

# Vegetation Mapping of the McKenzie Preserve at Table Mountain and Environs, Southern Sierra Nevada Foothills, California



By

**Danielle Roach, Suzanne Harmon, and Julie Evens**

Of the



**2707 K Street, Suite 1  
Sacramento CA, 95816**

**2011**



## **ACKNOWLEDGEMENTS**

### ***To Those Who Generously Provided Support and Guidance:***

Many groups and individuals assisted us in completing this report and the supporting vegetation map/data. First, we expressly thank an anonymous donor who provided financial support in 2010 for this project's fieldwork and mapping in the southern foothills of the Sierra Nevada. We also are thankful of the generous support from California Department of Fish and Game (DFG) in funding 2008 field survey work in the region. We are indebted to the following additional staff and volunteers of the California Native Plant Society who provided us with field surveying, mission planning, technical GIS, and other input to accomplish this project: Jennifer Buck, Andra Forney, Andrew Georgeades, Brett Hall, Betsy Harbert, Kate Huxster, Theresa Johnson, Claire Muerdter, Eric Peterson, Stu Richardson, Lisa Stelzner, Aaron Wentzel, and in particular, Kendra Sikes.

### ***To Those Who Provided Land Access:***

- Joanna Clines, Forest Botanist, USDA Forest Service, Sierra National Forest
- Ellen Cypher, Botanist, Department of Fish and Game, Region 4
- Mark Deleon, Supervising Ranger, Millerton Lake State Recreation Area
- Bridget Fithian, Mariposa Program Manager, Sierra Foothill Conservancy
- Coke Hallowell, Private landowner, San Joaquin River Parkway & Conservation Trust
- Wayne Harrison, California State Parks, Central Valley District
- Chris Kapheim, General Manager, Alta Irrigation District
- Denis Kearns, Botanist, Bureau of Land Management
- Melinda Marks, Executive Officer, San Joaquin River Conservancy
- Nathan McLachlin, Scientific Aid, Department of Fish and Game, Region 4
- Eddie and Gail McMurtry, private landowners
- Chuck Peck, Founder, Sierra Foothill Conservancy
- Kathryn Purcell, Research Wildlife Ecologist, San Joaquin Experimental Range, USDA Forest Service
- Carrie Richardson, Senior Ranger, U.S. Army Corps of Engineers - Hensley Lake
- Candyce Rogers, Executive Secretary, San Joaquin River Conservancy
- Tracy Rowland, Bureau of Land Management - San Joaquin River Gorge
- Larry Saslaw, Wildlife Biologist, Bureau of Land Management
- Bud Setencich, Area Supervisor, Fresno County Parks
- Diana Singleton, Private landowner
- Warren Shaw, Private landowner
- Krista Tomlinson, Ecological Reserve Biologist, Department of Fish and Game. Region 4 - Big Table Mountain
- Bart and Cindy Topping, owners Topping Ranch
- Jeannette Tuitele-Lewis, Executive Director, Sierra Foothill Conservancy

This page has been intentionally left blank.

## TABLE OF CONTENTS

Section	Page
<b>I. INTRODUCTION.....</b>	<b>1</b>
<b>II. OBJECTIVES .....</b>	<b>1</b>
<b>III. METHODS.....</b>	<b>2</b>
Study area.....	2
Field Sampling and Classification .....	2
Figure 1. Pilot mapping area and survey sites in the southern Sierra Nevada foothills. 3 Vegetation Mapping and Field Verification Methods .....	4
<b>IV. RESULTS .....</b>	<b>6</b>
Figure 2. Locations of vegetation stand/plot surveys and reconnaissance surveys in the pilot mapping area .....	8
Figure 3. Vegetation map illustrating the map units in the McKenzie Table Mountain/Millerton Lake area.....	9
Table 1. Vegetation classification crosswalk between the NVC floristic/mapping units and the DFG Wildlife Habitat Relationships (WHR) units for mapped types.....	11
Table 2. Total acreage and number of polygons mapped and visited per vegetation map unit.....	13
<b>V. REFERENCES .....</b>	<b>15</b>
<b>VI. APPENDICES.....</b>	<b>A-1</b>
Appendix A. CNPS Field Sampling Forms .....	A-1
Appendix B. Key to Vegetation Mapping Classification of the Central and Southern Sierra Nevada Foothills Region.....	B-1
Appendix C. Map Metadata and Mapping Rules for the Polygon Attributes .....	C-1
Appendix D. Vegetation Mapping Classification for the Pilot Mapping Area in the Southern Sierra Nevada Foothills :.....	D-1
Appendix E. Vegetation Map Unit Descriptions with GIS Screenshots and Ground Photos.....	E-1
Appendix F. Comprehensive Set of Vegetation Map Unit Screenshots.....	F-1

This page has been intentionally left blank.

## **I. INTRODUCTION**

The California Native Plant Society (CNPS) received a private donation to produce a fine-scale, spatially and floristically accurate vegetation map with field sampling in the southern Sierra Nevada Foothills. This included a focus mapping area of approximately 11,640 acres near Millerton Lake. The area is mainly in the Millerton Lake East quadrangle and includes 2,990 acres of the McKenzie Preserve at Table Mountain and 754 acres of Big Table Mountain. These protected areas contain vernal pools on basalt lava-flow table mountains, which provide habitat for rare plants and crustaceans.

Vegetation surveys from 2008 to 2010 resulted in a classification of 47 native vegetation alliances and semi-natural stands across a larger region of around 300,000 acres, and this contextual information was applied to a detailed vegetation map across the focused mapping area. The mapped lands are managed by the Bureau of Land Management, Bureau of Reclamation, Department of Fish and Game (DFG), and Department of Parks and Recreation for Millerton State Recreation Area, as well as private land owners and the Sierra Foothills Conservancy. Guidelines for assessing and mapping the plant communities are found in the widely accepted California standards for interpreting vegetation patterns and for initiating local and regional ecological assessments (see *A Manual of California Vegetation*, Sawyer et al. 2009).

## **II. OBJECTIVES**

The primary goal of the project was to create an accurate and detailed baseline vegetation map with supporting field surveys and classification in a focus area of the southern Sierra Nevada Foothills. The fine-scale map will assist in long-term management of many characteristic and sensitive foothill plant communities. In producing a vegetation map and classification of the area, CNPS completed the following objectives: 1) coordinate with land managers to access lands, 2) conduct field surveys to confirm vegetation types, 3) classify and represent vegetation as alliances and land cover types, 4) provide a crosswalk to other classification systems, 5) digitize vegetation/habitat features using 2009 imagery and existing vegetation surveys, 6) field verify the map, 7) construct revisions and complete digitizing, and 8) produce a final report.

### **III. METHODS**

#### ***Study area***

The study area for the focused mapping is approximately 5 km (3 miles) west of the town of Prather and just north of Auberry Road in the southern Sierra Nevada Foothills Ecoregion, California. This area contains a variety of private lands as well as public lands and open-space areas, including the McKenzie Table Mountain Preserve and the eastern portion of Millerton Lake in Fresno and Madera Counties, California. It encompasses the USGS 7.5 minute quarter-quadrangle of Millerton Lake East SW and extends into Millerton Lake West SE and Academy NW quarter-quadrangles in approximately 11,640 acres of area (see Figure 1). In this figure, the Protected Areas refer to lands owned by governments or non-profits that are protected for open space purposes (includes small urban parks as well as National Forest lands), per the California Protected Areas Database (CPAD), which is available at <http://www.calands.org/>.

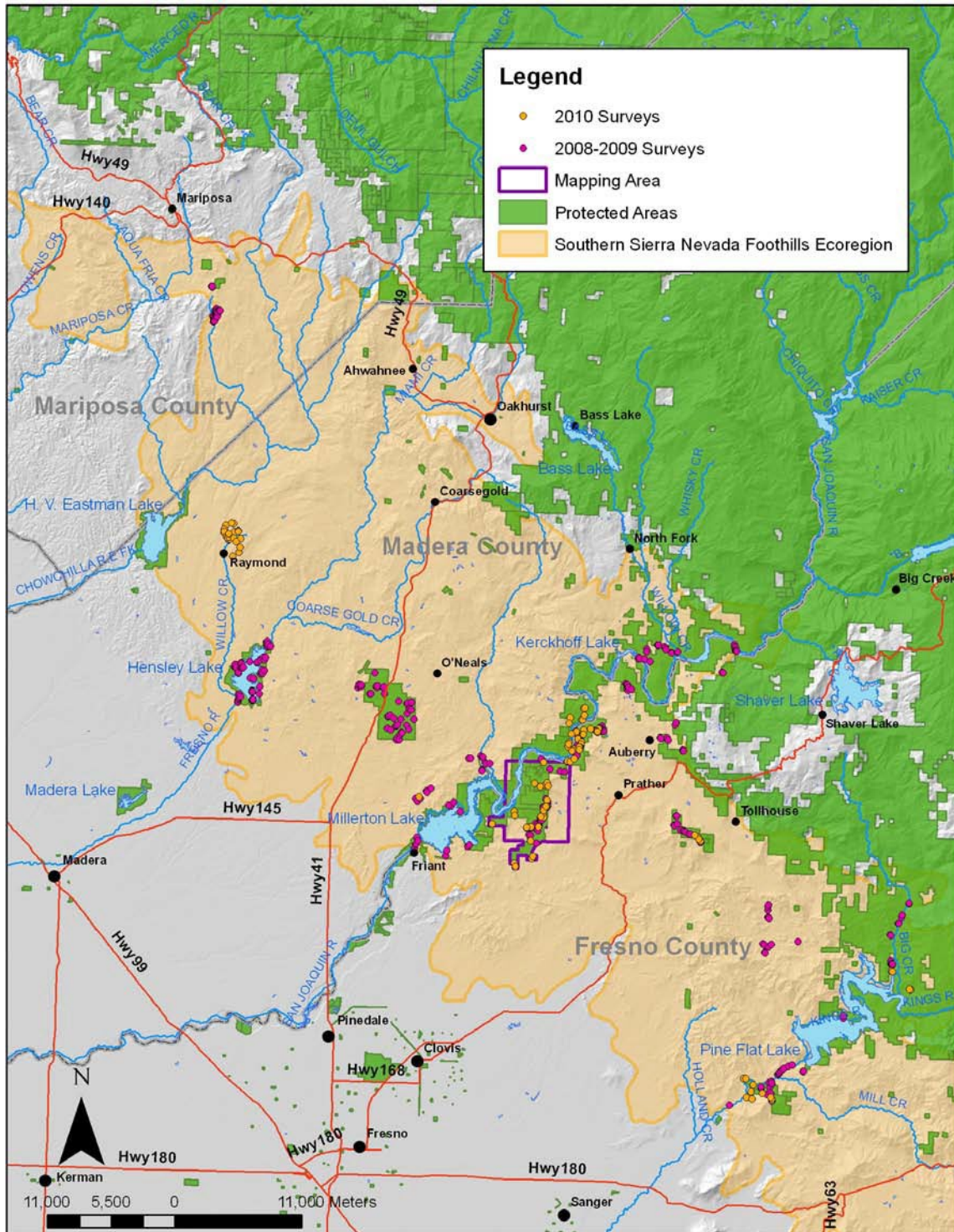
The region contains a variety of habitat types, including several large lava-rock table mountains with numerous vernal pools and associated native annual grasslands. The area also contains rolling hills, valleys, and rock outcrops of open grasslands, oak woodlands and forests, pine woodlands, deciduous riparian woodlands, ceanothus chaparral and lupine scrub. Many seeps, perennial and seasonal watercourses, wetland ponds and reservoir habitats, as well as habitat for valley elderberry (*Sambucus nigra*) also occur in the area.

#### ***Field Sampling and Classification***

The CNPS-DFG protocol for combined vegetation rapid assessment and relevé sampling was used for conducting field surveys in 2008 and 2010. The rapid assessment method is stand-based while the relevé method is plot-based; both methods are used to categorize and map vegetation at a fine-scale. This protocol uses vegetation stands as the basic sampling and mapping unit. A stand is defined as an area of vegetation that has both compositional and structural integrity and represents a relatively homogeneous vegetation type that repeats across the landscape. Stands can be selected on site or using aerial imagery. Once a stand is selected, field forms are completed to record both vegetation and environmental data (see Appendix A), and brief reconnaissance field surveys are also conducted to obtain additional observation points of the repeating vegetation stands.

The goal for sampling was to obtain multiple samples of all vegetation types that were encountered in the field or observed on aerial imagery in the pilot mapping area. Upon collecting data in the pilot area, as well as in the greater southern foothills region, CNPS staff used the vegetation and environmental data to confirm vegetation alliances and higher level group names for all stands sampled. CNPS staff adapted the existing key from the associated vegetation mapping project of the northern Sierra Nevada Foothills (Klein et al. 2007, Menke et al. 2011) for this project. The key was updated to represent those types additionally found in southern Sierra Nevada Foothills(see Appendix B), based on review of the field surveys shown in Figure 1.





**Figure 1.** Pilot mapping area and survey sites in the southern Sierra Nevada foothills

The classification in this report is based upon the U.S. National Vegetation Classification (NVC) standard and *A Manual of California Vegetation* (MCV). The NVC and MCV support the development and use of consistent national and state vegetation classifications that produce uniform statistics about vegetation resources across the nation, based on vegetation data gathered at local, regional or national levels (FGDC 2008, Sawyer et al. 2009). Refinements to the classification have occurred during its application by CNPS, NatureServe, and Department of Fish and Game (DFG), which can be seen using the NatureServe website of <http://www.natureserve.org/explorer> and the DFG website of [http://www.dfg.ca.gov/biogeodata/vegcamp/natural\\_comm\\_list.asp](http://www.dfg.ca.gov/biogeodata/vegcamp/natural_comm_list.asp).

### ***Vegetation Mapping and Field Verification Methods***

The mapping procedures began with pre-map field reconnaissance, and the vegetation classification of alliances and higher level groups was interpreted into a set of vegetation map units that applied to the entire project area. Prior to mapping, the photo- interpreters, who were also skilled field botanists and ecologists, spent two weeks in the field. The primary goals of this reconnaissance included the following:

- Acquire point observations for each vegetation type (map class) and capture variation within each type to later correlate with imagery for establishing photo signatures.
- Acquire ground-based photos and descriptions of the vegetation to correlate with the digital aerial imagery.
- Establish relationships between the vegetation and bio-physical attributes (e.g., vernal pool grasslands correlated with the table mountains).

Using these pre-map reconnaissance points along with other existing field surveys and keys, aerial photo signatures (color-texture-tone combinations that the photo-interpreter views on digital aerial photos) were then correlated to their corresponding vegetation type or plant species as recorded in the field. These correlations between the vegetation units and photo signatures were evaluated and refined to ensure that the map would consistently represent the different vegetation types at a fine-scale resolution. Thus, the vegetation mapping classification and mapping descriptions were based upon the information derived from this reconnaissance as well as the more detailed field data (of plot-based relevés and stand-based rapid assessments) in the central and southern Sierra Nevada foothills.

The vegetation map units were then interpreted across the pilot mapping area using heads-up digitizing and a polygon geodatabase. Heads-up digitizing is a process in Geographic Information Systems (GIS) of interpreting digital aerial photo images on- screen and then manually using a mouse to delineate and digitize vegetation polygons. Custom ArcMap 9.3 tools including the geodatabase were developed by CNPS and DFG for fine-scale vegetation mapping projects throughout the state.

As a general rule, common and widespread vegetation units were delineated down to a minimum mapping unit (MMU) of approximately a ½ hectare (1 acre). Small wetland types and other special features were delineated to approximately ¼ hectare (½ acre). Additional MMU considerations were applied for structural breaks in the overstory and understory, as described in Appendix C mapping rules.

Multiple sets of digital imagery were used in aiding the photo interpretation for delineating and labeling the polygons:

- 1-Meter Natural Color from the National Agricultural Inventory Program (NAIP) – from Summer 2009 and 2005 (1:12,000 spatial accuracy)
- Other Color Aerial Imagery from Digital Globe Image Connect - including Feb. 2007 imagery (0.3-Meter resolution 1:4,000 spatial accuracy) and Dec. 2007 imagery (0.6-Meter resolution 1:6,000 spatial accuracy)

The 1-meter natural color imagery from 2009 was used as base imagery for the mapped polygons. Photo interpreters also had contour layers to help determine the terrain related features when mapping the vegetation. These included slope steepness, position, direction and shape. The following is a list of supplemental data that aided in digitizing the polygons and in making map attribute designations:

- CNPS rapid assessment and relevé data from 2008 and 2010
- CNPS pre-map reconnaissance data from Spring 2010
- CNPS post-map field verification data from Summer 2010
- Hydrological Layer
- Local Roads Layer
- Geologic Layer at 1:750,000 scale
- Administrative and study area boundary layers
- Digital Raster Graphs depicting the USGS 7.5' topographic quads in the study area

Upon producing a draft map of the study area, ambiguous or other indiscernible photo signatures encountered during the photo-interpretation process were flagged for additional field verification. The mapping polygons were transferred to both digital PDA's and hard copy maps showing the polygons in question along with all of the other mapped polygons. In a one-week time period, three field staff attempted to visit as many of the questionable polygons as possible as well as a subset of all vegetation map units to verify their attributes. Information obtained in the field was used by the photo- interpreters and incorporated into a final map product. To ensure the accuracy and completeness of the photo-interpretations and delineations, a comprehensive quality control effort also was conducted.

#### IV. RESULTS

The vegetation sampling from 2008 and 2010 resulted in 375 stand and plot-based surveys in the general region of the central and southern Sierra Nevada foothills, of which 61 surveys were in the pilot mapping area. Additionally, about 185 reconnaissance surveys were recorded within the pilot mapping area as additional observations of the vegetation types before mapping proceeded (see Figure 2). A floristic vegetation and mapping classification was then developed using the National Vegetation Classification (NVC) standard levels of alliances and higher level groups. This classification resulted in 47 native vegetation alliances and semi-natural stands across the general region of around 300,000 acres (see Appendix B and D).

Upon interpreting the data and aerial imagery in the pilot area, the vegetation map resulted in 26 different floristic/mapping units, which were crosswalked to the California Wildlife Habitat Relationships system (see Table 1). These map units are hierarchically arranged by life form (tree, shrub, herbaceous) and by other ecological or land-use characters. All woody vegetation types are described and mapped at the alliance-level, including seven tree alliances and four shrub alliances. However, the herbaceous types are represented by four general groups (or higher level map classes) because the imagery did not afford signature recognition of the various herbaceous alliances. The mapping classification in Appendix D provides a list of the varied herbaceous types, and the descriptions in Appendix E provide photo-interpretative guides for the map units.

As shown in Figure 3 and Table 2, the map units of oak woodlands have the largest aerial coverage (about 7,700 acres) in the mapping area, followed by annual and perennial grasslands and a matrix of grasslands and vernal pool groups (about 2,400 acres). A total number of 1,611 polygons are delineated, and the average polygon size is 3.3 hectares (or 7.2 acres). Of these, 456 (or 28% of the polygons) were visited during pre- or post-mapping, and approximately 5,701 acres (or 49% of the acreage) of the map area was ground-truthed. This included over 365 polygons being visited in post-map field reconnaissance.

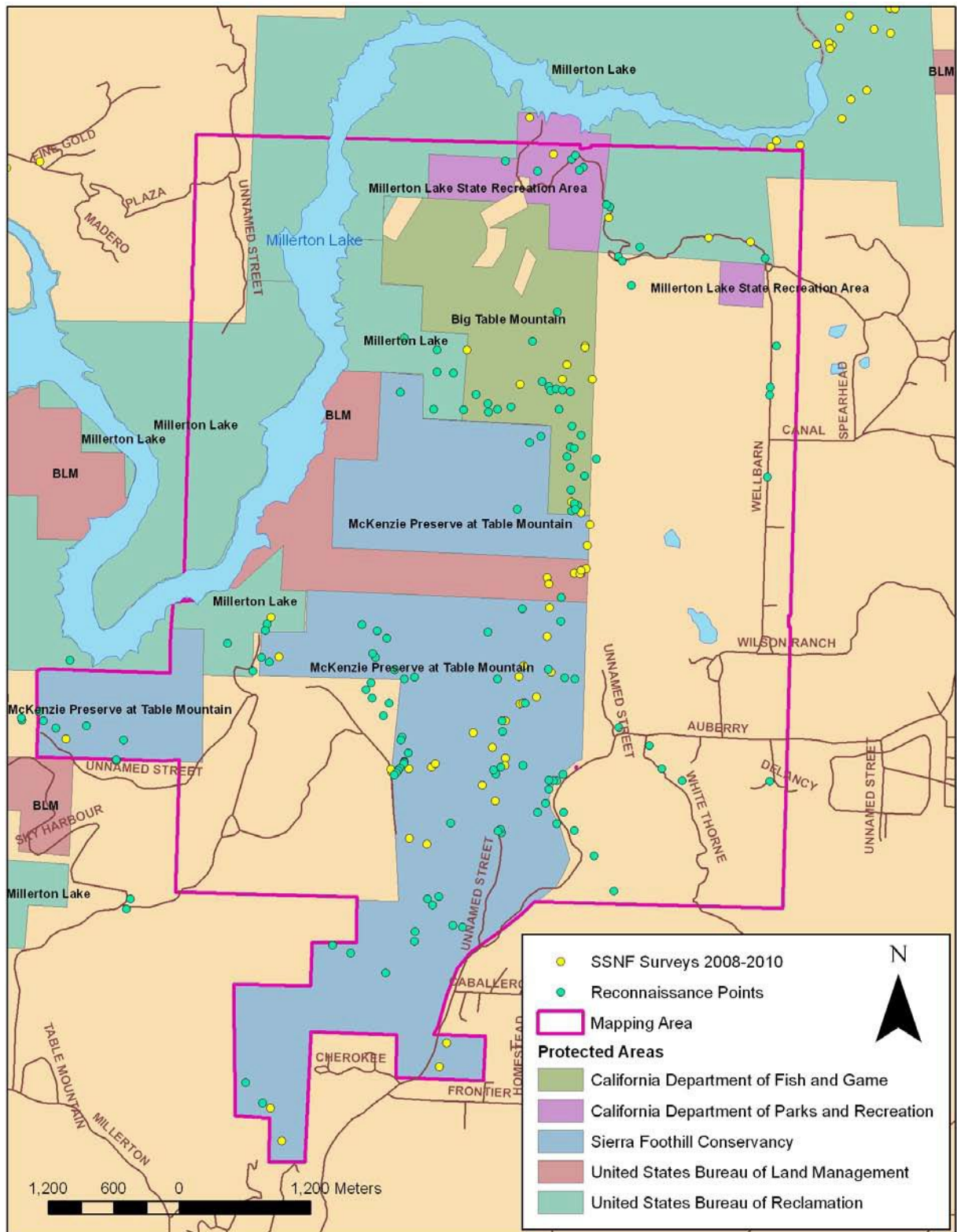
In general, the study area includes more common tree types of Buckeye (*Aesculus californica*), Blue Oak (*Quercus douglasii*), Interior Live Oak (*Q. wislizeni*), and Ghost Pine (*Pinus sabinana*) alliances, mapped in about 67.8% of the area. Less common tree types included riparian forests of Fremont Cottonwood (*Populus fremontii*), Valley Oak (*Q. lobata*), and Red Willow (*Salix laevigata*) alliances (in 0.5% of the area). Shrubland habitats were also less common (in 1.2% of the area), including Wedgeleaf Ceanothus (*Ceanothus cuneatus*) and Silver Bush Lupine (*Lupinus albifrons*) alliances.

The wetland marsh, vernal pool, and pool/upland grassland matrix habitats are important yet not common in the area (in about 7.6% of the area), as compared to the upland and moist herbaceous vegetation (in about 13.6% of the area). Other habitats included water features of Millerton Lake reservoir and small

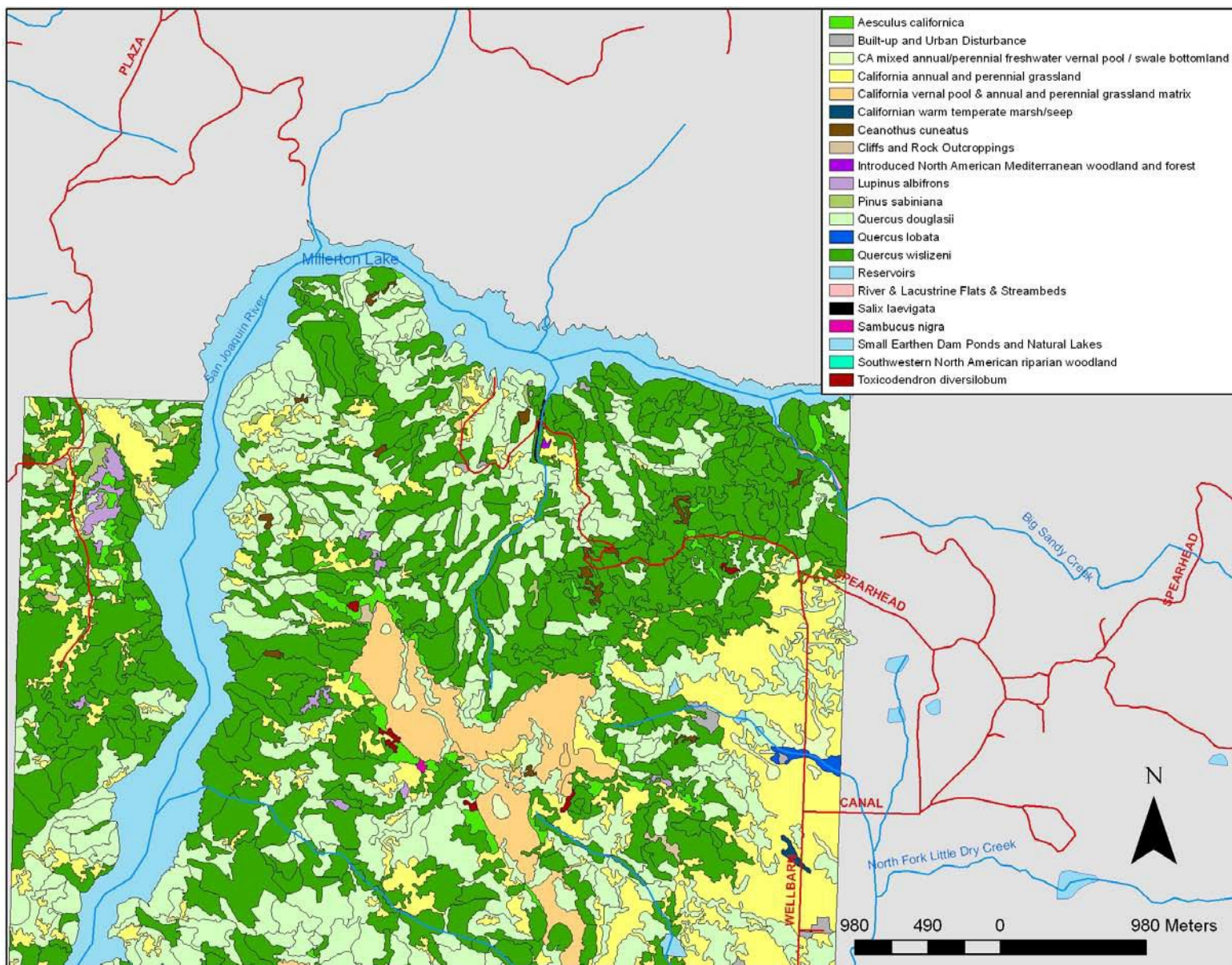
ponds (in about 6.4% of the area).

The resulting vegetation map includes seven tree alliances, four shrub alliances, four general herbaceous groups, and six land-use or land-cover types. This map and field data will serve as baseline information to assess future conservation efforts, adaptively manage resources, assess impacts of climate change, and effect other land-use decisions.



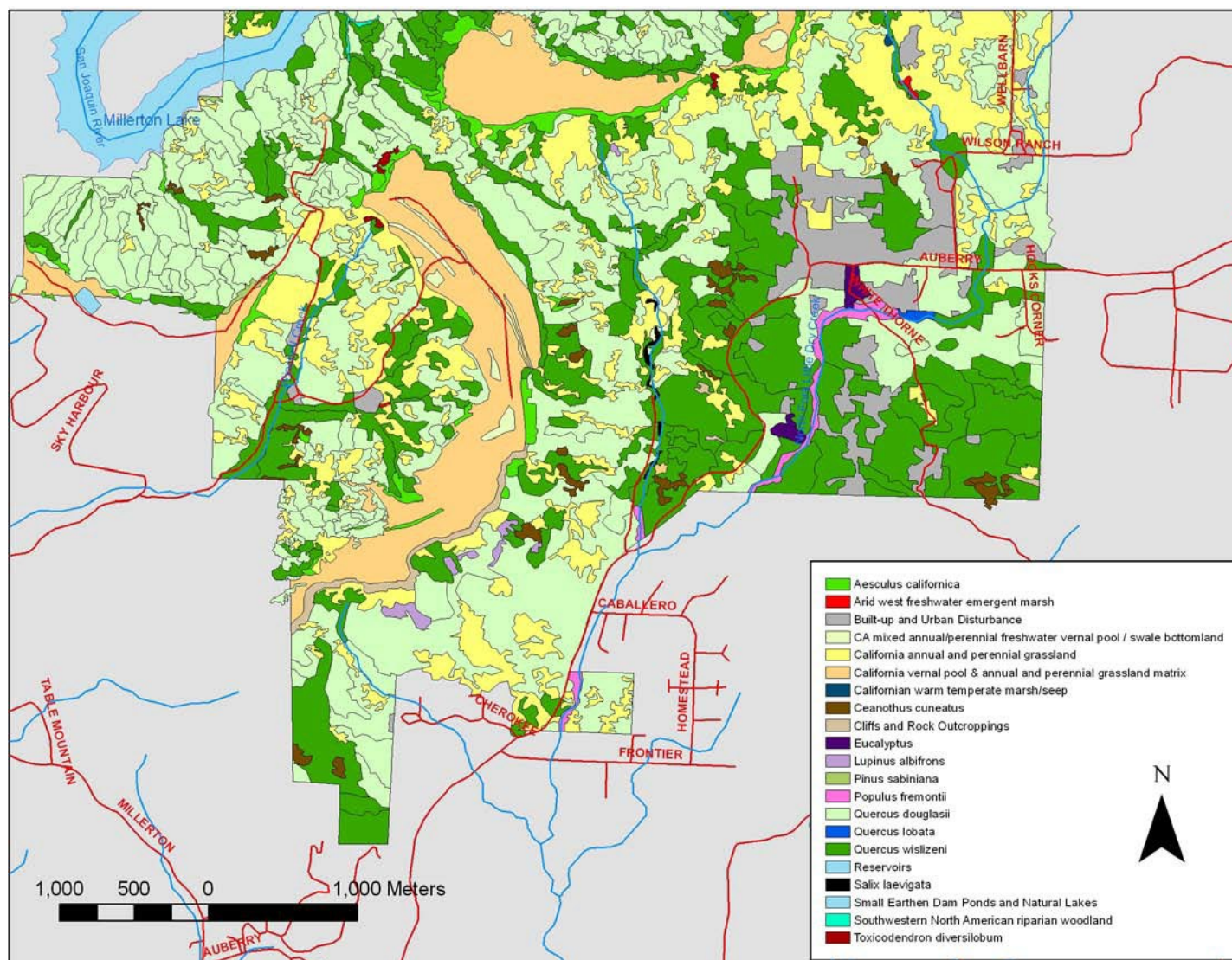


**Figure 2.** Locations of vegetation stand/plot surveys and reconnaissance surveys in the pilot mapping area



**Fig 3A. Northern Portion of the Mapping Area**





**Fig 3B. Southern Portion of the Mapping Area**

**Figure 3.** Vegetation map illustrating the map units in the McKenzie Table Mountain/Millerton Lake area



**Table 1.** Vegetation classification crosswalk between the NVC floristic/mapping units and the DFG Wildlife Habitat Relationships (WHR) units for mapped types

<b>VegCode</b>	<b>Alliance or Other Map Unit</b>	<b>WHR Name (<i>primary</i>)</b>	<b>WHR Name (<i>secondary</i>)</b>
1111	<i>Quercus wislizeni</i> Alliance	Blue Oak Woodland	Blue Oak–Foothill Pine, Valley Foothill Riparian
1210	<i>Pinus sabiniana</i> Alliance	Blue Oak–Foothill Pine	
1310	<i>Aesculus californica</i> Alliance	Blue Oak Woodland	Blue Oak–Foothill Pine
1311	<i>Quercus douglasii</i> Alliance	Blue Oak Woodland	Blue Oak–Foothill Pine
1313	<i>Quercus lobata</i> Alliance	Valley Oak Forest	
3100	SW North American Riparian Woodland Group	Valley Foothill Riparian	
3110	<i>Populus fremontii</i> Alliance	Valley Foothill Riparian	
3111	<i>Salix laevigata</i> Alliance	Valley Foothill Riparian	
4113	<i>Ceanothus cuneatus</i> Alliance	Mixed Chaparral	
4710	<i>Lupinus albifrons</i> Alliance	Mixed Chaparral	
6301	<i>Toxicodendron diversilobum</i> Alliance	Mixed Chaparral	
6302	<i>Sambucus nigra</i> Alliance	Mixed Chaparral	
7100	California Annual & Perennial Grassland Macrogroup	Annual Grassland	
7200	Californian Warm Temperate Marsh/Seep Group	Fresh Emergent Wetland	Wet Meadow
7300	Arid West Freshwater Emergent Marsh Group	Fresh Emergent Wetland	Wet Meadow
7400	Vernal Pool & CA Annual and Perennial Grassland Matrix Mapping Unit	Annual Grassland	Wet Meadow
7600	CA Mixed Annual/Perennial Vernal Pool and Swale Bottomland Group	Annual Grassland	Wet Meadow
9300	Built Up & Urban Disturbance	Urban	

9401	Cliffs & Rock Outcroppings	Barren	
9402	River & Lacustrine Flats & Steambeds	Riverine	Lacustrine
9500	Introduced N.A. Woodland and Forest Group	Urban	
9501	<i>Eucalyptus</i> spp.	Eucalyptus	
9802	Reservoirs	Lacustrine	
9803	Small Earthen Dam Ponds and Natural Lakes	Lacustrine	

**Table 2.** Total acreage and number of polygons mapped and visited per vegetation map unit

<b>VegCode</b>	<b>Name</b>	<b>Acreage Mapped</b>	<b># Polys Mapped</b>	<b>Acres Visited</b>	<b># Polys Visited</b>
1111	<i>Quercus wislizeni</i> Alliance	3,702	526	1,481	152
1210	<i>Pinus sabiniana</i> Alliance	28	17	3	3
1310	<i>Aesculus californica</i> Alliance	175	63	101	22
1311	<i>Quercus douglasii</i> Alliance	3,993	581	1,434	119
1313	<i>Quercus lobata</i> Alliance	12	2	12	2
3100	SW N.A. Riparian Woodland Group	2	1	0	0
3110	<i>Populus fremontii</i> Alliance	32	3	32	3
3111	<i>Salix laevigata</i> Alliance	7	5	6	4
4113	<i>Ceanothus cuneatus</i> Alliance	78	40	32	12
4710	<i>Lupinus albifrons</i> Alliance	45	16	16	6
6301	<i>Toxicodendron diversilobum</i> Alliance	11	8	2	1
6302	<i>Sambucus nigra</i> Alliance	1	1	1	1
7100	CA Annual & Perennial Grassland Macrogroup	1,580	243	955	79
7200	CA Warm Temperate Marsh/Seep Group	4	2	4	2
7300	Arid West Freshwater Emergent Marsh Group	2	2	0	0
6301	<i>Toxicodendron diversilobum</i> Alliance	11	8	2	1
6302	<i>Sambucus nigra</i> Alliance	1	1	1	1
7100	CA Annual & Perennial Grassland Macrogroup	1,580	243	955	79
7200	CA Warm Temperate Marsh/Seep Group	4	2	4	2
7300	Arid West Freshwater Emergent Marsh Group	2	2	0	0

7400	Vernal Pool & CA Annual and Perennial Grassland Matrix Mapping Unit	805	14	761	10
7600	CA Mixed Annual/Perennial Freshwater Vernal Pool and Swale Bottomland Group	70	33	60	24
9300	Built Up & Urban Disturbance	294	36	45	8
9401	Cliffs & Rock Outcroppings	37	7	2	1
9402	River & Lacustrine Flats & Streambeds	3	1	0	0
9500	Introduced N.A. Woodland and Forest Group	1	1	1	1
9501	<i>Eucalyptus</i> spp.	14	2	14	2
9802	Reservoirs	732	1	732	1
9803	Small Earthen Dam Ponds and Natural Lakes	16	6	7	3
<b>Sum Total</b>		11,644	1,611	5,701	456

## **V. REFERENCES**

Menke, J., E. Reyes, D. Johnson, J. Evens and K. Sikes, T. Keeler-Wolf and R. Yacoub. 2011. Northern Sierra Nevada Foothills Vegetation Project: Vegetation Mapping Report. Aerial Information Systems, California Native Plant Society, and Department of Fish and Game, Sacramento, CA.

Federal Geographic Data Committee (FGDC). 2008. National Vegetation Classification Standard, Version 2, FGDC-STD-005-2008 (Version 2). Vegetation Subcommittee of the Federal Geographic Data Committee, Reston, VA.

Klein, A., J. Crawford, J. Evens, T. Keeler-Wolf, and D. Hickson. 2007. Classification of the vegetation alliances and associations of the northern Sierra Nevada Foothills, California. Report. Prepared for CDFG. CNPS, Sacramento, CA.

Sawyer, J.O., T. Keeler-Wolf, and J. Evens. 2009. A Manual of California Vegetation. California Native Plant Society, Sacramento, CA.

## VI. APPENDICES

### Appendix A. CNPS Field Sampling Forms

**CNPS and CDFG Combined Vegetation Rapid Assessment and Relevé Field Form**  
(Revised March 22, 2010)

Relevé or Rapid Assessment (circle one)

For Office Use:	Final database #:	Final vegetation type name:	Alliance Association
-----------------	-------------------	-----------------------------	----------------------

**I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION**

Polygon/Stand #: 3-04200900 Air photo: — Date: 4/20/10 Name(s) of surveyors (circle recorder): SMH, DMR

GPS wypt #: — GPS name: 3 Datum: — or NAD83 Bearing, left axis at SW pt 65 (degrees) of Long / Short side  
UTME 274610 UTMN 4107607 Zone: 10 (circle one) Error:  $\pm$  3.4 ft / m (pdop)  
GPS within stand? (Yes) / No If No, cite from waypoint to stand, distance — (meters) & bearing — (degrees)

Elevation: 543 ft / m Camera Name/Photograph #: E12 NP 3110 - 3113; NE = 3114

Stand Size (acres) <1 1-5, >5 | Plot Size (m<sup>2</sup>): 10 / 100 / 400 / 1000 | Plot Shape 10 x 10 ft / m or Circle Radius — ft / m  
Exposure, Actual °: 320 NE NW SE SW Flat Variable All | Steepness, Actual °: 27 0° 1-5° 5-25° >25

Topography: Macro: top upper mid lower bottom | Micro: convex flat concave undulating  
Geology code: UNKNOWN Soil Texture code: MFS A | Upland or Wetland/Riparian (circle one)

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)  
H20: — BA Stems: 1 Litter: 8 Bedrock: 5 Boulder: <1 Stone: <1 Cobble: <1 Gravel: 20 Fines: 65 = 100%

% Current year bioturbation 3 Past bioturbation present? (Yes) / No | % Hoof punch <  
Fire evidence: Yes / No / Unknown (circle one) If yes, describe in Site history section, including date of fire, if known.

Site history, stand age, comments: Rocky hillside with moss-covered, exposed bedrock & gravelly soils. Strongly dominated by a species of forweed, possibly Madia, with Lupinus bicolor & an assortment of grasses. Cattle are in area, but this has not recently been grazed.

Disturbance code / Intensity (L,M,H): 05/L / / / / / / "Other" /

**II. HABITAT AND VEGETATION DESCRIPTION**

Tree DBH: T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5 >60% cover)  
Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), S3 mature (1-25% dead), S4 decadent (>25% dead)  
Herbaceous: H1 (<12" plant ht.), H2 (>12" ht.) % Non-Vasc cover: 8 Total % Vasc Veg cover: 40

% Cover - Conifer tree / Hardwood tree: — / — Regenerating Tree: — Shrub: — Herbaceous: 40  
Height Class - Conifer tree / Hardwood tree: — / — Regenerating Tree: 01 Shrub: — Herbaceous: 01  
Height classes: 01=<1/2m 02=1/2-1m 03=1-2m 04=2-5m 05=5-10m 06=10-15m 07=15-20m 08=20-35m 09=35-50m 10=>50m

Species, Stratum, and % cover. Stratum categories: T=Tree, S=Shrub, H=Herb, E=SEedling, A=SApling, N=Non-vascular.  
% cover intervals for reference: <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, 75%.

Strata Species	% cover	C Strata	Species	% cover	C
E <i>Quercus wislizeni</i>	1	H	<i>Lathraea</i> sp - Annual, pink	1	C
H <i>Layia platyglossa</i>	18	C	<i>Aira caryophylla</i>	2	
<i>Madia elegans</i> ssp <i>verpalis</i>	2		<i>Dichelostemma capitatum</i>	<1	
<i>Clarkia</i> sp	6		<i>Avena barbata</i>	<1	
<i>Thysanotus curvipes</i>	<1		<i>Bromus hordeaceus</i>	1	
<i>Lupinus bicolor</i>	5		<i>Erodium cicutarium</i>	1	
<i>Plagiobothrys portulacifolius</i>	<1		<i>Poa secunda</i>	<1	
<i>Hypochaeris glabra</i>	1		<i>Plagiobothrys (spartensis)</i>	<1	
<i>Lithophragma</i> sp.	1		<i>Plantago erecta</i>	<1	
<i>Nemophila</i> (shrub)	1		<i>Pterostegia drymaroides</i>	<1	

Unusual species: —

**III. INTERPRETATION OF STAND**

Field-assessed vegetation alliance name: Layia platyglossa

Field-assessed association name (optional): Layia platyglossa - Lupinus

Adjacent alliances/direction: Quercus wislizeni / NP

Confidence in alliance identification: L M H Explain: The forweed is strong, dominant

Phenology (E,P,L): Herb P Shrub - Tree P Other identification or mapping information: the zone

Joaquin River Gorge recreation area, Fresno Co.

Is poly >1 type: Yes / No If yes, explain: —

### Reconnaissance Form for Map Field Verification

OBJECTID	<input type="text" value="35"/>
VegCode	<input type="text" value="1111"/>
Heterogeneity	<input type="text" value="1"/>
ConifCover	<input type="text" value="15"/>
HdwdCover	<input type="text" value="15"/>
TreeCover	<input type="text" value="35"/>
ShrubCover	<input type="text" value="5"/>
HerbCover	<input type="text" value="3"/>
Conif_WHR_Size	<input type="text" value="5"/>
Hdwd_WHR_Size	<input type="text" value="4"/>
NonNative_Plants	<input type="text" value="2"/>
Roads_Trails	<input type="text" value="1"/>
OtherImpact	<input type="text" value="none"/>
Level_OtherImpac	<input type="text" value="0"/>
Method_ID	<input type="text" value="4"/>
Confidence	<input type="text" value="2"/>
Comments	<input type="text" value="FC. QUWI-QUDO-PISA; Includes small riparian steam"/>
Polygon_>1_Type	<input type="text" value="N"/> Riparian <input type="text" value="Y"/>
QCer	<input type="text"/> Sambucus <input type="text" value="N"/>

OBJECTID	<input type="text" value="198"/>
VegCode	<input type="text" value="1111"/>
Heterogeneity	<input type="text" value="1"/>
ConifCover	<input type="text" value="5"/>
HdwdCover	<input type="text" value="25"/>
TreeCover	<input type="text" value="35"/>
ShrubCover	<input type="text" value="5"/>
HerbCover	<input type="text" value="3"/>
Conif_WHR_Size	<input type="text" value="4"/>
Hdwd_WHR_Size	<input type="text" value="4"/>
NonNative_Plants	<input type="text" value="2"/>
Roads_Trails	<input type="text" value="1"/>
OtherImpact	<input type="text" value="none"/>
Level_OtherImpac	<input type="text" value="0"/>
Method_ID	<input type="text" value="4"/>
Confidence	<input type="text" value="2"/>
Comments	<input type="text"/>
Polygon_>1_Type	<input type="text" value="N"/> Riparian <input type="text" value="N"/>
QCer	<input type="text"/> Sambucus <input type="text" value="N"/>

OBJECTID	<input type="text" value="36"/>
VegCode	<input type="text" value="7100"/>
Heterogeneity	<input type="text" value="1"/>
ConifCover	<input type="text" value="0"/>
HdwdCover	<input type="text" value="0"/>
TreeCover	<input type="text" value="0"/>
ShrubCover	<input type="text" value="5"/>
HerbCover	<input type="text" value="3"/>
Conif_WHR_Size	<input type="text" value="0"/>
Hdwd_WHR_Size	<input type="text" value="0"/>
NonNative_Plants	<input type="text" value="3"/>
Roads_Trails	<input type="text" value="1"/>
OtherImpact	<input type="text" value="none"/>
Level_OtherImpac	<input type="text" value="0"/>
Method_ID	<input type="text" value="4"/>
Confidence	<input type="text" value="3"/>
Comments	<input type="text"/>
Polygon_>1_Type	<input type="text" value="N"/> Riparian <input type="text" value="N"/>
QCer	<input type="text"/> Sambucus <input type="text" value="N"/>

OBJECTID	<input type="text" value="199"/>
VegCode	<input type="text" value="9802"/>
Heterogeneity	<input type="text" value="1"/>
ConifCover	<input type="text" value="0"/>
HdwdCover	<input type="text" value="0"/>
TreeCover	<input type="text" value="0"/>
ShrubCover	<input type="text" value="0"/>
HerbCover	<input type="text" value="0"/>
Conif_WHR_Size	<input type="text" value="0"/>
Hdwd_WHR_Size	<input type="text" value="0"/>
NonNative_Plants	<input type="text" value="1"/>
Roads_Trails	<input type="text" value="0"/>
OtherImpact	<input type="text" value="none"/>
Level_OtherImpac	<input type="text" value="0"/>
Method_ID	<input type="text" value="4"/>
Confidence	<input type="text" value="3"/>
Comments	<input type="text"/>
Polygon_>1_Type	<input type="text" value="N"/> Riparian <input type="text" value="Y"/>
QCer	<input type="text"/> Sambucus <input type="text" value="N"/>

Reconnaissance Form SNF: Date 4/15/10 GPS\_Name 3 Surveyor(s) DMR & JME

Stand ID	Waypoint (if different)	Dist./bearing	Stand size	Alliance	Photo Info / Comments
sSNF 3001		- In 1 stand -		Quercus douglasii	
sSNF 3002		- In 1 stand -		Salix laevigata	Salix laevigata / Cephalanthus in stand #3044
sSNF 3003		260m / 76°		QUWI	to SE more Cecal stands #3049
sSNF 3004		42m / 350°		QUWI	Quwi - Qudo - Pisa, Rocky NW slope, mostly Quwi
sSNF 3005		- In 1 stand -		QUDO	Quwi - Pisa (Qudo) #3050
sSNF 3006	BLANK	1		QuDO	Qudo - Pisa / Grass (w/ little Quwi, little Cecal) #3053
sSNF 3007		1		Eleocharis macrostachya	Qudo stand to South open woodland // Quwi - Qudo to North - dense patch
sSNF 3008		480m / 352°		QUWI - PTSA	standing in Qudo
sSNF 3009		- In 1 stand -		QUWI	(with little Qudo & Pisa - linear strip along edge of table) #3062
sSNF 3010		1		Bromus (hordeaceus?)	dense grassland of Bromus - Erodium - Amsinckia menziesii intermedia
sSNF 3011		1		QUWI	Quwi - Acca, linear strip along steep side of table edge
sSNF 3012		140m / 20°		QUDO	Qudo - Pisa, below table edge on NE-facing upper slope
sSNF 3013		516m / 22°		AECA	Acca / Todi / most w/ some Quwi @ top of stand
sSNF 3014		550m / 31°		QUWI	QUWI - AECA
sSNF 3015		600m / 357°		QUDO	QUDO - PISA, on convex upper slope w/ scattered Quwi
sSNF 3016		- In 1 stand -		AECA	AECA / TODI / Moss, in stand patch containing to S along edge
sSNF 3017		84m / 35°		QUDO	QUDO - QUWI - PISA, on upper slope
sSNF 3018		- In 1 stand -		QUDO	QUDO / Herb



This page has been intentionally left blank.

## ***Appendix B. Key to Vegetation Mapping Classification of the Central and Southern Sierra Nevada Foothills Region***

**Class A.** Trees evenly distributed and conspicuous throughout stand. In areas where vegetation cover is greater than about 20 percent, tree canopy may be as low as 10 percent over denser layers of shrub and herbaceous species. In areas where vegetation is < 20 percent total cover, trees may cover somewhat < 10 percent (as low as about 8 percent) but are evenly distributed across the stand = **Tree-Overstory Vegetation**

**Class B.** Woody shrubs or sub-shrubs conspicuous throughout stand. When total vegetation cover is over ca. 20 percent, the tree layer, if present, generally less than 10 percent cover; herbaceous species may total higher cover than shrubs. Shrubs are always at least 10 percent cover. In areas where vegetation is < 20 percent total cover, shrubs may cover < 10 percent, but are evenly distributed across the stand = **Shrub-Overstory Vegetation**

**Class C.** Non-woody herbaceous vegetation, including graminoid and forb species, dominant throughout stand. When total vegetation cover is greater than about 20 percent, the layers for shrubs, subshrubs, and trees, if present, are of lower cover than herbs and < 10 percent. If total vegetation cover is less than about 20 percent, shrubs, subshrubs, and/or trees may be present but are < 8 percent cover and are not evenly distributed across stand. = **Herbaceous Vegetation**

**Class D.** Stand is not vegetated with a conspicuous cover of native plants; OR the stand has naturalized or planted species at > 10% cover. This may include more strongly dominated agricultural cover rather than naturalized plants, or a mix of native and non-native plants in urban settings. = **Unvegetated or Urbanized**

*Note: Vegetation types identified in the region are included in the key below, based on field samples and observations between 2008 and 2010. Those that are found in the study area or general foothills region, but not mapped in pilot study area are identified with a “\*” after their classification name’s map unit number.*

---

### **Class A. Tree-Overstory (Woodland / Forest Vegetation)**

1. Riparian or wetland stands in cismontane California (west of the Cascades–Sierra Nevada and Transverse–Peninsular crests).

2. Stands with non-natives or semi-natural and planted stands of natives strongly dominant.

**Introduced North American Mediterranean Woodland and Forest Group  
(9500)**

**(Non-native semi-natural stands; various types not listed in classification)**

2’ Stands with native trees dominant or co-dominant.

3. Forest or woodland stands with high summer temperatures (mostly below 1500 m elevation). Typical winter deciduous trees or tall shrubs in the following genera: *Populus*, *Salix*, *Fraxinus*, or *Platanus*.

**Southwestern North American Riparian Evergreen and Deciduous Woodland Group (3100)**

4. Fremont cottonwood (*Populus fremontii*) and/or California Cottonwood (*Platanus racemosa*) has equal or greater than 5% cover in overstory

5. Fremont cottonwood (*Populus fremontii*) has equal or greater than 5% cover in overstory usually as a dominant or co-dominant in the overstory with willows.

***Populus fremontii* Woodland/Forest Alliance (3110)**

The following associations with cottonwood are found in the region:

***Populus fremontii/Vitis californica* Association**

***Populus fremontii-Salix laevigata* Association**

- 5' California sycamore (*Platanus racemosa*) has equal or greater than 5% absolute cover in the overstory. Other species may intermix in the overstory, including California buckeye (*Aesculus californica*), California bay (*Umbellularia californica*), and/or Oregon ash (*Fraxinus latifolia*). If sycamore co-occurs with cottonwood, stands are keyed here.

***Platanus racemosa* Woodland/Forest Alliance (3310)\***

The following association is found in the region:

***Platanus racemosa* / (annual grass) Association**

***Platanus racemosa/Toxicodendron diversilobum* Association**

- 4' Other trees dominant or co-dominant in overstory, and Fremont cottonwood is not at least 5% cover.

6. A willow is dominant in the stands and usually with at least 10% absolute cover.

7. Red willow (*Salix laevigata*) is the dominant in the overstory. Arroyo willow (*Salix lasiolepis*) may occur as a sub- or co-dominant as a shrub or low tree.

***Salix laevigata* Woodland/Forest Alliance (3111)**

The following associations with red willow are found in the region:

***Salix laevigata* - *Salix lasiolepis* Woodland Association**

***Salix laevigata* Woodland Association**

- 7' Black willow (*Salix gooddingii*) is dominant in the overstory, though other tall shrubs or low trees may be present and sub-dominant to co-dominant.

***Salix gooddingii* Woodland/Forest Alliance\***

***Salix gooddingii* Association**

**6'** Valley oak (*Quercus lobata*) or California buckeye (*Aesculus californica*) is dominant or co-dominant with other trees including other oaks.

8. California buckeye is dominant, though valley oak and/or interior live oak (*Quercus wislizeni*) may be present with other riparian species in the overstory or understory.

***Aesculus californica* Woodland/Forest Alliance (1310)**  
***Aesculus californica* Riparian Association**

**8'** Valley oak is dominant or co-dominant with other trees including oaks and alder.

***Quercus lobata* Woodland/Forest Alliance (1313)**

The following riparian associations with valley oak are found in the region:

***Quercus lobata* / *Rubus armeniacus* Association**  
***Quercus lobata* - *Alnus rhombifolia* Association**  
***Quercus lobata* / Herbaceous Semi-Riparian Association**

**3'** Forest or woodland stands usually associated closely to flowing water during the growing season. Generally with cooler and moister soil conditions than previous group, and dominated or characterized by *Alnus*, *Fraxinus*, or shining willow (*S. lucida*).

**Vancouverian Riparian Deciduous Forest Group (3200)**

**9'** White alder (*Alnus rhombifolia*) is dominant, co-dominant or sub-dominant with other trees such as valley oak and willow.

***Alnus rhombifolia* Forest Alliance (3210)\***

The following associations with white alder are found in the region:

***Alnus rhombifolia*/Carex sp. Association**  
***Alnus rhombifolia* - *Platanus racemosa* - *Salix laevigata* Association**  
***Alnus rhombifolia*/Salix exigua Association**

9. Oregon ash (*Fraxinus latifolia*) is dominant or co-dominant with other trees, including white alder and willows, and ash is at least 5% absolute cover.

***Fraxinus latifolia* Forest Alliance (3210)\***

The following associations with white alder are found in the region:

***Fraxinus latifolia*/Toxicodendron diversilobum Association**  
***Fraxinus latifolia* - *Alnus rhombifolia* Association**

**1'. Stands of upland forests and woodlands, not generally tied to immediate vicinity of permanent water bodies or with prevalent fluvial disturbance and seasonally flooding.**

7. Stands with non-native, semi-natural and planted trees which are strongly

dominant.

**Introduced North American Mediterranean woodland and forest Group (9500)**

10. Tree overstory dominated by *Eucalyptus* species.

***Eucalyptus* spp. Semi-natural Stands (9501)**

7' Stands with native trees dominant or co-dominant with high summer temperatures (mostly below 1500 m elevation).

**California Woodland and Forest Macrogroup**

11. Stands with conifer trees (e.g., pines) trees strongly dominant. If oaks are co-dominant (i.e., oaks usually at least 30% relative cover, then see next step in key).

**Californian Evergreen Coniferous Forest and Woodland Group**

12. Ghost pine (*Pinus sabiniana*) is the dominant tree in the overstory, and it is generally greater than 8% absolute cover in overstory.

***Pinus sabiniana* Woodland/Forest Alliance (1210)**

The following associations with ghost pine are found in the region:

***Pinus sabiniana*/Herbaceous Association *Pinus sabiniana*/*Ceanothus cuneatus* Association *Pinus sabiniana*/*Arctostaphylos viscida* Association**

- 11' Stands with broad-leaf hardwood species dominant, or co-dominant with conifers.

**Californian Broadleaf Forest and Woodland Group**

13. One or more oak (*Quercus* spp.) species are the primary overstory canopy tree, or oaks share dominance with conifers.

14. Blue oak (*Quercus douglasii*) and/or interior live oak is the dominant oak species at greater than 50% relative cover in the overstory. Other trees, such as foothill pine (*Pinus sabiniana*), buckeye (*Aesculus californica*), or other oaks, may be present, but blue and/or interior oak generally have greater cover.

15. Blue oak is dominant or co-dominant with trees such as foothill pine and buckeye. Interior live oak is usually less than 40% in relative cover to blue oak.

#### ***Quercus douglasii* Woodland/Forest Alliance (1311)**

The following associations with blue oak are found in the region:

***Quercus douglasii* - *Aesculus californica* / Herbaceous Association**

***Quercus douglasii* - *Quercus wislizeni* / Herbaceous Association**

***Quercus douglasii* - *Pinus sabiniana* / Herbaceous Association**

***Quercus douglasii* / *Ceanothus cuneatus* / Herbaceous Association**

***Quercus douglasii* / Annual Grass - Forb Sub-Alliance**

***Quercus douglasii* / Perennial Grass - Forb Sub-Alliance**

15' Interior live oak (*Quercus wislizeni*) is dominant or co-dominant at >30% relative cover, with other trees in the overstory. Scrub oak (*Q. berberidifolia*) and canyon live oak (*Q. chrysolepis*), if present, have low cover.

#### ***Quercus wislizeni* Woodland/Forest Alliance (1111)**

The following associations with interior live oak are found in the region:

***Quercus wislizenii* - *Salix laevigata* / *Rhamnus tomentella* Association**

***Quercus wislizenii* - *Quercus douglasii* - *Aesculus californica* Association**

***Quercus wislizenii* - *Aesculus californica* Association**

***Quercus wislizeni* - *Quercus douglasii* - *Pinus sabiniana* Association**

***Quercus wislizeni* - *Quercus douglasii* / Herbaceous Association**

***Quercus wislizeni* - *Pinus sabiniana* Woodland Association**

***Quercus wislizeni* / *Arctostaphylos viscida* Association**

***Quercus wislizenii* / *Heteromeles arbutifolia* Association**

***Quercus wislizenii* / *Toxicodendron diversilobum* Association**

14' Valley oak (*Quercus lobata*) is usually the dominant species in the overstory, though sometimes other oaks or riparian species may be co-dominant.

#### ***Quercus lobata* Woodland/Forest Alliance (1313)**

The following associations with valley oak are found in the region:

***Quercus lobata* / *Rubus armeniacus* Association**

***Quercus lobata* - *Quercus wislizeni* Association**

***Quercus lobata* / *Rhus trilobata* Association (Provisional)**

***Quercus lobata* / Herbaceous Semi-Riparian Association**

13' California bay (*Umbellularia californica*) and/or California buckeye (*Aesculus californica*) is dominant in the overstory as a tree or tall shrub. If co-dominant with interior live oak (*Quercus wislizeni*), see above and below.

16. California buckeye is dominant as a tree or tall shrub in the overstory though oaks may be present at relatively low cover. If buckeye is co-dominant with blue or interior live oak, see the Blue Oak (*Quercus douglasii*) and Interior Live Oak (*Quercus wislizeni*) Alliances.

***Aesculus californica* Woodland/Forest Alliance (1310)**

The following associations with buckeye are found in the region:

***Aesculus californica* Riparian Association  
*Aesculus californica* / *Toxicodendron diversilobum* / Moss Association**

16' California bay is dominant at a tree or tall shrub in the overstory, and stands may be small in size.

***Umbellularia californica* Woodland/Forest Alliance (1110)**

The following association with California bay is found in the region:

***Umbellularia californica*–*Quercus wislizeni* Association**

---

**Class B. Shrubland Vegetation**

1. Stands dominated by sclerophyllous temperate shrubs (with leaves hardened by a waxy cuticle). They are dominated by typical chaparral shrubs such as deerbrush (*Ceanothus*) manzanita (*Arctostaphylos*), chamise (*Adenostoma fasciculatum*), scrub oaks (*Quercus*), etc.

**California Chaparral Macrogroup**

2. Stands occur in dry upland slopes and ridges, usually dominated by a *Ceanothus* and/or other chaparral plants.

**California Xeric Chaparral (4100)**

3. Stands dominated by wedgeleaf ceanothus (*Ceanothus cuneatus*) or California yerba santa (*Eriodictyon californicum*) as the dominant or in shared dominance together or other shrubs such as chamise or flannelbush (*Fremontodendron californicum*).

4. Wedgeleaf ceanothus dominant or co-dominant in the shrub canopy.

***Ceanothus cuneatus* Shrubland Alliance (4113)**

The following associations with wedgeleaf ceanothus are found in the region:

***Ceanothus cuneatus* / Herbaceous Association  
*Ceanothus cuneatus* - *Eriodictyon californicum* - (*Fremontodendron californicum*) Association**

4' California yerba santa dominant in the shrub canopy.

***Eriodictyon californicum* Shrubland Alliance (4114)\***

***Eriodictyon californicum*/herbaceous Association**

**3'** Stands dominated by manzanita or other ceanothus, or they may be co-dominant with chamise, poison oak, or other shrubs.

**California Xeric Chaparral and Californian Pre-montane Chaparral**

**5.** Whiteleaf manzanita dominant or co-dominant in stands.

***Arctostaphylos viscida* Shrubland Alliance (4112)\***

The following associations with whiteleaf manzanita are found in the region:

***Arctostaphylos viscida* Association**

***Arctostaphylos viscida* - *Quercus wislizeni* Association**

**5'** Chaparral whitethorn (*Ceanothus leucodermis*) dominant or co-dominant in stands.

***Ceanothus leucodermis* Shrubland Alliance (6501)\***

The following associations with chaparral whitethorn are found in the region:

***Ceanothus leucodermis* Association**

***Ceanothus leucodermis*/*Toxicodendron diversilobum* Association**



2' Stands occur in moister settings including north-facing slopes, draws, and stream terraces with one or more dominant shrub species, and tree species may be present though less than 10% cover.

**California Mesic Chaparral and California Coastal Evergreen Scrub Groups**

6. Birch leaf mountain-mahogany (*Cercocarpus montanus* = *C. betuloides*) is dominant or co-dominant with other shrubs such as wedgeleaf ceanothus and manzanita.

***Cercocarpus montanus* Shrubland Alliance (4211)\***

The following associations with birchleaf mountain-mahogany are found in the region:

***Cercocarpus montanus* Association**

***Cercocarpus montanus* - *Ceanothus cuneatus* Association**

6' Other plants are dominant to co-dominant in the shrub layer.

7. Hoary coffeeberry (*Frangula californica* ssp. *tomentella* = *Rhamnus tomentella*) is dominant.

***Frangula californica* Shrubland Alliance (4501)\***

***Frangula californica* ssp. *tomentella* Association**

7' Tree anemone (*Carpenteria californica*) is dominant or co-dominant with other shrubs and small trees including California redbud (*Cercis orbiculata* = *C. occidentalis*), poison oak (*Toxicodendron diversilobum*), buckeye, and others.

***Carpenteria californica* Shrubland Special Stands (4220)\***

1' Stands dominated by other shrubs that are soft-leaved and either evergreen or deciduous. They include both riparian and upland stands.

8. Stands with riparian conditions where shrubs generally tap into moisture or water table for most of the growing season. Shrubs include willows (*Salix*), button-willow (*Cephalanthus occidentalis*), redbud (*Cercis occidentalis*), blackberry (*Rubus*).

**Southwestern North American Riparian/Wash Scrub Group (6200)\***

9. One or more willow species (*Salix* spp.) dominate the shrub layer, generally considered to be 5 m or less in height.

10. Arroyo willow (*Salix lasiolepis*) dominant as a shrub or low tree. Other shrubs may be present and sub-dominant to co-dominant.

***Salix lasiolepis* Shrubland Alliance (3115)\***

***Salix lasiolepis* /*Baccharis salicifolia* Association**

10' Narrow-leaf willow (*Salix exigua*) dominant or co-dominant. Other willow species may be present and sub-dominant with low cover.

***Salix exigua* Shrubland Alliance (6211)\***

***Salix exigua* Association**

9' Other riparian species are dominant or co-dominant in the shrub layer.

11. Button-willow (*Cephalanthus occidentalis*) forms an open to intermittent shrub canopy along streambeds and rivers.

***Cephalanthus occidentalis* Shrubland Alliance (6214)\***  
***Cephalanthus occidentalis* Association**

11' Mulefat (*Baccharis salicifolia*) is dominant in the open to intermittent shrub overstory.

***Baccharis salicifolia* Shrubland Alliance (6210)\***  
***Baccharis salicifolia* Association**

8' Stands in upland or moist conditions including on rocky, volcanic or granitic slopes.

12. Stands dominated by poison oak (*Toxicodendron diversilobum*), elderberry (*Sambucus*), or basket bush (*Rhus trilobata*).

13. Poison oak dominates the shrub overstory. Other shrubs such as wedgeleaf ceanothus, and blue elderberry (*Sambucus nigra*) may intermix at low cover.

***Toxicodendron diversilobum* Shrubland Alliance (6301)**

The following associations occur in the region:

***Toxicodendron diversilobum*/herbaceous Association**  
***Toxicodendron diversilobum*–*Philadelphus lewisii* Association**

13' Other shrubs dominate.

14. Mexican/Blue elderberry (*Sambucus nigra*=*Sambucus mexicana*) dominates the shrub canopy, especially on rocky substrates.

***Sambucus nigra* Shrubland Alliance (6302)**  
***Sambucus nigra* Association**

14' Basket bush dominates, especially adjacent to oak woodlands/forests on mesic hillslopes and stream terraces.

***Rhus trilobata* Provisional Shrubland Alliance (6601)\***

12' Stands dominated by other soft-leaved (non-sclerophyll) shrubs (including *Eriodictyon*, *Lupinus*, *Lotus* spp., *Eriogonum fasciculatum*), often transitional with grasslands or seral in disturbed areas such as along road-cuts, steep slopes, stream terraces, etc.

**Central and South Coastal California Seral Scrub (4700)**

15. California yerba santa (*Eriodictyon californicum*) dominant in the shrub canopy.

***Eriodictyon californicum* Shrubland Alliance (4114)\***  
***Eriodictyon californicum*/ herbaceous Association**

15' Silver bush lupine (*Lupinus albifrons*) and/or Deerweed (*Lotus scoparius*) dominant or co-dominant together or with other shrubs in the shrub canopy.

16. Silver bush lupine dominant or co-dominant in stands with other shrubs.  
***Lupinus albifrons* Shrubland Alliance (4710)**

The following associations with silver bush lupine are found in the region:  
***Lupinus albifrons* Association**  
***Lupinus albifrons* - *Lotus scoparius* Association**

- 16' Deerweed (*Lotus scoparius*) dominant in stands.  
***Lotus scoparius* Shrubland Alliance (4711)\***  
***Lotus scoparius* Association**

---

### **Class C. Herbaceous Vegetation**

**Herbaceous stands found in wetland settings or in seasonally moist to dry areas. Includes marshes, meadows, upland grasslands, mesa tops, swales, and vernal pools (water or wet ground present throughout the growing season). Stand identification is contingent upon appropriate phenology.**

1. Stands are passively irrigated pasture lands that mostly contain non-native herbs.  
**Naturalized Non-native Perennial Grassland & Meadow Macrogroup**

**(7102)\***

- 1' Stands are not passively irrigated; either upland or naturally riparian and/or wetland.

2. Stands are wetland with soils saturated or moist through the growing season, not including vernal pools.

3. Stands of tall obligate wetland herbaceous species such as bulrushes (*Schoenoplectus*, *Scirpus*) and cattails (*Typha*) that are typically emergent from water at least in the early portion of the growing season.

**Western North American Freshwater Marsh Macrogroup Arid West**  
**Freshwater Emergent Marsh Group (7300)**

4. A species of cattail dominates the herbaceous overstory.

***Typha (angustifolia, latifolia, domingensis)* Herbaceous Alliance (7310)\***  
***Typha latifolia* Association**

- 3' Stands of largely perennial wetland graminoids or forbs, but not usually perpetually wet or saturated through the summer months, which are generally shorter-stature and less tied to permanent or semi-permanent bodies of water than above group.

5. Stands of native obligate or facultative wetland perennial plants (including *Carex barbarae*, *Juncus balticus*, *J. mexicanus*, *Leymus triticoides*, *Mimulus guttatus*, *Muhlenbergia rigens*) with typically moist soils through the growing season due to flooding or high water table.

**Western North American Wet Meadow and Low Shrub Carr Macrogroup  
Californian Warm Temperate Marsh/Seep Group (7200)**

6. Stands with deergrass (*Muhlenbergia rigens*) dominant or co-dominant.  
***Muhlenbergia rigens* Alliance (7210)\***

- 6' Stand where either smartweed (*Persicaria*, *Polygonum* species) and/or  
cocklebur (*Xanthium strumarium*) dominant to codominant.  
***Persicaria lapathifolia*–*Xanthium strumarium* Alliance (7211)\***

- 5' Stands of native wetland graminoids and forbs (including *Lasthenia*,  
*Deschampsia danthonioides*, *Downingia*, *Eleocharis macrostachya*,  
*Eryngium*, *Limnanthes*, *Sidalcea*, *Trifolium*, etc.) usually with high annual  
plant cover and with typically vernal wet soils, which dry through the growing  
season, including vernal pools and swales that meet the minimum mapping  
unit (MMU).

**Western North America Vernal Pool Macrogroup  
Californian Mixed Annual/Perennial Freshwater Vernal Pool and Swale  
Bottomland Group (7600)  
Various alliances exist in the study area (see  
classification table in Appendix D)**

- 2' Stands are upland or vernal moist with soils drying during the growing season.

6. Stands are upland grasslands with some native plant component, including  
rocky volcanic tablelands with grasses and forbs, and the typical "California  
Annual Grasslands".

**Californian Annual and Perennial Grasslands & Meadow Macrogroup  
(7100) Various groups and alliances exist in the study area (see  
classification table in Appendix D)**

- 6' Stands are complexes with vernal pool and grassland vegetation, thus,  
consisting of two types listed above (the 7600 but below MMU, and the 7100).

**Vernal Pool & Californian Annual and Perennial Grasslands Matrix Mapping  
Unit (7400)**

---

**Class D. Unvegetated or Urbanized**

1. Areas impacted by agriculture and urban development.

2. Agriculture including orchards, hayfields without fallow annual grasses dominating,  
and horse ranches (including corrals, tracks, associated farm buildings).  
**Agriculture (9200)\***

- 2' Developed areas including urban, suburban, and isolated residential areas with  
groups of houses, areas with commercial, industrial, and extractive land uses, and  
areas cleared for potential development.

### **Built up & Urban Disturbance (9300)**

3. Fully developed areas with build up and disturbance, originating from an intensely developed urban core, and includes large built-up areas usually composed of 7-13 houses per 8 acre and at least 1 square mile (640ac) in size.

### **Urban Window (9310)\***

1' Areas of open water, rocky substrates or streams with little or no vegetation cover.

4. Areas with little or no vegetation in upland habitats.

5. Areas with rock outcrops, rocky slopes, canyons, and cliffs with sparse vegetation cover.

### **Cliffs & Rock Outcroppings (9401)**

5' Areas appearing sparsely vegetated such as recently cleared areas.

### **Undefined Areas with Little or No Vegetation (9403)\***

4' Areas of riparian/lakeshore habitats with little/no vegetation, or areas with open water.

6. Areas along riparian streams or along lakeshores.

7. Riparian stream corridors with open water and perennial flooding.

### **Perennial Stream Channels (9801)\***

7' Riparian and lakeshore areas with sparse vegetation cover, and usually with seasonal flooding.

### **Riverine & Lacustrine Flats & Streambeds (9402)**

6' Areas of open water including lakes, reservoirs, and ponds.

8. Large man-made lakes and other larger basins with water.

### **Reservoirs (9802)**

8' Smaller man-made ponds as well as natural lake basins with water.

### **Small Earthen Dam Ponds & Natural Lakes (9803)**

## ***Appendix C. Map Metadata and Mapping Rules for the Polygon Attributes***

### **Primary Items in the Polygon Attribute Geodatabase**

<b>COLUMN</b>	<b>ITEM NAME</b>	<b>DATA TYPE</b>	<b>COLUMN WIDTH</b>	<b>OUTPUT (# characters)</b>
1	ObjectID	N	4	4
3	VegCode	N	8	4
4	NVCS_level	T	15	12
5	Heterogeneity	I	4	1
6	ConifCover	I	2	2
7	HdwdCover	I	2	2
8	TreeCover	I	2	2
9	ShrubCover	I	2	2
10	HerbCover	I	4	1
11	NonNative_Plants	I	1	1
12	Roads_Trails	I	1	1
13	Other_Impact	T	20	15
14	Level_OtherImpact	I	2	1
15	Method_ID	I	4	1
22	UID	T	10	6
26	Shape_Area	N	8	13
27	Conif_WHR_Size	I	2	1
28	Hdwd_WHR_Size	I	2	1
30	Riparian	T	5	1
31	Sambucus	T	5	1

### **Primary Item Name and Basic Attribute Information**

- **VegCode:** Mapping code for vegetation type or other type, including water and land use
- **ConifCover:** Cover (birdseye view) of conifers in polygon
- **HdwdCover:** Cover (birdseye view, not overlapping with taller conifers) of hardwoods in polygon
- **TreeCover:** Cover (birdseye view) of trees in polygon (combination of both conifer and hardwood cover)
- **ShrubCover:** Cover (birdseye view, not overlapping with trees) of shrubs in polygon

- **HerbCover:** Cover (birdseye view, not overlapping with woody plants) of herbs in polygon
- **Riparian:** Riparian modifier (see map rules for more information)
- **Sambucus:** *Sambucus nigra* modifier (see map rules for more information)
- **UID:** internal unique record number for ArcGIS
- **Shape\_Area:** Area in square meters
- **Other items:** See below in Mapping Rules table for more information

### Data Type Codes

- T = Text
- N = Numeric
- I = Integer

### File Specifications

- ArcGIS Layer Format
- Personal Geodatabase

### Coordinate System

- NAD83 UTM projection – Meters, Zone 11

## General Specifications for Mapping Polygons

Mapping Rules	Specifications of the Rules
Minimum Mapping Unit (MMU)	0.5 acres for localized vegetation stands (including wetland, vernal pool, riparian, pond/earthen dam, or other types)
MMU	1 acre for typical vegetation types (distinguished largely by overstory layer, and vegetation is not a specialized type)
Polygon break	3 acres MMU for cover class break in overstory cover (when adjacent vegetation is of the same map unit)
Polygon break	5 acres MMU for cover class break in understory cover (when adjacent vegetation is of the same map unit)
Polygon break	5 acres for non-floristic breaks (e.g., height, clearing, other urban features or for impact changes of 2 classes)
Delineation	Scale of 1:2000 to 1:4000 (can vary)
Other mapping decisions	For stands containing pine and oaks as the dominants, an oak alliance is typically mapped
	For most mixed stands of blue oak and interior live oak, interior live oak alliance is attributed

	Mean separation distance for including peripheral trees in oak-dominated polygons = average separation distance within the stand
	Threshold for the attribution of wedgeleaf ceanothus alliance is 30% relative cover of the ceanothus

### General Specifications for Attributing Polygons

Attributes	Additional Specifications for Attributes
Heterogeneity	Internal heterogeneity of the map unit type within the polygon: <5%, 5– 40%, and >40%
Cover (bird's eye percent cover)	Tree and shrub layers: Estimated in 10% cover class intervals. Result is midpoint of each class (e.g., 5 for 1–10%)
	Herb layer: Estimate in the WHR cover classes 1 = <2%, 2 = 2–9%, 3 = 10–39%, 4 = 40–59%, 5 = 60–100%
	For shrub and herb cover: estimated cover not obscured by an overstory (such as trees over herbs)
	Herb cover classes for woody and upland herbaceous types are typically 2–9% and 10–39%
	Herb cover classes for vernal pool types are usually 40–59.9% or 60–100%
Non-Native Plants	Low = Any polygon with <33% relative cover of non-native to native plants
	Moderate = Any with >33-66% relative cover
	High = Any with >66% relative cover
Roads and Trails	Based on percent cover of road and/or trail disturbance
	Low = 1-33% of polygon affected by disturbance
	Medium = 33% - 66% of polygon affected by disturbance
	High = 66% - 100% of polygon affected by disturbance
Other Impact and Level	Other means of unnatural disturbance with impact levels using same disturbance categories as Roads and Trails, and including the following:
	OHV activity, Disking/grading, Development, Erosion/runoff, Ungulate trails, Riparian modification, none
Method_ID	Method for digitizing/assessing the polygons characteristics:



	1 = Rapid assesment and relevé data, 3 = Map reconnaissance, 4 = Photo interpretation, 6 = Pre-map reconnaissance
Polygon more than one type	yes/no if polygon was assessed during reconnaissance to include more than one vegetation map unit type, so that map updates could be made
Comments	Comments during digitizing, reconnaissance and explanation of low or medium confidence
CalVeg	Crosswalk to classification names of the USDA Forest Service's CalVeg system
CWHR	Crosswalk to classification names of the Department of Fish and Game's California Wildlife Habitat Relationships system. Translation for the tree map units required inspection of hardwood and conifer types/covers
Riparian	yes/no if a stream is present in polygon as based on reconnaissance data, rapid assessment/relevé data, or Hydrologic or DRG notation
Sambucus Present	yes/no if Sambucus is present in polygon as based on reconnaissance data or rapid assessment/relevé data (this attribute was not extrapolated from field-based information to unvisited polygons)
Confidence	Applies specifically to the VegCode attribute, with comments entered to clarify low or medium ranking
Conifer and Hardwood WHR Size	Tree size based on California Wildlife Habitat Relationships (WHR) size classes, based on crown diameter and cover, including the following: 1=seedling, 2=sapling, 3=pole, 4=small, 5=medium-large, 6 = multi layered, 0=not determined/not applicable when tree cover is <10%
Formation, Macrogroup and Group_	Higher level vegetation classification units per the National Vegetation Classification System hierarchy, associated with the VegCode

### Additional WHR Size Class Information for Tree Polygons

WHR Classes	Conifer crown diameter	Hardwood crown diameter
1 = Seedlings (< 1")	n/a	n/a
2 = Saplings (1-6")	n/a	<15'
3 = Pole (6-11")	<12'	15–29.9'
4 = Small (11-24")	12–24'	30–45'
5 = Medium – Large (> 24")	>24'	>45'
6 = Multi Layered (Medium to large canopy trees over smaller trees in cover/densities >60%)	Size class 5 trees over a distinct layer of size class 4 or 3 trees. Total tree canopy exceeds 60% closure. (Layers must have $\geq 10.0\%$ canopy cover and distinct height separation)	
0 = Not Determined / Not Applicable		

## **Appendix D. Vegetation Mapping Classification for the Pilot Mapping Area in the Southern Sierra Nevada Foothills**

The floristic/mapping classification is arranged in structural order (tree, shrub and herbaceous life forms) and in hierarchical order, beginning with the broader map class of the Formation, and ending in the finer map class of the Alliance (per the National Vegetation Classification hierarchy). An example of the hierarchy's organization is displayed before the classification.

Formations may occasionally repeat across shrub and herbaceous life forms. Also, Alliances that floristically occur in the study area (based on review of existing field data as compared to Sawyer et al. 2009), but not mapped are denoted with a †, while Alliances that are found in the region (based on review of existing field data), but that do not appear to occur within the pilot mapping area are denoted with a \*.

### **LEVEL 1 FORMATION CLASS**

- **Level 2 or 3 Formation Subclass or Formation**
  - **Levels 4, 5, or 6: Divisions, Macro Groups, & Groups** or Other Non-hierarchy Land-Use or Land-Cover Types
    - Level 7: California Scientific Name (Alliance) or Other Map Units

#### **Level 1.A. Mesomorphic Tree Vegetation (Forest and Woodland)**

- Formation Class 1000 – Warm Temperate Forest Formation
  - **1100, 1300 – California Broadleaf Forest and Woodland Group**
    - 1310 – *Aesculus californica*
      - 1311 – *Quercus douglasii*
      - 1313 – *Quercus lobata*
      - 1111 – *Quercus wislizeni*
      - 1312 – *Quercus kelloggii*\*
    - 1410 – *Quercus chrysolepis*\*
    - 1110 – *Umbellularia californica*†
  - 1200 – California Evergreen Coniferous Forest and Woodland Group
    - 1210 – *Pinus sabiniana*
- 2000 – Cool Temperate Forest Formation
  - **2200 – California Montane Conifer Forests Group\***
    - 2212 – *Pinus ponderosa* – *Calocedrus decurrens*\*
- 3000 – Temperate Flooded and Swamp Forest Formation
  - **3100 – Southwestern North American Riparian Evergreen and Deciduous Woodland Group**
    - 3110 – *Populus fremontii*
      - 3111 – *Salix laevigata*
      - 3112 – *Salix gooddingii*\*
    - 3310 – *Platanus racemosa*\*

- 3200 – Vancouverian Riparian Deciduous Forest Group\*
  - 3210 – *Alnus rhombifolia*\*
  - 3211 – *Fraxinus latifolia*\*

**Level 1.B. Mesomorphic Shrub and Herb Vegetation (Shrubland and Grassland) Formation Class**

- **4000 (except 4500) – Mediterranean Scrub**
  - **Formation 4100 – California Xeric Chaparral Group**
    - 4111 – *Adenostoma fasciculatum*\* 4112 – *Arctostaphylos viscida*\*
    - 4113 – *Ceanothus cuneatus*
    - 4114 – *Eriodictyon californicum*\*
  - 4200 – California Mesic Chaparral Group\*
    - 4211 – *Cercocarpus montanus*\*
    - 4220 – *Carpenteria californica*\*
  - 4700 Central and South Coastal California Seral Scrub Group
    - 4710 – *Lupinus albifrons*
      - 4711 – *Lotus scoparius*\*
  - 4800 – Californian Pre-montane Chaparral Group\*
    - 4811 – *Ceanothus leucodermis*\*
  - 4500 – Temperate and Boreal Scrub and Herb Coastal Vegetation 4500 – California Coastal Evergreen Scrub Group\*
    - 4501 – *Frangula californica* (including *F. c. ssp. tomentella*)\*
- **6000 (except 6200) – Temperate Grassland, Meadow and Shrubland Formation**
  - **6100 – Southern Vancouverian Montane Deciduous Scrub Group\***
    - 6110 – *Ceanothus integerrimus*\*
  - 6300 – Vancouverian Coastal Deciduous Scrub Group
    - 6301 – *Toxicodendron diversilobum*
    - 6302 – *Sambucus nigra*
  - 6600 – Western Cordilleran Montane Deciduous Scrub Group\*
    - 6611 – *Rhus trilobata*\*
  - 6200 – Temperate Flooded and Swamp Forest Formation
  - **6200 – Southwestern North American Riparian/Wash Scrub Group\***
    - 6210 – *Baccharis salicifolia*\*
    - 6211 – *Salix exigua*\*
    - 6214 – *Cephalanthus occidentalis*\*
- **7100 – Mediterranean Grassland and Forb Meadow Formation**
  - **7100 – California Annual and Perennial Grassland Macrogroup**
    - *Amsinckia (menziesii, tessellata)*\*
    - *Bromus (hordeaceus, diandrus)*–*Brachypodium distachyon*†
    - *Lasthenia californica*–*Plantago erecta*–*Vulpia microstachys*†
    - *Lotus purshianus*†

- *Nassella cernua*\*
- *Plagiobothrys nothofulvus*†
- 7200 to 7600 – Temperate and Boreal Freshwater Marsh Formation
  - 7200 – Californian Warm Temperate Marsh/Seep Group
    - 7210 – *Muhlenbergia rigens*\*
    - 7211 – *Persicaria lapathifolia*–*Xanthium strumarium*\*
  - 7300 – Arid West Freshwater Emergent Marsh Group
    - 7310 – *Typha (angustifolia, latifolia, domingensis)*†
  - 7400 – Californian Vernal Pool & Annual and Perennial Grassland Matrix Mapping Unit
  - **7600 – Californian Mixed Annual/Perennial Freshwater Vernal Pool / Swale Bottomland Group**
    - *Eleocharis macrostachya*†
    - *Lasthenia fremontii* – *Downingia (cuspidata)*†
    - *Layia fremontii* – *Achyrachaena mollis*†
    - *Montia fontana* – *Sidalcea calycosa*†
    - *Trifolium variegatum*†

#### **Level 1.C. Sparsely Vegetated, Water, & Urbanized Land-Use and Land-Cover Types**

- **9200 – Agriculture** (Without fallow annual grasses dominating)\*
- **9300 – Built Up & Urban Disturbance** (includes development, mines and borrow pits)
  - 9310 – Urban Window\*
- 9400 – Areas of Little or No Vegetation
  - 9401 – Cliffs & Rock Outcroppings
  - 9402 – River & Lacustrine Flats & Streambeds
- 9500 – Introduced North American Mediterranean Woodland and Forest Group
  - 9501 – *Eucalyptus* spp.
  - 9502 – *Juglans hindsii*, *Juglans regia*, and hybrids\*
- 9800 – Water
  - 9801 – Perennial Stream Channel\* 9802 – Reservoirs
  - 9803 – Small Earthen Dam Ponds and Natural Lakes

## **Appendix E. Vegetation Map Unit Descriptions with GIS Screenshots and Ground Photos**

### **Mesomorphic Tree Vegetation Formation Class (Forest and Woodland)**

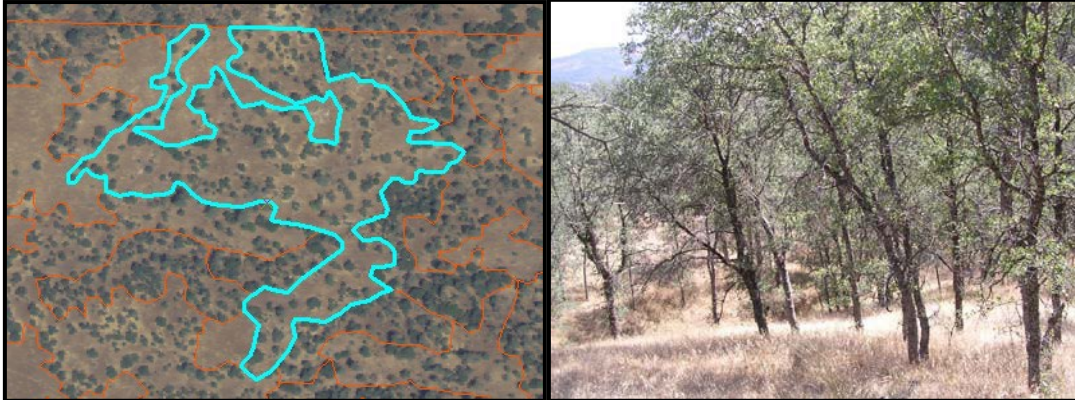
**1000 – Warm Temperate Forest Formation**  
**1100 , 1300 Californian Broadleaf Forest and Woodland Group**  
**1310 Aesculus californica (Buckeye) Woodland Alliance**



**Description:** *A. californica* is typically the dominant tree species and can occur at low to high cover. This alliance occurs in mesic and riparian settings often mixing with *Quercus wislizeni*. Shrubs commonly co-occur. In the study area stands of buckeye are commonly found along the upper edge of the table mountains, along draws and stream sides. Soils are shallow and moderately to excessively drained.

**Photo Interpretation Signature:** *A. californica* varies in color from light brown almost invisible to a light yellow or bright green color. Crowns are smooth rounded and smaller in size than oaks and with little to no shadow. This type can be difficult to see in summertime imagery since this plant is summer-deciduous.

### 1311 *Quercus douglasii* (Blue oak) Woodland Alliance



**Description:** *Q. douglasii* is the dominant tree species and can occur at low to high cover, or it is co-dominant with *Q. wislizeni*, *Aesculus californica*, or *Pinus sabiniana*. This alliance occurs on dry upland settings usually on valley bottoms, foothills, rocky outcrops and exposed hilltops. Soils are shallow, low in fertility, moderately to excessively drained with extensive rock.

**Photo Interpretation Signature:** *Q. douglasii* has rounded crowns that may cast an irregular shadow in winter imagery. The crown size varies from small to large and may be confused with a shrub type except for the tall shadow the saplings cast.

### 1313 *Quercus lobata* (Valley Oak) Woodland Alliance



**Description:** *Q. lobata* is the dominant tree species with low to high cover, though in some cases, *Q. wislizeni* or *Q. douglasii* may be co-dominant. This alliance occurs on lowland riparian settings on the valley bottoms and lower slopes that may be intermittently flooded. Soils are alluvial or residual.

**Photo Interpretation Signature:** *Q. lobata* is easily confused with *Q. douglasii* but can have a larger crown diameter. It has rounded crowns that may cast an irregular shadow in winter imagery.



### 1111 *Quercus wislizeni* (Live oak) Forest Alliance



**Description:** *Q. wislizeni* is the dominant or co-dominant tree species, and can occur at low to high cover. When *Q. wislizeni* is co-dominant, it is usually with either *Pinus sabiniana*, *Aesculus californica*, *Salix*. spp., or *Quercus douglasii*. This alliance occurs on dry, mesic and riparian settings, usually on canyon bottoms, flats, valley bottoms and lower slopes. Slope level and position varies significantly, though most stands occur in mesic settings and draws. Polygons with *Q. wislizeni* and riparian features are identified with an attribution. Soils are shallow and moderately to excessively drained.

**Photo Interpretation Signature:** *Q. wislizeni* appears as dark green to dark brown (in some imagery) individuals or groups of trees which have large dense evenly shaped crowns and coarse texture.

### 1200 California Evergreen Coniferous Forest and Woodland Group 1210 *Pinus sabiniana* (Ghost pine) Woodland Alliance



**Description:** *P. sabiniana* is the dominant tree species, where oaks and other trees are low in cover. *P. sabiniana* usually occurs in low cover overall with an open to intermittent canopy with low to high shrub cover. This alliance occurs on slopes and ridges in the study area. *P. sabiniana* is not a common alliance in the mapping area, as typically blue and interior oak species are also present in the canopy (and so their respective oak alliances would be mapped). Soils are shallow, often stony, infertile, and moderately to excessively drained.



**Photo Interpretation Signature:** *P. sabiniana* appears as a tall light grey-green to green. Ghost pine trees have a crown that resembles a star shape or triangle and is highly coarse in texture. It is seen easiest by the tall shadow it casts in the aerial imagery.

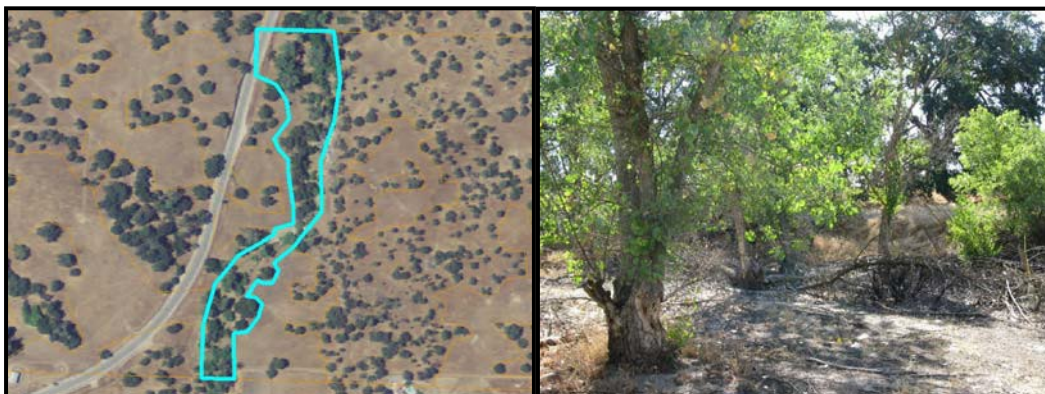
**3000 – Temperate Flooded and Swamp Forest Formation**  
**3100 Southwestern North American Riparian Evergreen and Deciduous Woodland Group**



**Description:** Southwestern North American riparian evergreen and deciduous woodland is a group level mapping unit and can include any riparian type in the study area. It may have various riparian species, such as *Salix* (willow) and *Populus* (cottonwood) species, as well as *Quercus wislizeni*, and high cover of riparian scrub or herbs in the understory. Soils are typically deep and well developed, often rocky.

**Photo Interpretation Signature:** This group has a bright to dark green signature with a rough texture. It contains narrow and broad crown trees, and appears as a combination of cottonwood, willow and oak signatures.

### 3110 *Populus fremontii* (Fremont cottonwood) Forest Alliance



**Description:** *P. fremontii* co-occurs with many other riparian species and is at least more than 5% absolute cover. This alliance occurs on floodplains, along perennial or seasonally intermittent streams on lower slopes and is not a common type in the study area.

**Photo Interpretation Signature:** *P. fremontii* has a bright green signature with a patchy texture. It is taller than oaks and has a narrow crown.

### 3111 *Salix laevigata* (Red willow) Woodland Alliance



**Description:** *S. laevigata* is typically the dominant species and usually occurs at medium to high cover. This alliance is commonly found with various shrub species in riparian settings and on mid to lower slopes. This type is not common in the study area.

**Photo Interpretation Signature:** This alliance has a bright green to light green or light brown signature and has a rough texture. When these trees grow close together they may appear smoother in texture.

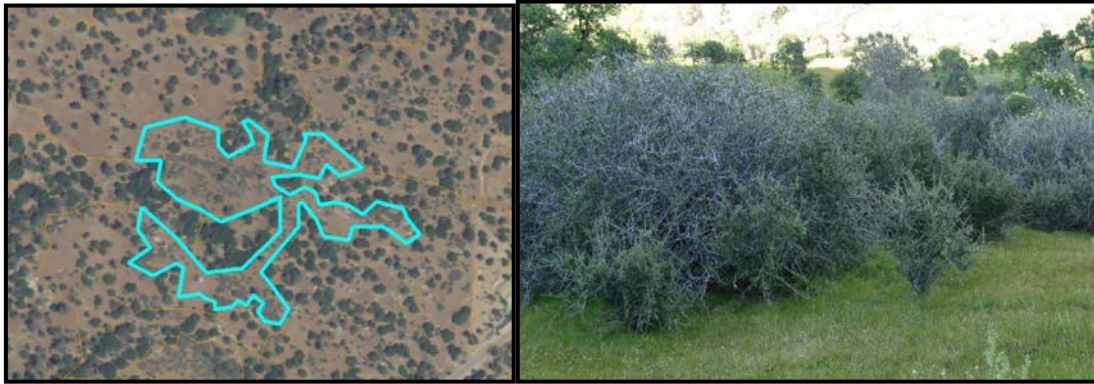


**Mesomorphic Shrub and Herb Vegetation Formation Class (Shrubland and Grassland)**

**4000 – Mediterranean Scrub Formation;**

**4100 California Xeric Chaparral Group;**

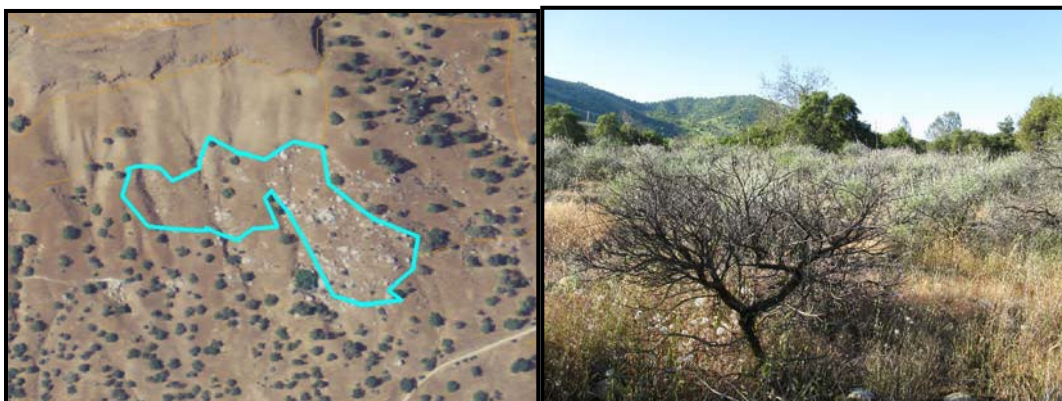
**4113 *Ceanothus cuneatus* (Wedge leaf ceanothus) Shrubland Alliance**



**Description:** *C. cuneatus* is dominant in the shrub layer. Stands of this type may contain few oaks and a low cover of other shrubs such as *Lupinus albifrons*, *Toxicodendron diversilobum* or *Sambucus nigra*. This alliance is typically found on rocky upland ridges and exposed upper slopes. Soils are shallow, rocky, and well drained.

**Photo Interpretation Signature:** *C. cuneatus* has a grey signature with patchy small crowns that cast little to no shadow. These crowns are more robust than other shrubs.

**4700 Central and South Coastal California Seral Scrub;**  
**4710 *Lupinus albifrons* (Silver bush lupine) Shrubland Alliance**



**Description:** *Lupinus albifrons* is the dominant shrub and may co-occur with other shrubs such as *Ceanothus cuneatus* or *Lotus scoparius* (deerweed) as well as sparse, emergent oaks. This alliance is typically found in chaparral settings on rocky upland ridges and exposed mid to upper slopes. Soils are shallow, rocky, and well drained.

**Photo Interpretation Signature:** *L. albifrons* has a smaller crown and shorter height than *C. cuneatus*, yet emergent *C. cuneatus* may look similar in signature.

**6000 – Temperate Grassland, Meadow, and Shrubland Formation;  
6300 Vancouverian Coastal Deciduous Scrub Group;  
6301 *Toxicodendron diversilobum* (Poison oak) Shrubland Alliance**



**Description:** *T. diversilobum* is typically the dominant shrub and may be open to dense in the shrub layer. In the study area this alliance is found in mesic environments and on upper exposed slopes adjacent to stands of *Aesculus californica* and may co-occur with *Sambucus nigra*. Soil types are similar to *A. californica* and *Quercus douglasii*.

**Photo Interpretation Signature:** *T. diversilobum* is a dark, rich green and may turn light green or almost brownish in color. It can be patchy or smooth in texture.



### 6302 *Sambucus nigra* (Blue elderberry) Shrubland Alliance



**Description:** *S. nigra* is typically the dominant species and usually co-occurs with *Toxicodendron diversilobum*. This alliance is uncommon in the study area and occurs on exposed rocky slopes near the table edge or on sheltered north facing slopes. Soils are typically gravelly alluvium and may be intermittently flooded.

**Photo Interpretation Signature:** *S. nigra* is similar in signature to *T. diversilobum* yet may have a small shadow or a lighter green color.

### 7100, 7400 or 7600 – Mediterranean Grassland and Forb Meadow Formation; 7100 California Annual and Perennial Grassland Macrogroup;



**Description:** This macrogroup includes many herbaceous types, these types can vary from high to low cover. Grasslands are found over the entire study area, from valley bottoms to upper slopes and hill tops. California grasslands are always present with very low cover of trees and shrubs. Some of the common grassland species include *Bromus* spp. (bromes), *Erodium* spp. (storksbills), *Gilia tricolor* (birds's-eye gilia), *Hypochaeris glabra* (smooth cat's ear), *Lasthenia* spp. (goldfields), *Lotus unifoliolatus* var. *unifoliolatus* (American bird's-foot trefoil), *Lupinus* spp. (lupines), *Phacelia cicutaria* (caterpillar phacelia), *Plagiobothrys nothofulvus* (rusty popcornflower), *Plantago erecta* (dwarf plantain), *Sedella pumila* (Sierra mock sotonecrop), *Selaginella hansenii* (Hansen's spikemoss), and *Vulpia microstachys* (small fescue).

**Photo Interpretation Signature:** This Group is a grassland type that is

not wet or very rocky. It is usually light brown and yellowish in summer imagery and green in spring imagery.

**7200 or 7300 – Temperate and Boreal Freshwater Marsh Formation;  
7200 Californian Warm Temperate Marsh/Seep Group**



**Description:** This group is found in riparian or flooded areas without trees and shrubs. The dominant species are *Carex* spp. (sedges) or *Juncus* spp. (rushes) and are typically found in valley bottomlands. This type was not common in the study area.

**Photo Interpretation Signature:** This macro group has a dark green color in spring and early summer imagery with a smooth texture. The signature may be similar to the Arid Freshwater Emergent Marsh Group.

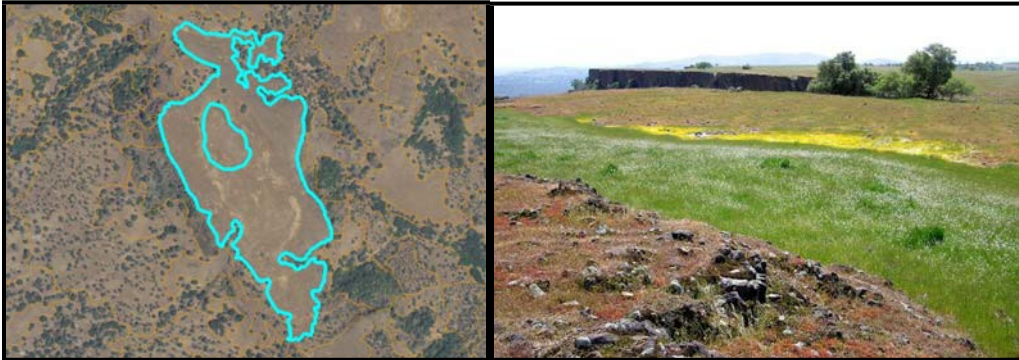
**7300 Arid West Freshwater Emergent Marsh Group**



**Description:** This group is typically found in riparian or flooded areas without shrubs and trees. The dominant herbaceous species include *Typha* spp. (cattail) or *Schoenoplectus* spp. (bulrush), and are found on valley bottomlands or riparian lowland areas.

**Photo Interpretation Signature:** This group has a dark green color in imagery even in summer and is smooth in texture, found in riparian strips or along ponds or other stagnant water. This type is easily confused with the California Warm Temperate Marsh/Seep Group.

## 7400 Californian Vernal Pool & California Annual and Perennial Grassland Matrix Mapping Unit



**Description:** This matrix mapping unit includes small stands of vernal pools and swales intermixed with upland grasslands. Annual herbaceous cover is high and consists of native wetland graminoids and forbs along with upland herbs and non-native grasses. This is a common type on the table mountain tops in the study area, where the soils are shallow, underlain by lava rock, and vernally wet. As individual vernal pools are usually well below the minimum mapping unit (MMU) of  $> 1/2$  acre, they are therefore mapped as within a matrix with other grasslands rather than as individual vernal pools and swales.

**Photo Interpretation Signature:** This matrix has a light brown and spotted white signature in summer imagery. In spring imagery it is dark green with small bodies of water or dark blotches spotted throughout. They are commonly found on table mountains (in the study area) and in valley plains (to the west of the study area).



## 7600 California Mixed Annual/Perennial Vernal Pool and Swale Bottomland Group



**Description:** This vernal pool and swale group represents a rare type of vegetation including *Lasthenia* spp. (goldfields), *Eleocharis macrostachya* (spikerush), *Downingia* spp., *Montia fontana* (water blinks), *Sidalcea calycosa* (annual checkerbloom) and *Vulpia* spp. (annual fescues). Stands usually have high herbaceous cover and have winter ponding and vernal wet soils. This type is primarily found across the top of the lava rock table mountains. The few mapped stands in the study area are >1/2 acre; however, most stands are below this MMU and therefore mapped as a matrix with upland grasslands within the 7401 map unit.

**Photo Interpretation Signature:** Large and small areas on the table mountain tops in the study area that have a lighter color than the surrounding areas and in winter imagery are dark green or dark blue. They are circular in shape or in a stream-like, swale shape. Most areas of this type are too small to map.

### 9000 – Sparsely Vegetated, Water, & Urbanized Land Use & Land Cover Types; 9300 Built Up & Urban Disturbance

**Description:** This land use map unit is not related to agricultural settings. It includes areas for residential, commercial, industrial, and extractive uses, as well as areas cleared for potential development.

### 9400 Areas of Little or No Vegetation 9401 Cliffs & Rock Outcroppings

**Description:** This land cover unit is mapped as natural land features with little or no vegetation (generally below 5–10% total cover) on rock outcrops, rocky slopes, canyons, and cliffs.

### 9402 Riverine & Lacustrine Flats & Streambeds

**Description:** This unit is mapped as natural land features with little or no vegetation (generally below 5–10% total cover) along riparian and lakeshore areas, and usually with seasonal and yearly flooding. Baseline date for interpretation is late spring to summer 2009, using NAIP 1-meter imagery.

### 9500 Introduced North American Mediterranean Woodland and Forest

**Description:** This land cover unit is mapped when non-native trees are visible, and trees may have been planted and escaped from urban dwellings.

**9501 *Eucalyptus* spp.**

**Description:** This unit is mapped when *Eucalyptus* species are visible, and trees may have been planted or escaped in urban and rural settings.

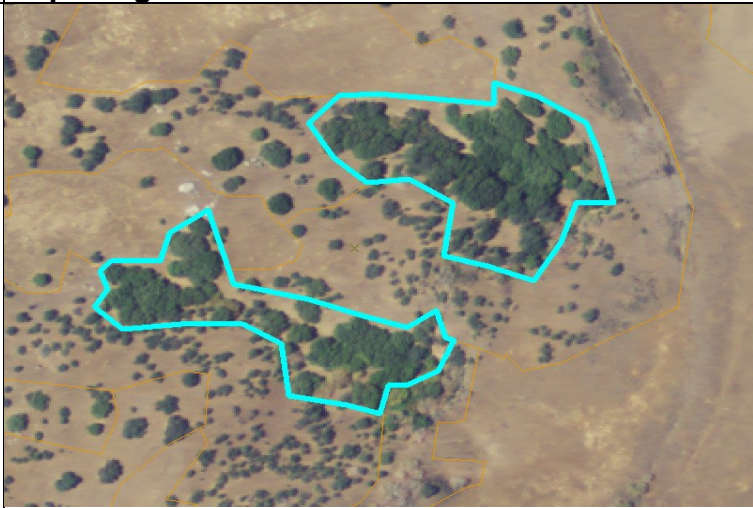


**9800 Water**

**Description:** This land cover unit is mapped when open water is visible in basins including man-made reservoirs, and natural or man-made ponds and lakes. Baseline date for interpretation is late spring to summer 2009, using NAIP 1-meter imagery. However, changes in flooding (and vegetation) may occur seasonally or yearly, especially along the margins of these water-holding basins. The following map units are included in this category:




- **9802 Reservoirs**
- **9803 Small Earthen Dam Ponds & Natural Lakes**

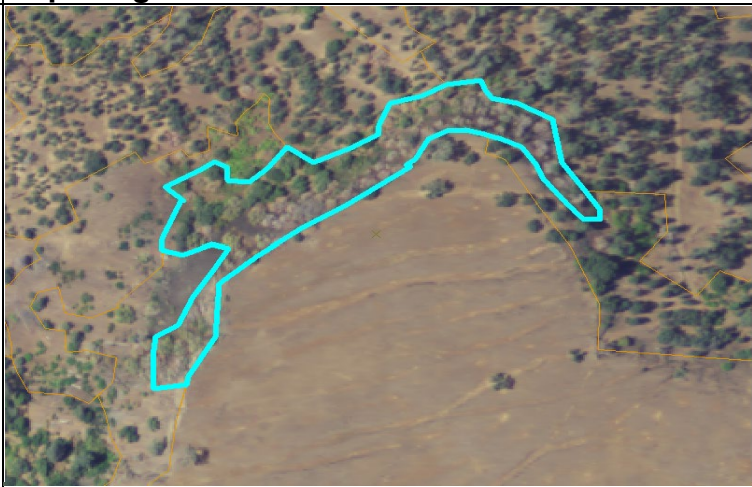


## Appendix F. Comprehensive Set of Vegetation Map Unit Screenshots

### Woodlands and Forests in Upland to Moist Settings



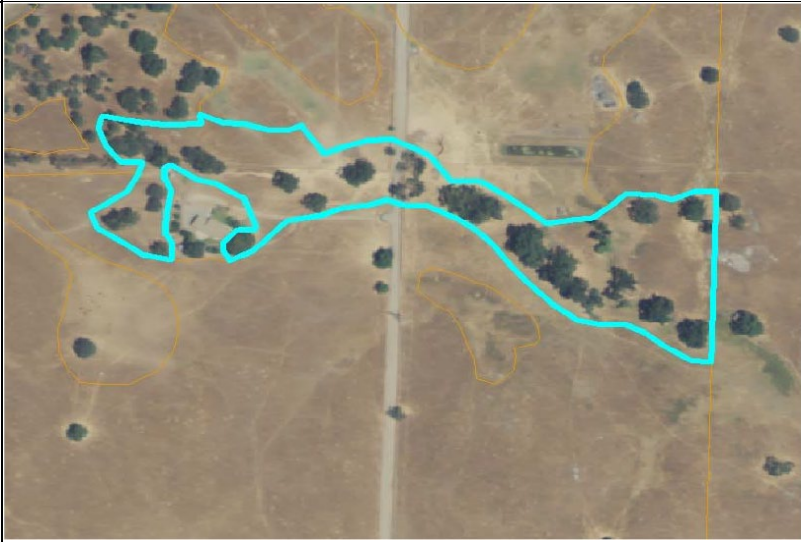
Code	Map Name	Map Image Screenshot	Scale
1111	<i>Quercus wislizeni</i> Alliance (denser stand)		1:4,000
1111	<i>Quercus wislizeni</i> Alliance (open stand)		1:4,000
1111E	<i>Quercus wislizeni</i> (– <i>Aesculus californica</i> Association)		1:4,000

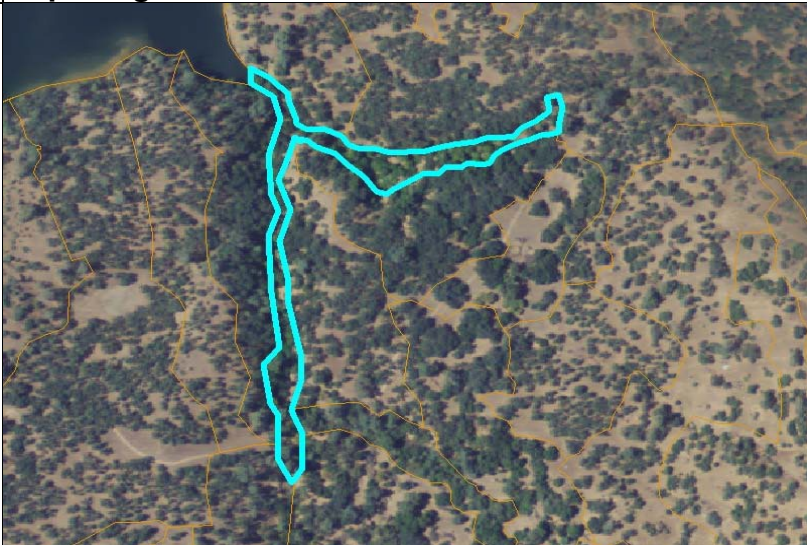



Code	Map Name	Map Image Screenshot	Scale
1111H	<i>Quercus wislizeni</i> (– <i>Quercus douglasii</i> – <i>Pinus sabiniana</i> Association)		1:4,000
1111J	<i>Quercus wislizeni</i> (– <i>Pinus sabiniana</i> Association)		1:4,000
1210	<i>Pinus sabiniana</i> Alliance		1:6,000

Code	Map Name	Map Image Screenshot	Scale
1310	<i>Aesculus californica</i> Alliance		1:4,000
1311	<i>Quercus douglasii</i> Alliance (larger open stand)		1:6,000
1311	<i>Quercus douglasii</i> Alliance (small open stand)		1:4,000



Code	Map Name	Map Image Screenshot	Scale
1311	<i>Quercus douglasii</i> Alliance (denser stand)		1:4,000
1311F	<i>Quercus douglasii</i> (– <i>Pinus sabiniana</i> / Grass Association)		1:6,000
1313	<i>Quercus lobata</i> Alliance		1:6,000

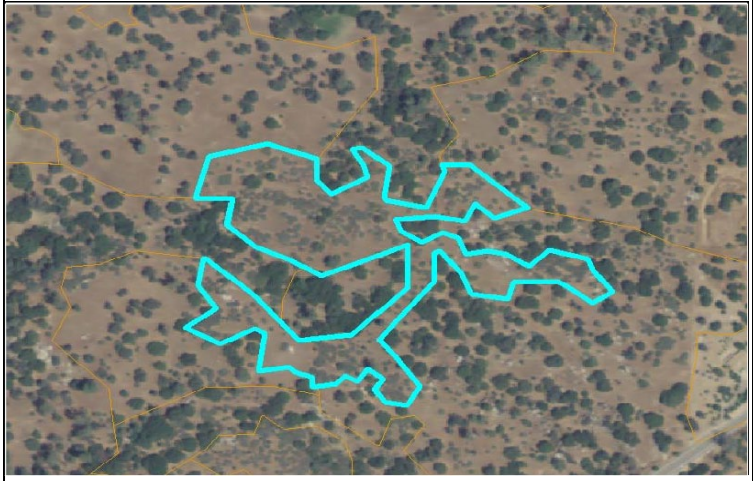


Code	Map Name	Map Image Screenshot	Scale
3100	Southwestern North American Riparian Woodland Group	 An aerial photograph of a riparian woodland area. A cyan line outlines a specific region that follows a water body on the left and extends into a forested area. The surrounding landscape is a mix of dense green trees and lighter brown, open areas.	1:6,000
3110	<i>Populus fremontii</i> Alliance	 An aerial photograph of a landscape with a cyan boundary outline. The outline encloses a strip of land adjacent to a road or waterway, containing several large, dark green trees. The rest of the area is sparsely vegetated with small, dark green shrubs or trees on a light brown background.	1:6,000


3111	<i>Salix laevigata</i> Alliance		1:6,000
------	------------------------------------	--	---------

**Woodlands and Forests in Riparian Settings**





# Chaparral and other Shrublands

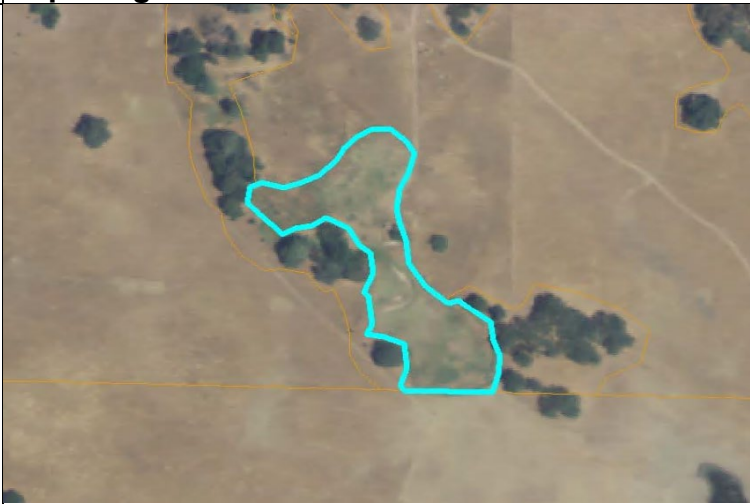
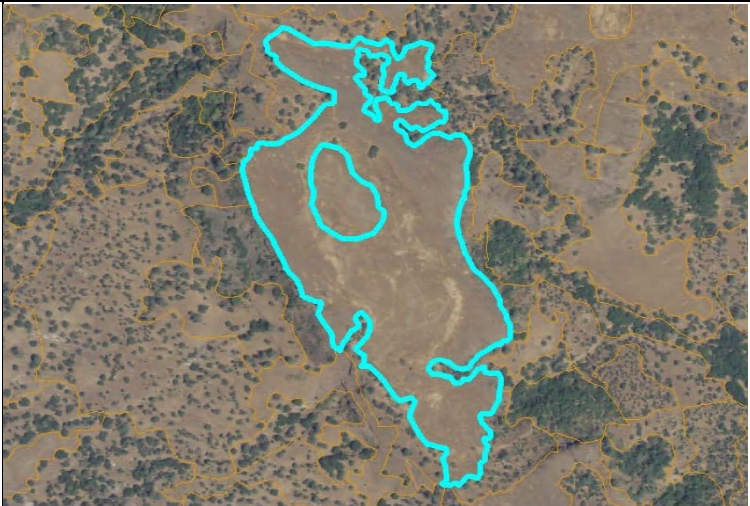

Code	Map Name	Map Image Screenshot	Scale
4113	<i>Ceanothus cuneatus</i> Alliance		1:6,000
4710	<i>Lupinus albifrons</i> Alliance		1:6,000
6301	<i>Toxicodendron diversilobum</i> Alliance		1:4,000

Code	Map Name	Map Image Screenshot	Scale
6302	<i>Sambucus mexicana</i> Alliance		1:4,000




#### Herbaceous Vegetation (Upland to Wetland)

Code	Map Name	Map Image Screenshot	Scale
7100	California Annual & Perennial Grassland Group		1:6,000
7200	Californian Warm Temperate Marsh/Seep Group		1:4,000








Code	Map Name	Map Image Screenshot	Scale
7300	Arid Freshwater Emergent Marsh Group		1:4,000
7400	Vernal Pool & Californian Annual and Perennial Grasslands Matrix Mapping Unit		1:12,000
7600	California Mixed Annual/Perennial Vernal Pool and Swale Bottomland Group		1:4,000

# **Rocky, Sparsely Vegetated, Semi-Natural, or Urbanized Settings**

Code	Map Name	Map Image Screenshot	Scale
9300	Built up & Urban Disturbance		1:6,000
9401	Cliffs & Rock Outcroppings		1:4,000
9401	Cliffs & Rock Outcroppings		1:4,000



Code	Map Name	Map Image Screenshot	Scale
9402	River & Lacustrine Flats & Streambeds		1:6,000
9500	Introduced North American Mediterranean woodland and Forest Group		1:4,000
9501	Eucalyptus spp. Stands (in urban setting)		1:6,000

Code	Map Name	Map Image Screenshot	Scale
9802	Reservoirs		1:24,000
9803	Small Earthen Dam Ponds and Natural Lakes		1:4,000