DRAFT DELINEATION OF WATERS OF THE UNITED STATES

Clover Creek at First Street Bridge Replacement Project
Federal Project No. BRLO-5914 (079)

June 2017

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DRAFT DELINEATION OF JURISDICTIONAL WATERS OF THE UNITED STATES,

Clover Creek at First Street Bridge Replacement Project, Lake County, California

Federal Project No. BRLO-5914 (079)

Introduction and Project Location

Gallaway Enterprises conducted a delineation of Waters of the U.S. and aquatic resources for the Clover Creek at First Street Bridge Replacement project (Project). The Project is on First Street approximately 250 feet east of Washington Street, in the city of Upper Lake, Lake County, CA, within the "Upper Lake, CA" USGS Quadrangle, Section 7, Township 15N, Range 9W (**Figure 1 and 2**). From Clearlake, CA, travel west on SR 20 to the community of Upper Lake, CA, then turn right onto Government Street and left onto First Street for 1,300 feet to the Project site.

A wetland survey was conducted on April 2, 2017 by biologist, Melissa Murphy. Data regarding the location and extent of wetlands and other waters of the U.S. were collected using a Trimble Geo Explorer 6000 Series GPS Receiver. The survey involved an examination of botanical resources, soils, hydrologic features, and determination of wetland characteristics based on the *United States Army Corps of Engineers Wetlands Delineation Manual* (1987); the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (2008); the *U.S. Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook* (2007); the *Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States,* (2008), and the *State of California 2016 Wetland Plant List.* Gallaway Enterprises have prepared this report in compliance with the Minimum Standards for Acceptance of Aquatic Resources Delineation Reports (January 2016).

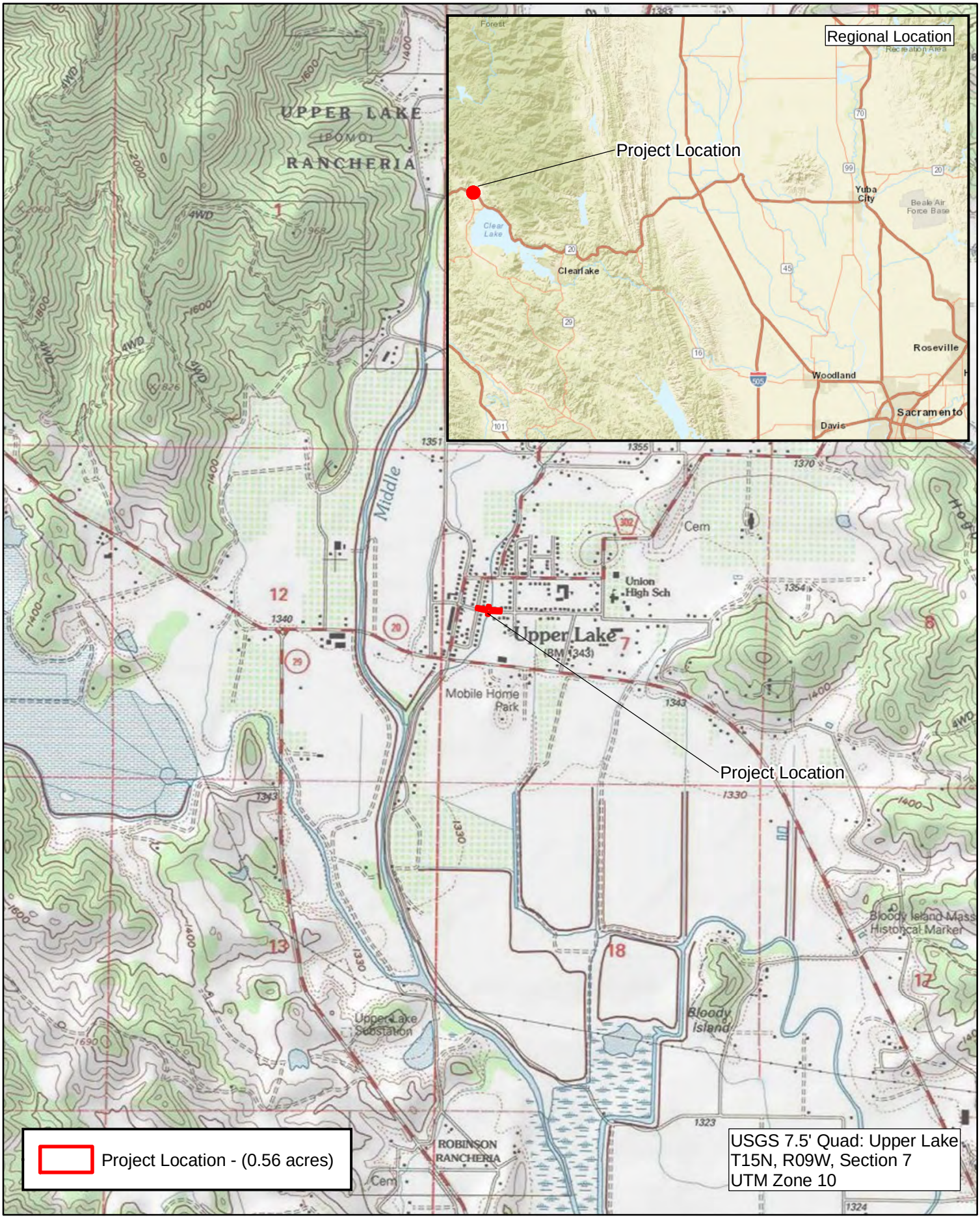
Environmental Setting and Site Conditions

The Project site is located in a residential setting and is closely bordered by fencing associated with residential development. Clover Creek, a perennial drainage flows in a southerly direction through the site. Clover Creek is primarily controlled by the upstream Clover Creek diversion structure and seasonal runoff. The associated levees were built by the Corps and the responsibility for operation and maintenance was transferred to the Central Valley Flood Protection board. These services were contracted to the Lake County Watershed Protection District. The dominant vegetation type observed on the segment of the creek within the project limits was Himalayan blackberry (*Rubus armeniacus*).

At the time of the April 2, 2017 site visit, Clover Creek contained flowing water approximately four (4) inches deep. The purpose of the Project is to replace the existing single span concrete girder bridge over Clover Creek due to its poor structural condition. The average annual precipitation is 31.5 inches and the average annual temperature is 56.8°F (US Climate Data 2017) in the region where the surveys are located. Elevation at the Project site is roughly 1,345 feet mean sea level. Soil at the site is comprised of deep, well-drained, silty loam.

Survey Methodology

The entire Project site was surveyed on-foot by Gallaway Enterprises staff on April 2, 2017 to identify potentially jurisdictional features. The survey, mapping efforts, and report production were performed according to the valid legal definitions of waters of the United States (WOTUS) in effect on April 2, 2017. The boundaries of non-tidal, non-wetland waters, when present, were delineated at the ordinary high water mark (OHWM) as defined in 33 Code of Federal Regulations (CFR) 328.3. The OHWM represents



NORTH

1:24,000

0 500 1,000 Feet

Data Sources: ESRI, USGS, Lake County

Clover Creek Bridge at First Street
Regional Location Map
Figure 1

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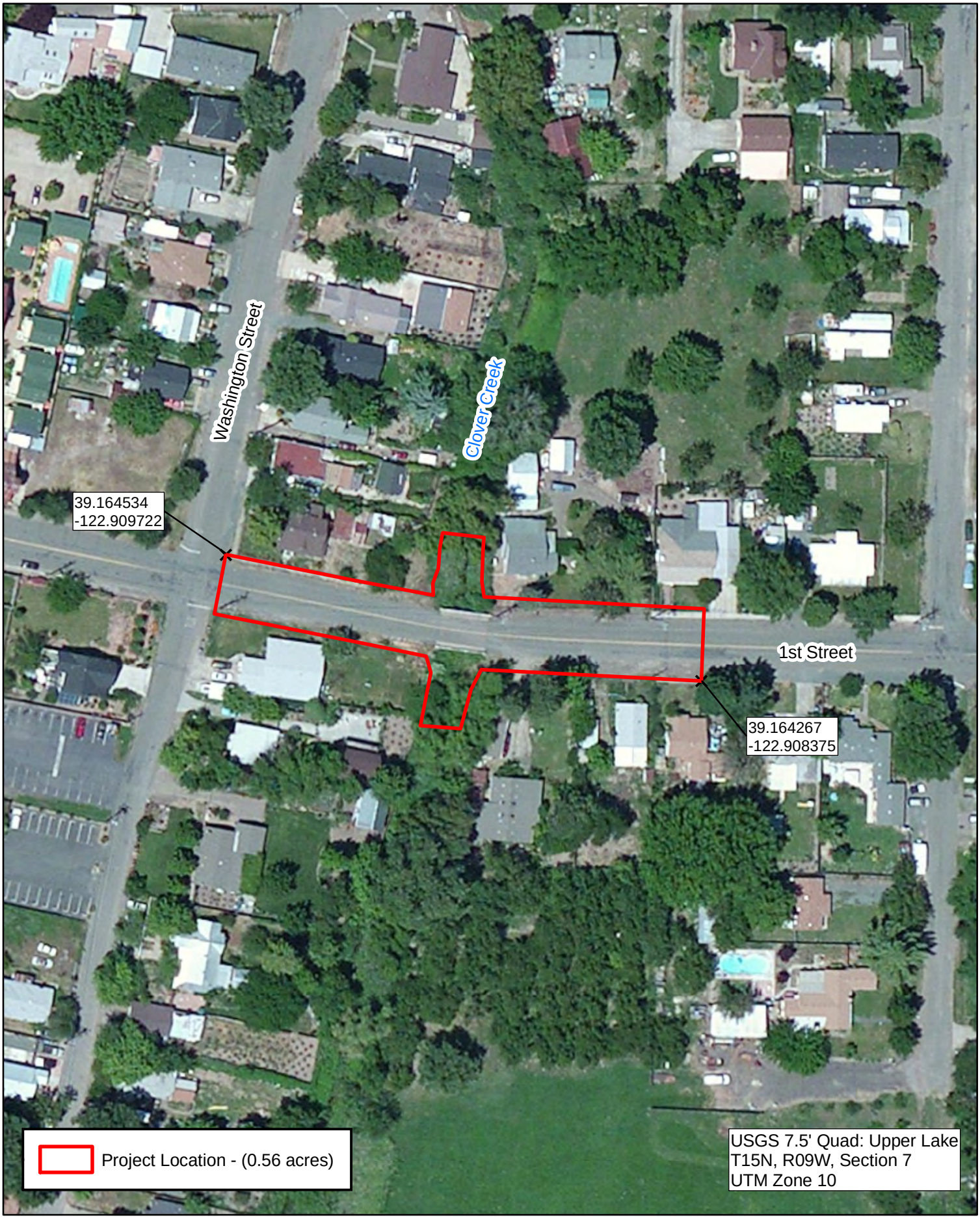
GE: #16-134b Map Date: 05/12/17



NORTH

1:1,200 1 inch = 100 feet

0 50 100 Feet

Data Sources: ESRI (Base map sourced: 05/12/2017), Lake County

Clover Creek Bridge at First Street
Location Map
Figure 2

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GE: #16-134b Map Date: 05/12/17

the limit of United States Army Corps of Engineers (Corps) jurisdiction over non-tidal waters (e.g., streams and ponds) in the absence of adjacent wetlands (33 CFR 328.04) (Curtis, et. al. 2011). Field data was entered onto the Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States (2010) (**Appendix A**). Wetland perimeters based on the United States Army Corps of Engineers Wetlands Delineation Manual (1987) and the Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Arid West Region (2008) (Arid West Manual) were recorded and defined according to their topographic and hydrologic orientation. Photographs were taken to show wetland features. The locations of the photo points are depicted in **Figure 3** and the associated photographs are provided at the end of the report. Many of the terms used throughout this report have specific meanings relating to the federal wetland delineation process. Term definitions are based on the Corps Wetlands Delineation Manual (1987); the Arid West Manual; Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States (2008) and the Corps Jurisdictional Determination Form Instructional Guidebook (2007). The terms defined below have specific meaning relating to the delineation of Waters of the U.S. as described in 33 CFR Part 328 and 40 CFR Parts 110, 112, and 116, and 122.

Determination of Hydrophytic Vegetation

The presence of hydrophytic vegetation was determined using the methods outlined in the Corps Wetlands Delineation Manual (1987) and the Arid West Manual (2008). Areas were considered to have positive indicators of hydrophytic vegetation if they pass the dominance test, meaning more than 50 percent of the dominant species are OBL, FACW, FAC. Plant species were identified to the lowest taxonomy possible. Plant indicator status was determined by reviewing the State of California 2016 Wetland Plant List for the Arid West Region. In situations where dominance can be misleading due to seasonality, the prevalence index will be used to determine the hydrophytic status of the community surrounding sample sites.

Plant indicator status categories:

Obligate wetland plants (OBL) – plants that occur almost always (estimated probability 99%) in wetlands under normal conditions, but which may also occur rarely (estimated probability 1%) in non-wetlands.

Facultative wetland plants (FACW) - plants that usually occur (estimated probability 67% to 99%) in wetlands under normal conditions, but also occur (estimated probability 1% to 33%) in non-wetlands.

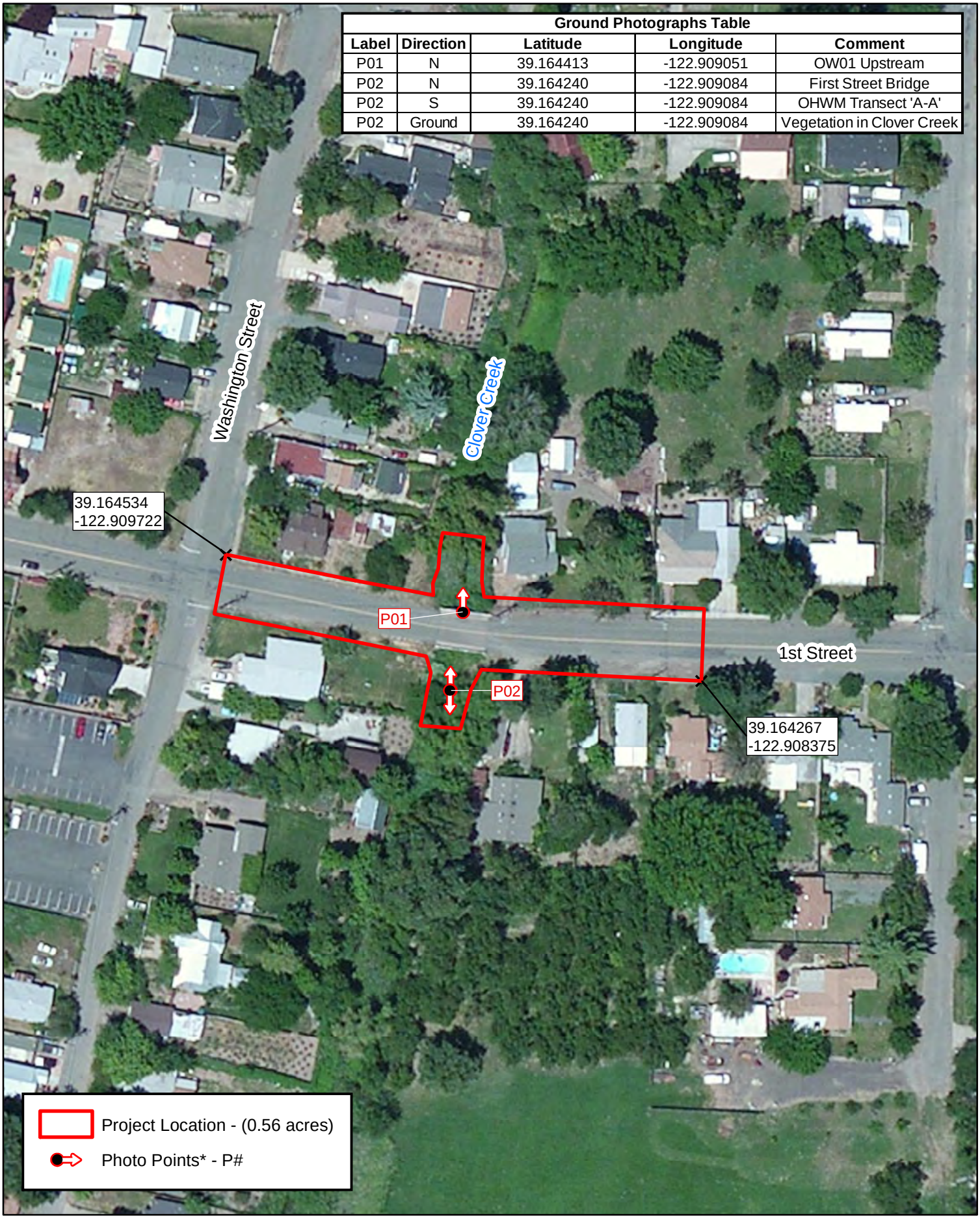
Facultative plants (FAC) – Plants with a similar likelihood (estimated probability 33% to 67%) of occurring in both wetlands and non-wetlands.

Facultative upland plants (FACU) – Plants that occur sometimes (estimated probability 1% to 33%) in wetlands, but occur more often (estimated probability 67% to 99%) in non-wetlands.

Obligate upland plants (UPL) – Plants that occur rarely (estimated probability 1%) in wetlands, but occur almost always (estimated probability 99%) in non-wetlands under natural conditions.

Determination of Hydric Soils

Soil survey information was reviewed for the current site condition. Field samples were evaluated using the Munsell soil color chart (2009 Edition), hand texturing, and assessment of soil features (e.g. oxidized root channels, evidence of hardpan, Mn and Fe concretions). Information regarding local soil and series descriptions is provided in **Appendix B.**



NORTH

1:1,200 1 inch = 100 feet

0 50 100 Feet

Data Sources: ESRI, USDA NAIP
5/31/2016, Lake County

Clover Creek Bridge at First Street
Ground Photogrpahs Map
Figure 3

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GE: #16-134b Map Date: 06/22/17

Determination of Wetland Hydrology

Wetland hydrology was determined to be present if a site supported one or more of the following characteristics:

- Landscape position and surface topography (e.g. position of the site relative to an up-slope water source, location within a distinct wetland drainage pattern, and concave surface topography),
- Inundation or saturation for a long duration either inferred based on field indicators or observed during repeated site visits, and
- Residual evidence of ponding or flooding resulting in field indicators such as scour marks, sediment deposits, algal matting, surface soil cracks and drift lines.

The presence of water or saturated soil for approximately 12% of the growing season typically creates anaerobic conditions in the soil, and these conditions affect the types of plants that can grow and the types of soils that develop (Wetland Training Institute 1995).

Determination of Ordinary High Water Mark

Gallaway utilized methods consistent with the Arid West Manual and *Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States, (2008)* to determine the OHWM. The lateral extents of non-tidal water bodies (e.g. intermittent and ephemeral streams) were based on the OHWM, which is "the line on the shore established by the fluctuations of water" (Corps 2005). The OHWM was determined based on multiple observed physical characteristics of the area, which can include scour, multiple observed flow events (from current and historical aerial photos), shelving, and changes in the character of soil, presence of mature vegetation, deposition, and topography. Due to the wide extent of some floodplains, adjacent riparian scrub areas characterized by hydric soils, hydrophytic vegetation, and hydrology may be included within the OHWM of a non-tidal water body (Curtis, et. al. 2011). Inclusion of minor special aquatic areas is an acceptable practice as outlined in the Arid West Manual.

OHWM Transects:

Representative OHWM widths measured in the field are shown as transect lines and measured in feet as required by the Corps *Updated Map and Drawings Standards for the South Pacific Division Regulatory Program (2016)*. These transect lines are used to ensure that the other waters of the United States identified within the Project site are mapped and calculated at the appropriate average width for each channel segment based on the Corps definition of OHWM as defined in the Arid West OHWM Field Guide and the *Ordinary High Water Mark Identification RGL 05-05 (2005)* (RGL 05-05). If the average width of a feature changes, this change is shown on the delineation map as a feature transition and a new average channel width is determined. At each transect line Gallaway uses multiple observed physical indicators in determining the OHWM. The lateral extents of the transect lines identify the location of the OHWM where benches, drift, exposed root hairs, changes in substrate/particle size, and, if appropriate, changes in vegetation were observed. If any other physical indicators as described in the Arid West OHWM Field Guide or RGL 05-05 are observed, these indicators are recorded. The data recorded at the transect is provided in Appendix A.

Results

Table 1 lists the identified pre-jurisdictional features within the Project boundary including area calculations. A complete Draft Wetland Delineation map, utilizing a 1" to 100' scale, is included as **Exhibit A**.

Table 1 – Results from the Delineation of Waters of the United States for the Clover Creek at First Street Bridge Replacement Project, Lake County, CA.

Wetland Features						
Label	**Feature Type**	**Designation**	**Width**	**Length**	**Area (sq ft)**	**Acres**
OW01	Other Waters	RPW	22.0	156.3	3439.2	0.08
Other Waters of the U.S. Totals=					**3439.2**	**0.08**

Waters of the United States: Other Waters

One (1) feature is identified as an other waters of the United States within the Project site. Other waters of the United States are seasonal or perennial water bodies, including lakes, stream channels, ephemeral and intermittent drainages, ponds, and other surface water features that exhibit an ordinary high-water mark, but lack positive indicators for one or more of the three wetland parameters (hydrophytic vegetation, hydric soil, and wetland hydrology) (33 CFR 328.4). The boundaries of all other waters identified within the survey area were delineated based on the observed OHWM, including physical characteristics such as natural lines impressed on the bank, shelving, changes in the character of the soil, the destruction of terrestrial vegetation, debris lines and other appropriate indicators.

The other waters feature present within the Project site, Clover Creek (OW 01), is identified as a Relatively Permanent Water (RPW). Relatively Permanent Waters are defined as tributaries that typically flow for at least 3 months of the year and have a documented hydrologic connection to a Traditionally Navigable Water (TNW).

Waters of the United States: Wetlands

No wetland features were observed within the Project boundary.

Soils

Gallaway queried the National Cooperative Soil Survey database to evaluate soil conditions within the Project. A copy of the soil survey map and a description of mapped soil units for the Project are included as **Appendix B**. Soil map units identified within the Project site are listed below in **Table 2**. Lupoyoma silt loam, protected, is the only soil series identified within the Project site. This very deep, moderately well drained soil is generally found on alluvial plains. Based on Gallaway's review, the Lupoyoma silt loam soil map unit identified within the Project site contains minor hydric components.

Table 2 - Soil Map Units, NRCS hydric soil designation, and approximate totals for the Clover Creek at First Street Bridge Replacement Project, Lake County, CA.

Map Unit Symbol	Map Unit Name	% Hydric Component in Map Unit	Landform of Hydric Component	% of Survey Area
158	Lupoyoma silt loam, protected	3	Fans	100

Vegetation

The banks and levees of Clover Creek within the Project site are vegetated with a dense and nearly homogenous shrub cover of Himalayan blackberry (FAC). In addition to Himalayan blackberry, overgrown English ivy (*Hedera helix*) (NL) used as landscaping around a house in the southeastern corner of the Project site is also dominating Clover Creek's bank along this section of the Project. Within the Project site, the bed of Clover Creek was dominated by obligate wetland vegetation; a result of the year-round controlled flows.

Hydrology

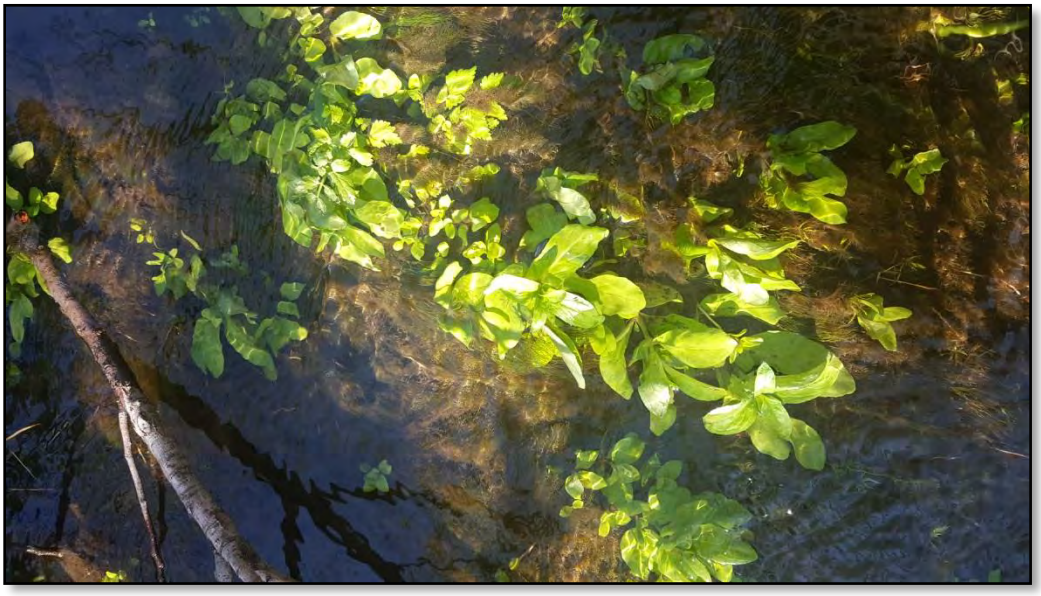
Clover Creek (OW 01) is primarily controlled by the upstream Clover Creek diversion structure and seasonal runoff. The flows were reduced by the diversion structure from 8500 cubic feet per second (cfs) to 500 cfs for a 200-year flood event. The associated levees were built by the Corps. The responsibility for operation and maintenance was transferred to the Central Valley Flood Protection board. These services were contracted to the Lake County Watershed Protection District. Clover Creek flows in a southerly direction through the Project site before crossing under First Street Bridge and outside of the Project boundary. It then continues south for another 0.4 miles to its confluence with Middle Creek, which flows through the Rodman Slough before entering Clear Lake.

Site Photos Taken April 2, 2017

P01: Standing on the First Street Bridge looking upstream at OW 01.

P02: Standing in Clover Creek looking north at the First Street Bridge to be replaced.

P02: Looking downstream at where OHWM transect A-A was taken.



P02: The bed of Clover Creek is highly vegetated due to the year-round controlled flows.

Glossary

- **Abutting:** When referring to wetlands that are adjacent to a tributary, abutting defines those wetlands that are not separated from the tributary by an upland feature, such as a berm or dike.
- **Adjacent:** Adjacent as used in "Adjacent to traditional navigable water," is defined in USACE and EPA regulations as "bordering, contiguous, or neighboring." Wetlands separated from other waters of the U.S. by man-made dikes or barriers, natural river berms, beach dunes and the like are 'adjacent wetlands. A wetland "Abuts" a tributary if it is not separated from the tributary by uplands, a berm, dike, or similar feature.

  While all wetlands that meet the agencies' definitions are considered adjacent wetlands, only those adjacent wetlands that have a continuous surface connection because they directly abut the tributary (e.g., they are not separated by uplands, a berm, dike, or similar feature) are considered jurisdictional under the plurality standard. (CWA Jurisdiction Following Rapanos v US and Carabell v US 12-02-08).

  The regulations define "adjacent" as follows: "[t]he term adjacent means bordering, contiguous, or neighboring. Wetlands separated from other waters of the United States by man-made dikes or barriers, natural river berms, beach dunes and the like are 'adjacent wetlands.'" Under this definition, a wetland does not need to meet all criteria to be considered adjacent. The agencies consider wetlands to be bordering, contiguous, or neighboring, and therefore "adjacent" if at least one of following three criteria is satisfied:

  (1) There is an unbroken surface or shallow sub-surface hydrologic connection between the wetland and jurisdictional waters; or

  (2) The wetlands are physically separated from jurisdictional waters by "manmade dikes or barriers, natural river berms, beach dunes, and the like;" or,

  (3) Where a wetland's physical proximity to a jurisdictional water is reasonably close, that wetland is "neighboring" and thus adjacent. For example, wetlands located within the riparian area or floodplain of a jurisdictional water will generally be considered neighboring, and thus adjacent. One test for whether a wetland is sufficiently proximate to be considered "neighboring" is whether there is a demonstrable ecological interconnection between the wetland and the jurisdictional waterbody. For example, if resident aquatic species (e.g., amphibians, reptiles, fish, mammals, or waterfowl) rely on both the wetland and the jurisdictional waterbody for all or part of their life cycles (e.g., nesting, rearing, feeding, etc.), that may demonstrate that the wetland is neighboring and thus adjacent. The agencies recognize that as the distance between the wetland and jurisdictional water increases, the potential ecological interconnection between the waters is likely to decrease.

  The agencies will also continue to assert jurisdiction over wetlands "adjacent" to traditional navigable waters as defined in the agencies' regulations. Under EPA and Corps regulations and as used in this guidance, "adjacent" means "bordering, contiguous, or neighboring." Finding a continuous surface connection is not required to establish adjacency under this definition. The Rapanos decision does not affect the scope of jurisdiction over wetlands that are adjacent to traditional navigable waters. The agencies will assert jurisdiction over those adjacent wetlands that have a continuous surface connection with a relatively permanent, non-navigable tributary, without the legal obligation to make a significant nexus finding.

- **Atypical situation (significantly disturbed):** In an atypical (significantly disturbed) situation, recent human activities or natural events have created conditions where positive indicators for hydrophytic vegetation, hydric soil, or wetland hydrology are not present or observable.
- **Bar:** An elongated landform generated by waves and currents, usually running parallel to the shore, composed predominantly of unconsolidated sand, gravel, stones, cobbles, or rubble and with water on two sides.
- **Beach:** A sloping landform on the shore of larger water bodies, generated by waves and currents and extending from the water to a distinct break in landform or substrate type (e .g. a fore dune, cliff, or bank).
- **Boulder:** Rock fragments larger than 60 .4 cm (24 inches) in diameter.
- **Channel:** "An open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water" (Langbein and Iseri 1960:5).
- **Channel bank:** The sloping land bordering a channel. The bank has steeper slope than the bottom of the channel and is usually steeper than the land surrounding the channel.
- **Cobbles:** Rock fragments 7.6 cm (3 inches) to 25 .4 cm (10 inches) in diameter.
- **Debris flow**: A moving mass of rock fragments, soil, and mud where more than 50% of the particles are larger than sand-sized.
- **Desert pavement**: Tightly interlocking gravel at the surface formed after years of surface exposure in the absence of active streamflow over the surface.
- **Desert varnish**: A thin, dark, shiny film, composed of iron oxide with traces of manganese oxide and silica, formed on the surface of pebbles, boulders, and rock outcrops in desert regions after long exposure.
- **Divide**: High ground that forms the boundary of a watershed.
- **Drift:** Organic debris oriented to flow direction(s) (larger than small twigs).
- **Effective discharge:** Discharge that is capable of carrying a large proportion of sediment over time.
- **Emergent hydrophytes:** Erect, rooted, herbaceous angiosperms that may be temporarily to permanently flooded at the base but do not tolerate prolonged inundation of the entire plant; e.g., bulrushes (*Scirpus spp*.), salt marsh cord grass.
- **Emergent mosses:** Mosses occurring in wetlands, but generally not covered by water.
- **Ephemeral stream:** An ephemeral stream has flowing water only during and for a short duration after, precipitation events in a typical year. Ephemeral streambeds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.
- **Eutrophic lake:** A lake that has a high concentration of plant nutrients such as nitrogen and phosphorus.
- **Facultative wetland (FACW):** Wetland indicator category; species usually occurs in wetlands (estimated probability 67–99%) but occasionally found in non-wetlands.
- **Flat:** A level landform composed of unconsolidated sediments usually mud or sand. Flats may be irregularly shaped or elongate and continuous with the shore, whereas bars are generally elongate, parallel to the shore, and separated from the shore by water.
- **Floating plant:** A non-anchored plant that floats freely in the water or on the surface; e.g., water hyacinth (*Eichhornia crassipes*) or common duckweed (*Lemna minor*).
- **Floating-leaved plant:** A rooted, herbaceous hydrophyte with some leaves floating on the water surface; e.g., white water lily (*Nymphaea odorata*), floating-leaved pondweed (*Potamogeton natans*). Plants such as yellow water lily (*Nuphar luteum*) which sometimes has

leaves raised above the surface are considered floating leaved plants or emergents, depending on their growth habit at a particular site.

- **Freshwater Emergent Wetland:** Fresh emergent wetlands are characterized by erect, rooted herbaceous hydrophytes and are flooded frequently enough that the roots of the plants flourish in an anaerobic environment. They are most common on gently rolling topography yet also occur in depressions at the edges of rivers and lakes. Supportive soils tend to contain high amounts of silt and clay with coarser sediments and organic matter intermixed. Characteristic plant species include cattails (Typha sp.) and rushes (Scirpus sp.).
- **Gravel:** A mixture composed primarily of rock fragments 2mm (0 .08 inch) to 7.6 cm (3 inches) in diameter. Usually contains much sand.
- **Growing season:** The frost-free period of the year (see U.S. Department of Interior, National Atlas 1970:110-111 for generalized regional delineation).
- **Herbaceous:** With the characteristics of an herb; a plant with no persistent woody stem above ground.
- **Hydric soil:** Soil is hydric that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic (oxygen-depleted) conditions in its upper part (i.e., within the shallow rooting zone of herbaceous plants).
- **Hydrophyte**, **hydrophytic:** Any plant growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content.
- **Hyperconcentrated flow**: Suspension flow with large suspended sediment concentrations (i.e., greater than 1–3%).
- **Intermittent stream:** An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.
- **Jurisdictional Wetland:** Sites that meet the definition of wetland provided below and that fall under COE regulations pursuant to Section 404 of the CWA are considered jurisdictional wetlands.
- **Lacustrine:** The Lacustrine System includes wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% areal coverage; and (3) total area exceeds 8 ha (20 acres). Similar wetland and deepwater habitats totaling less than 8 ha are also included in the Lacustrine System if an active wave-formed or bedrock shoreline feature makes up all or part of the boundary, or if the water depth in the deepest part of the basin exceeds 2 m (6.6 feet) at low water. Lacustrine waters may be tidal or non-tidal, but ocean-derived salinity is always less than 0.5 parts per thousand.
- **Litter:** Organic debris oriented to flow direction(s) (small twigs and leaves).
- **Macrophytic algae:** Algal plants large enough either as individuals or communities to be readily visible without the aid of optical magnification.
- **Man-induced wetlands:** A man-induced wetland is an area that has developed at least some characteristics of naturally occurring wetlands due to either intentional or incidental human activities.
- **Mesophyte, mesophytic:** Any plant growing where moisture and aeration conditions lie between extremes. (Plants typically found in habitats with average moisture conditions, not usually dry or wet.)
- **Non-persistent emergent:** Emergent hydrophytes whose leaves and stems break down at the end of the growing season so that most above-ground portions of the plants are easily

transported by currents, waves, or ice. The breakdown may result from normal decay or the physical force of strong waves or ice. At certain seasons of the year there are no visible traces of the plants above the surface of the water; e.g., wild rice (*Zizania aquatica*), arrow arum (*Peltandra virginica*).

- **Non-Relatively Permanent Water:** A non-relatively permanent water (NRPW) is defined as a tributary that is not a TNW and that typically flows for periods for less than 3 months. NRPWs are jurisdictional when the have a documented significant nexus to TNWs. All NRPWs must also contain appropriate morphology of bed, bank and scour and be clearly connected to a TNW.
- **Normal circumstances:** This term refers to the soil and hydrologic conditions that are normally present, without regard to whether the vegetation has been removed.
- **Obligate hydrophytes:** Species that are found only in wetlands e.g., cattail (*Typha latifolia*) as opposed to ubiquitous species that grow either in wetland or on upland-e .g., red maple (*Acer rubrum*).
- **Obligate wetland (OBL):** Wetland indicator category; species occurs almost always (estimated probability 99%) under natural conditions in wetlands.
- **Other Waters of the United States:** Other waters of the United States are seasonal or perennial water bodies, including lakes, stream channels, drainages, ponds, and other surface water features, that exhibit an ordinary high-water mark but lack positive indicators for one or more of the three wetland parameters (hydrophytic vegetation, hydric soil, and wetland hydrology) (33 CFR 328.4).
- **Palustrine:** the Palustrine System includes all non-tidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 parts per thousand. It also includes wetlands lacking such vegetation, but with all of the following four characteristics: (1) area less than 8 ha (20 acres); (2) active wave-formed or bedrock shoreline features lacking; (3) water depth in the deepest part of basin less than 2 m (6.6 feet) at low water; and (4) salinity due to ocean-derived salts is less than 0.5 parts per thousand.
- **Perennial stream:** A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.
- **Persistent emergent:** Emergent hydrophytes that normally remain standing at least until the beginning of the next growing season; e.g. ., cattails (*Typha spp*.) or bulrushes (*Scirpus spp.*).
- **Pioneer species:** A species that colonizes a previously uncolonized area.
- **Ponded:** Ponding is a condition in which free water covers the soil surface (e.g., in a closed depression) and is removed only by percolation, evaporation, or transpiration.
- **Problem area**: Problem areas are those where one or more wetland parameters may be lacking because of normal seasonal or annual variations in environmental conditions that result from causes other than human activities or catastrophic natural events**.**
- **Rating curve:** A curve that illustrates the relationship between depth (stage) and the amount of flow (discharge) in a channel.
- **Reach**: A segment of a stream channel.
- **Ruderals:** Disturbance-adapted herbaceous plant.
- **Scour:** Soil and debris movement.
- **Sheetflood:** Sheet of unconfined floodwater moving down a slope; a relatively low-frequency, high-magnitude event.

- **Sheetflow:** Overland flow occurring in a continuous sheet; a relatively high-frequency, low-magnitude event.
- **Shift-adjusted rating curve**: A curve that reflects changes (shifts) in the rating for a gage. Ratings may change due to erosion or deposition within the streambed or growth of riparian vegetation.
- **Shrub:** A woody plant which at maturity is usually less than 6 m(20 feet) tall and generally exhibits several erect, spreading, or prostrate stems and has a bushy appearance ; e.g., speckled alder (*Alnus rugosa*) or buttonbush (*Cephalanthus occidentalis*).
- **Stream power**: The rate of doing work, or a measure of the energy available for moving rock, sediment, or woody or other debris in a stream channel, as determined by discharge, water surface slope, and the specific weight of water.
- **Succession:** Changes in the composition or structure of an ecological community.
- **Stone:** Rock fragments larger than 25 .4 cm (10 inches) but less than 60 .4 cm (24 inches).
- **Submergent plant:** Avascular or nonvascular hydrophyte, either rooted or non-rooted, which lies entirely beneath the water surface, except for flowering parts in some species; e.g., wild celery (*Vallisneria americana*) or the stoneworts (*Chara spp*.).
- **Traditional Navigable Waters (TNWs):** "[a]ll waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide." These waters are referred to in this guidance as traditional navigable waters. The traditional navigable waters include all of the "navigable waters of the United States," as defined in 33 C.F.R. Part 329 and by numerous decisions of the federal courts, plus all other waters that are navigable-in-fact (for example, the Great Salt Lake, UT, and Lake Minnetonka, MN). Thus, the traditional navigable waters include, but are not limited to, the "navigable waters of the United States" within the meaning of Section 10 of the Rivers and Harbors Act of 1899 (also known as "Section 10 waters").
- **Transmission loss:** Loss of discharge due to infiltration of flow into the channel bed and banks.
- **Tree:** A woody plant which at maturity is usually 6 m (20 feet) or more in height and generally has a single trunk, unbranched for 1 m or more above the ground, and a more or less definite crown; e.g., red maple (*Acer rubrum*), northern white cedar (*Thuja occidentalis*).
- **Wash:** Broad gravelly dry bed of an intermittent stream.
- **Water table:** The upper surface of a zone of saturation. No water table exists where that surface is formed by an impermeable body (Langbein and Iseri 1960:21).
- **Waters of the United States**: This is the encompassing term for areas under federal jurisdiction pursuant to Section 404 of the CWA. Waters of the United States are divided into "wetlands" and "other waters of the United States".
- **Watershed (drainage basin)**: An area of land that drains to a single outlet and is separated from other watersheds by a divide.
- **Wetland**: Wetlands are defined as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3 [b], 40 CFR 230.3). To be considered under federal jurisdiction, a wetland must support positive indicators for hydrophytic vegetation, hydric soil, and wetland hydrology.
- **Woody plant:** A seed plant (gymnosperm or angiosperm) that develops persistent, hard, fibrous tissues, basically xylem; e.g., trees and shrubs.
- **Xeric:** Relating or adapted to an extremely dry habitat

References

Cheatham, N.H., and J.R. Haller. 1975. An annotated list of California habitat types. Univ. of California Natural Land and Water Reserve System, unpubl. manuscript.

Cowardin, Lewis M., Virginia Carter, Francis C. Golet and Edward T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington D.C.

Curtis, Katherine E., Robert W. Lichvar, Lindsey E. Dixon. 2011. Ordinary High Flows and the Stage-Discharge Relationship in the Arid West Region (Technical Report). U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH

Environmental Laboratory 1987. U.S. Army Corps of Engineers wetlands delineation manual. (Technical Report Y-87-1). U.S. Army Waterways Experiment Station. Vicksburg, MS.

Lichvar, R.W., and J.S. Wakeley, ed. 2004. Review of Ordinary High Water Mark indicators for delineating arid streams in the southwestern United States. ERDC/CRREL TR-04-1. Hanover, NH: U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory. (http://www.crrel.usace.army.mil/techpub/CRREL _Reports/reports/TR04-21.pdf).

Lichvar, R.W., D. Finnegan, M. Ericsson, and W. Ochs. 2006. Distribution of Ordinary High Water Mark (OHWM) indicators and their reliability in identifying the limits of "Waters of the United States" in arid southwestern channels. ERDC/CRREL TR-06-5. Hanover, NH: U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory. (http://www.crrel.usace.army.mil/techpub/CRREL_Reports/ reports/TR06-5.pdf).

Lichvar, R.W., D.L. Banks, N.C. Melvin, and W.N. Kirchner. 2016. State of California 2016 Wetland Plant List: The National Wetland Plant List: 2016 update of wetland ratings. Phytoneuron 2016-30: 1-17. U.S. Army Corps of Engineers. Cold Regions Research and Engineering Laboratory.

Mayer, K.E. and W.F. Laudenslayer. 1988. A Guide to Wildlife Habitats of California. California Department of Forestry and Fire Protection. Sacramento, CA.

National Oceanic and Atmospheric Administration (NOAA). 2016. National Integrated Drought Information System. U.S. Drought Monitor. Accessed online through the U.S. Drought Portal (www.drought.gov).

Natural Resource Conservation Service (NRCS). 2008. Soil Quality Indicators: Infiltration. June 2008. USDA Natural Resources Conservation Service. Accessed through the NRCS website (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/health/assessment/?cid=stelprdb1237387).

Soil Survey Staff. 2010. Keys to Soil Taxonomy, 11th ed. USDA-Natural Resources Conservation Service, Washington, DC.

U.S. Army Corps of Engineers (Corps). 2008. Regional supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region. J.S. Wakeley, R.W. Lichvar, and C.V. Noble, ed. ERDC/EL TR-06-16. Vicksburg, MS: U.S. Army Engineer Research and Development Center, Environmental Laboratory. U.S. Army Corps of Engineers, South Pacific Division. 2001. Final summary report: Guidelines for jurisdictional determinations for water of the United States in the arid Southwest. San Francisco, CA: U.S. Army Corps of Engineers, South Pacific Division. (http://www.spl.usace.army.mil/regulatory/lad.htm).

U.S. Army Corps of Engineers (Corps). 2014. SPK-2014-00005 Guidance on Delineations in Drought Conditions. Public Notice. February 5, 2014. Sacramento District, U.S. Army Corps of Engineers, Sacramento, CA.

U.S. Climate Data 2017. Local Climate Data 2017 Summary for Nice, CA. Online access.

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://soils.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://soils.usda.gov/ 21

Wetland Training Institute. 1995. Field guide for wetland delineation: 1987 Corps of Engineers manual. (WTI 95-3). Poolsville, MD.

Appendix A: Ordinary High Water Mark Data Sheets

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Clover Creek at First Street
Project Number: Bridge Replacement
Stream: Clover Creek
Investigator(s): M. Murphy
Date: April 2 2017 **Time:** 10:00am
Town: Upper Lake **State:** CA
Photo begin file#: **Photo end file#:**

Y ☒ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☒ Is the site significantly disturbed?

Location Details: On First Street in Upper Lake, Lake County

Projection: **Datum:**
Coordinates: 39.164267, -122.908375

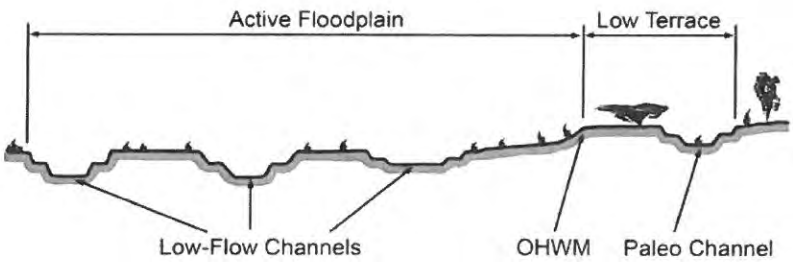
Potential anthropogenic influences on the channel system:
The Lake County Watershed Protection District operates + maintains a system of ~~11~~ 14.2 miles of levees, a pump station and a diversion channel to divert Clover Creek overflow around the town of Upper Lake. Therefore, Clover Creek no longer experiences high flow events and the entire drainage is choked w/ Himalayan blackberry.

Brief site description:
The Creek is lined with houses on the lower terrace and Himalayan blackberry on its banks. In the project area, the low flow channel upstream of the 1st Street bridge is completely covered w/ him. blackberry. The bed of the creek is covered w/ algae + OBL wetland plants b/c flows are kept at a constant nearly year round

Checklist of resources (if available):

- ☒ Aerial photography
  Dates:
- ☒ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☒ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☒ Global positioning system (GPS)
- ☐ Other studies
- ☐ Stream gage data
  Gage number:
  Period of record:
- ☐ History of recent effective discharges
- ☐ Results of flood frequency analysis
- ☐ Most recent shift-adjusted rating
- ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

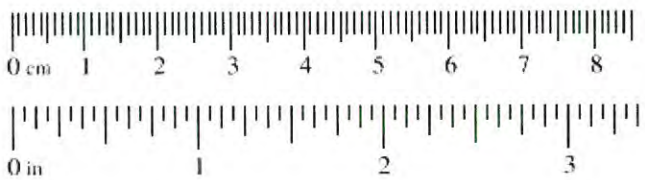


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☐ Mapping on aerial photograph
   - ☐ Digitized on computer
   - ☒ GPS
   - ☐ Other:

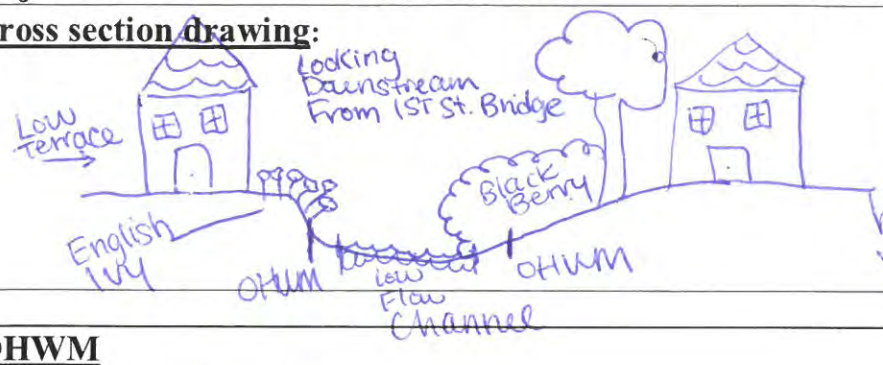
Wentworth Size Classes

Inches (in)	Millimeters (mm)	Wentworth size class	
10.08	256	Boulder	
		Cobble	Gravel
2.56	64	Pebble	
0.157	4	Granule	
0.079	2.00	Very coarse sand	
0.039	1.00	Coarse sand	
0.020	0.50	Medium sand	Sand
1/2 0.0098	0.25	Fine sand	
1/4 0.005	0.125	Very fine sand	
1/8 0.0025	0.0625	Coarse silt	
1/16 0.0012	0.031	Medium silt	
1/32 0.00061	0.0156	Fine silt	Silt
1/64 0.00031	0.0078	Very fine silt	
1/128 0.00015	0.0039	Clay	Mud



Project ID: **Cross section ID:** **Date:** **Time:**

Cross section drawing:



Low Flow Channel Heavily Vegetated w/ Algae + OBL Wetland Plants. No evidence of high flows in recent years.

OHWM

GPS point: A-A

Indicators:

- ☐ Change in average sediment texture
- ☐ Change in vegetation species
- ☒ Change in vegetation cover
- ☒ Break in bank slope
- ☐ Other: _____
- ☐ Other: _____

Comments:

Controlled flows have lead to blackberry encroaching into low flow channel.

Floodplain unit: ☒ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: Very Fine Silt

Total veg cover: 100 % Tree: ____% Shrub: ____% Herb: 100 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☒ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☒ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☒ Other: Water Flowing 4" Deep
- ☐ Other: _____
- ☐ Other: _____

Comments:

Algae, Water Grass

Project ID: **Cross section ID:** **Date:** **Time:**

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: 100 % Tree: ____ % Shrub: 100 % Herb: ____ %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☒ Drift and/or debris
- ☒ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☒ Other: Bare Ground below OHWM
- ☐ Other: _____
- ☐ Other: _____

Comments:

Active Floodplain nearly non-existent due to the constant control of flows upstream. No evidence of Clover Creek experiencing high flows in the last couple of years.

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: ____ % Tree: 50 % Shrub: 10 % Herb: 50 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☒ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☒ Surface relief
- ☒ Other: Houses Present
- ☐ Other: _____
- ☐ Other: _____

Comments:

Mature trees, english ivy, + houses present on low terrace.

Appendix B: Soils Map and Soil Series Descriptions

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Lake County, California

Clover Creek Bridge at First Street

June 5, 2017

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:663 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 30 60 120 180

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lake County, California
Survey Area Data: Version 13, Sep 12, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 12, 2010—Jun 15, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Lake County, California (CA033)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
158	Lupoyoma silt loam, protected	0.6	100.0%
Totals for Area of Interest		**0.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lake County, California

158—Lupoyoma silt loam, protected

Map Unit Setting

National map unit symbol: hf6k
Elevation: 800 to 1,450 feet
Mean annual precipitation: 25 to 40 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 150 to 205 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Lupoyoma and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lupoyoma

Setting

Landform: Flood plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 31 inches: silt loam
H2 - 31 to 84 inches: stratified very fine sandy loam to silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water storage in profile: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Xerofluvents

Percent of map unit: 3 percent
Landform: Fans
Hydric soil rating: Yes

Cole, variant

Percent of map unit: 3 percent
Hydric soil rating: No

Kelsey

Percent of map unit: 3 percent
Hydric soil rating: No

Maywood, variant

Percent of map unit: 3 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 3 percent
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

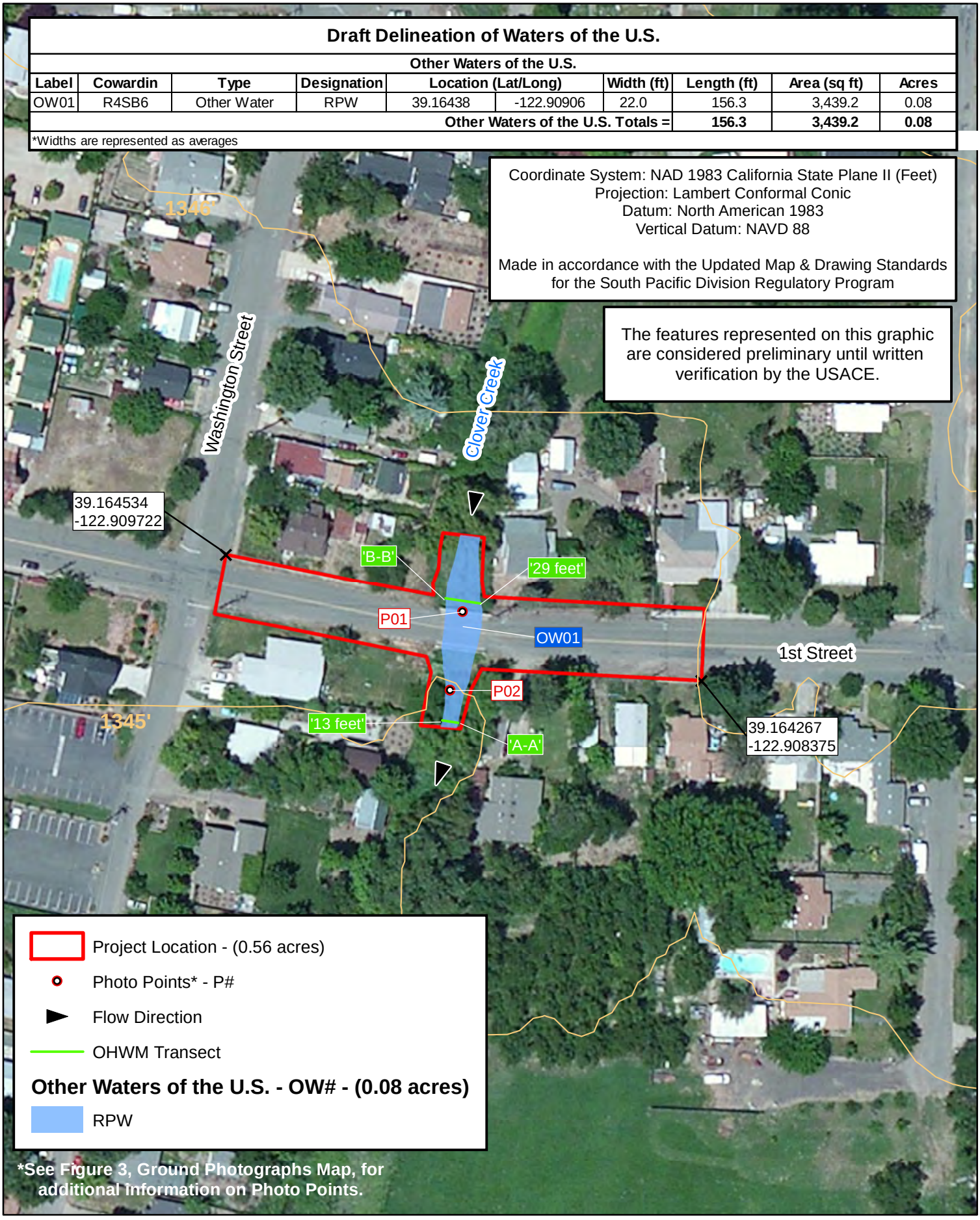
Exhibit A – Draft Delineation of Waters of the U.S. Map

Draft Delineation of Waters of the U.S.

Other Waters of the U.S.

Label	Cowardin	Type	Designation	Location (Lat/Long)		Width (ft)	Length (ft)	Area (sq ft)	Acres
OW01	R4SB6	Other Water	RPW	39.16438	-122.90906	22.0	156.3	3,439.2	0.08
					Other Waters of the U.S. Totals =		**156.3**	**3,439.2**	**0.08**

*Widths are represented as averages



NORTH

1:1,200 — 1 inch = 100 feet

0 — 50 — 100 Feet

Data Sources: ESRI, USDA NAIP (5/31/2016), USDA NED10m, Lake County

Clover Creek Bridge at First Street
Draft Delineation of Waters of the U.S.
Exhibit A

Delineation by: M. Murphy on April 12, 2017
Map by: C. Davis
GE: #16-134b

gallaway ENTERPRISES

Map Date: 05/03/17