' 51.36" N Long: 122° 03' 46.18" W Datum: NAD83

Soil Map Unit Name: Inks Cobbly Loam, 3 to 30% slopes (IcD) 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 ☐	No ☒		
Hydric Soil Present?	Yes ☐	No ☒	**Is the Sampled Area within a Wetland?**	**Yes ☐ No ☒**
Wetland Hydrology Present?	Yes ☐	No ☒		

Remarks: **Drainage through access road. Hydrologic conditions are very dry for this time of the year due to record dry winter and spring.**

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:_____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
50% = _____, 20% = _____	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:_____)			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
50% = _____, 20% = _____	0	= Total Cover	
Herb Stratum (Plot size:0.5 m²)			
1. *Hordeum marinum*	20	yes	FAC
2. *Festuca perennis*	20	yes	FAC
3. *Erodium botrys*	15	yes	FACU
4. *Trifolium subterraneum*	3	no	NL (UPL)
5. *Bromus hordeaceus*	10	no	FACU
6. *Hypochaeris glabra*	1	no	OBL
7. *Navarretia tagetina*	3	no	FACW
8. *Juncus bufonius*	3	no	FACW
50% = 37.5, 20% = 15	75	= Total Cover	
Woody Vine Stratum (Plot size:_____)			
1. _____	0	_____	_____
2. _____	_____	_____	_____
50% = 38.5, 20% = 15.4	0	= Total Cover	
% Bare Ground in Herb Stratum 0	% Cover of Biotic Crust 0		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	**2**	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	**0**	(A/B)

Prevalence Index worksheet:

	Total % Cover of :	Multiply by:	
OBL species	1	x1 =	1
FACW species	6	x2 =	12
FAC species	40	x3 =	120
FACU species	25	x4 =	100
UPL species	3	x5 =	15
Column Totals:	75 (A)		248 (B)

Prevalence Index = B/A = 3.3

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ☐ No ☒**

Remarks:

Taeniatherum caput-medusae < 1

Lepidium nitidum < 1

Trifolium dubium 2

Briza minor < 1

Lupinus bicolor < 1

Project Site: Mill Creek Fish Passage Restoration Project

SOIL

Sampling Point: DP-2

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 -1	7.5YR 3/3	100					sandy loam	granular structure, many fine roots
1 - 11	5YR 3/3	100					sndy cly lm	massive structure, poss. manganese
11 +	10YR 3/3	100					sandy clay	platy structure

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? **Yes** ☐ **No** ☒

Remarks: Some cobble throughout soil pit

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): _____

Water Table Present? Yes ☐ No ☒ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): _____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks: Hydrologic conditions are very dry for this time of the year due to record dry winter and spring.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Mill Creek Fish Passage Restoration Project City/County: Los Molinos/Tehama Sampling Date: 5/21/2014

Applicant/Owner: U.S. Fish and Wildlife Service / The Nature Conservancy State: CA Sampling Point: DP-3

Investigator(s): J. Souza / B. Myhre Section, Township, Range: Section 36, Township 26 North, Range 2 West MDBM

Landform (hillslope, terrace, etc.): vernal pool Local relief (concave, convex, none): concave Slope (%): 3

Subregion (LRR): C- Mediterranean California Lat: 40° 03' 41.29" N Long: 122° 03' 02.11" W Datum: NAD83

Soil Map Unit Name: Tuscan Cobbly Loam, 1 to 5% slopes (TuB) 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 ☒	No ☐		
Hydric Soil Present?	Yes ☒	No ☐	**Is the Sampled Area within a Wetland?**	**Yes ☒ No ☐**
Wetland Hydrology Present?	Yes ☒	No ☐		

Remarks: **Hydrologic conditions are very dry for this time of the year due to record dry winter and spring.**

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:_____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
50% = _____, 20% = _____		= Total Cover	
Sapling/Shrub Stratum (Plot size:_____)			
1.			
2.			
3.			
4.			
5.			
50% = _____, 20% = _____		= Total Cover	
Herb Stratum (Plot size:0.5 m²)			
1. *Lythrum hyssopifolium*	20	yes	OBL
2. *Hordeum marinum*	20	yes	FAC
3. *Plagiobothrys stipitatus*	25	yes	FACW
4. *Juncus bufonius*	30	yes	FACW
5. *Festuca perennis*	2	no	FAC
6. *Psilocarphus brevissimus*	1	no	FACW
7. *Calycadenia truncata*	1	no	NL (UPL)
8.			
50% = 49.5, 20% = 19.8	99	= Total Cover	
Woody Vine Stratum (Plot size:_____)			
1.	0		
2.			
50% = _____, 20% = _____	0	= Total Cover	
% Bare Ground in Herb Stratum _____	% Cover of Biotic Crust _____		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of :		Multiply by:	
OBL species	20	x1 =	20
FACW species	56	x2 =	112
FAC species	22	x3 =	66
FACU species	0	x4 =	0
UPL species	1	x5 =	5
Column Totals:	99 (A)		203 (B)

Prevalence Index = B/A = 2.05

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

☒ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ☒ No ☐**

Remarks:

Project Site: Mill Creek Fish Passage Restoration Project

SOIL

Sampling Point: DP-3

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 1/2	10YR 3/2	90	5YR 3/4	10	C	PL	silt loam	granular structure, many fine roots
1/2 - 5	10YR 3/3	80	5YR 4/6	20	C	PL *	clay loam	sub angular blocky (*ped faces)
5 - 13	5YR 3/3	100					sandy loam	massive struct.,manganese concentration
13+							crs sndy cly	hard cemented layer below (ash like)

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☒ Redox Depressions (F8)
- ☒ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Clay hardpan

Depth (Inches): 13

Hydric Soils Present? **Yes** ☒ **No** ☐

Remarks: Some cobble throughout soil pit

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☒ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☒ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☒ Shallow Aquitard (D3)
- ☒ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches):
Water Table Present?	Yes	☐	No	☒	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches):

Wetland Hydrology Present? **Yes** ☒ **No** ☐

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

Remarks: Hydrologic conditions are very dry for this time of the year due to record dry winter and spring.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Mill Creek Fish Passage Restoration Project City/County: Los Molinos/Tehama Sampling Date: 5/21/2014

Applicant/Owner: U.S. Fish and Wildlife Service / The Nature Conservancy State: CA Sampling Point: DP-4

Investigator(s): J. Souza / B. Myhre Section, Township, Range: Section 36, Township 26 North, Range 2 West MDBM

Landform (hillslope, terrace, etc.): upland Local relief (concave, convex, none): concave Slope (%): 3

Subregion (LRR): C- Mediterranean California Lat: 40° 03' 41.35" N Long: 122° 03' 02.14" W Datum: NAD83

Soil Map Unit Name: Tuscan Cobbly Loam, 1 to 5% slopes (TuB) 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 ☐	No ☒		
Hydric Soil Present?	Yes ☐	No ☒	**Is the Sampled Area within a Wetland?**	**Yes ☐ No ☒**
Wetland Hydrology Present?	Yes ☐	No ☒		

Remarks: **Hydrologic conditions are very dry for this time of the year due to record dry winter and spring.**

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:_____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
50% = _____, 20% = _____	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:_____)			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
50% = _____, 20% = _____	0	= Total Cover	
Herb Stratum (Plot size:0.5 m²)			
1. *Erodium botrys*	80	yes	FACU
2. *Hordeum marinum*	2	no	FAC
3. *Juncus bufonius*	2	no	FACW
4. *Centaurea solstitialis*	2	no	NL (UPL)
5. *Festuca myuros*	1	no	NL (UPL)
6. *Bromus hordeaceaous*	1	no	FACU
7. *Trifolium subterraneum*	1	no	NL (UPL)
8. *Lepidium nitidum*	1	no	FAC
50% = 45, 20% = 18	90	= Total Cover	
Woody Vine Stratum (Plot size:_____)			
1. _____	0	_____	_____
2. _____	_____	_____	_____
50% = _____, 20% = _____	0	= Total Cover	
% Bare Ground in Herb Stratum _____	% Cover of Biotic Crust _____		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0	(A/B)

Prevalence Index worksheet:

	Total % Cover of :	Multiply by:	
OBL species	0	x1 =	0
FACW species	2	x2 =	4
FAC species	3	x3 =	9
FACU species	81	x4 =	324
UPL species	4	x5 =	20
Column Totals:	90 (A)		357 (B)

Prevalence Index = B/A = 3.97

Hydrophytic Vegetation Indicators:

☐ Dominance Test is >50%

☐ Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ☐ No ☒**

Remarks:

Project Site: Mill Creek Fish Passage Restoration Project

SOIL

Sampling Point: DP-4

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 -1	7.5YR 2.5/3	100					sandy loam	many fine roots, granular structure
1 - 5	5YR 3/3	100					sandy loam	massive structure, some manganese
5 -18+	5YR 3/3	100					sandy clay	massive structure

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

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? **Yes** ☐ **No** ☒

Remarks: Some cobble throughout soil pit

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): _____

Water Table Present? Yes ☐ No ☒ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): _____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks: Hydrologic conditions are very dry for this time of the year due to record dry winter and spring.

APPENDIX B

Site Photos

Photo 1. View of the Upper Dam, looking northeast. Photo date: May 22, 2014.

Photo 2. View of Upper Dam from north bank of Mill Creek, looking southwest. Photo date: May 22, 2014.

Photo 3. View of the fish ladder located on the north side of the Upper Dam, looking southwest. Photo date: May 22, 2014.

Photo 4. View of Mill Creek channel upstream of the Upper Dam, looking southwest. Photo date: May 22, 2014.

Photo 5. View of concrete irrigation canal inlet, looking upstream. Photo date: August 9, 2014.

Photo 6. View of Upper Dam fish screen in downstream irrigation canal, looking northeast. Photo date: August 9, 2014.

Photo 7. View of Ward Dam and fish ladder, looking southeast. Photo date: June 30, 2014.

Photo 8. View of fish ladder located on the south side of Ward Dam, looking east. Photo date: June 30, 2014.

Photo 9. View Ward Dam, looking north. Photo date: June 30, 2014.

Photo 10. View of Exposed Siphon, looking east and upstream. Photo date: July 1, 2014.

Photo 11. View of siphon cap, looking from south bank to the north bank of Mill Creek. Photo date: July 1, 2014.

Photo 12. View of Mill Creek downstream of Exposed Siphon, looking west. Photo date: July 1, 2014.

Photo 13. View of vernal pool VP 1 (left) and disturbed vernal pool DVP 1 (in road) on upper dam access road. Looking southeast towards Upper Dam. Photo date: May 7, 2014.

Photo 14. View of vernal pool VP 2 (left and right of road) and disturbed vernal pool DVP 2 (in road) on Upper Dam access road. Photo date: May 7, 2014.

Photo 15. View of vernal pool VP 25 and Data Points 1 and 2, along Upper Dam access road, looking west. Photo date: May 7, 2014.