

FINE-SCALE VEGETATION MAP AND ACCURACY ASSESSMENT OF THE SOUTHERN SIERRA NEVADA FOOTHILLS, CALIFORNIA

Contract P1884008



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Prepared for the
California Department of Fish and Wildlife
Final Report March 2022

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ACKNOWLEDGMENTS

Funding was provided by **The California Department of Fish and Wildlife.**

Personnel involved in developing the methodology and implementing this project included:

Aerial Information Systems: Lisa Cotterman, Christian Farmer, John Fulton, Arin Glass, Anne Hepburn, Ben Johnson, Debbie Johnson, John Menke, Trevor Merback, Lisa Morse, Ed Reyes, Patrick Yiu

California Department of Fish and Wildlife: John Battistoni, Rachelle Boul, Catherine Curley, Betsy Harbert, Torrance Haynes, Diana Hickson, Jaime Ratchford, Ron Samra, Todd Keeler-Wolf, Rosalie Yacoub

California Native Plant Society: Jennifer Buck-Diaz, Julie Evens, Kelsey Guest, Adam Hoeft, Alexis LaFever-Jackson, Jaime Ratchford, Tom Reyes, Kendra Sikes, Savannah Vu, Molly Wiebush

Soar Environmental Consulting: Travis Albert, Danielle Aparicio, Sam Hopstone, Patrick Sauls, Casey Stewman

Vollmar Natural Lands Consulting: Jake Schweitzer, John Vollmar

We thank the following public land managers and resource experts for permitting and facilitating the field data collection visits and for help with the project overall:

California Department of Fish & Wildlife: John Battistoni, Ron Samra

California Department of Parks & Recreation: Nita Barve, Darcy Moore, Nathaniel Wiggington

California State Lands Commission: Lucien Pino

National Audubon Society: Reed Tollefson

San Joaquin River Parkway and Conservation Trust: Coke Hallowell

Sierra Foothill Conservancy: Bridget Fithian, Gary Miltimore

Sequoia National Forest, San Joaquin Experimental Range: Renee Denton

Sequoia Riverlands Trust: Jeff Powers, Jonathan Vaughn

Serengeti Foundation: Wolfgang Gaede

The Nature Conservancy, Tehachapi Preserve: Zach Principe

The Wildlands Conservancy, Wind Wolves Preserve: Melissa Dabulamanzi, Landon Peppel, Matt Thorp

US Army Corps of Engineers: Orlando Roncal

US Bureau of Land Management, California State Office: Christina Lund, Laura St John

US Bureau of Land Management, Bakersfield Field Office: Karen Doran

US Forest Service: Joanna Clines, Ty Davis, Dan Smith, Kristen Waltz

Additionally, thank you to dozens of local land owners who provided assistance or granted access to their properties. Apologies to anyone we may have left off of this list.

ABSTRACT

Under contract to the California Department of Fish and Wildlife (CDFW), Aerial Information Systems (AIS) created a fine-scale vegetation map of portions of the Southern Sierra Nevada Foothills in central California. AIS subcontracted the California Native Plant Society (CNPS) to conduct field reconnaissance assistance for this project, as well as accuracy assessment (AA) field data collection; and Soar Environmental Consulting to assist in the AA field data collection. CDFW's Vegetation Classification and Mapping Program (VegCAMP) provided in-kind service to allocate and score the AA.

The mapping study area, consists of approximately 1,824,939 acres, of Mariposa, Madera, Tulare, Kern, and Los Angeles counties. Work was performed on the project between 2019 and 2022. The primary purpose of the project was to further CDFW's goal of developing fine-scale digital vegetation maps as part of the California Biodiversity Initiative Roadmap of 2018.

CNPS under separate contract and in collaboration with CDFW VegCAMP developed the floristic vegetation classification used for the project. The floristic classification follows protocols compliant with the Federal Geographic Data Committee (FGDC) and National Vegetation Classification Standards (NVCS).

The vegetation map was produced applying heads-up digitizing techniques using a 2018 base of one-meter National Agricultural Imagery Program (NAIP) imagery (true-color and color infrared), in conjunction with ancillary data and imagery sources. Map polygons are assessed for Vegetation Type, Percent Cover, Exotics, Development Disturbance, and other attributes. The minimum mapping unit (MMU) is 2 acres; exceptions are made for wetlands and riparian types, which were mapped to a 1-acre MMU.

Field reconnaissance and accuracy assessment enhanced map quality. There was a total of 111 mapping classes. The overall Fuzzy Accuracy Assessment rating for the final vegetation map, at the Alliance and Group levels, is 89.5 percent.

Keywords: California Department of Fish and Wildlife, National Vegetation Classification Standard, NVCS, photointerpretation, Sierra Nevada, Southern Sierra Nevada, vegetation, vegetation alliance, Vegetation Classification and Mapping Program, VegCAMP

Please use the following citation for this report:

Reyes, E., A. Glass, J. Evens, J. Buck-Diaz, A. LaFever-Jackson, J. Ratchford, R. Boul, R. Yacoub, J. Menke, J. Fulton, and D. Johnson. 2022. ***Fine-Scale Vegetation Map and Accuracy Assessment of the Southern Sierra Nevada Foothills, California. Contract P1884008.*** Final Report. Prepared for the California Department of Fish and Wildlife. Aerial Information Systems, Inc., Redlands, CA.

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CHAPTER 1: Introduction

1.1 The Mapping Program

Under Contract P1884008, the California Department of Fish and Wildlife (CDFW) tasked Aerial Information Systems, Inc. (AIS) to conduct mapping classification development and fine-scale vegetation mapping of approximately 1,824,939 acres within Mariposa, Madera, Fresno, Tulare, Kern, and Los Angeles counties of California. The California Native Plant Society (CNPS), as a subcontractor to AIS, assisted AIS in field reconnaissance efforts and conducted the accuracy assessment (AA) field data collection for this project. Soar Environmental Consulting (SOAR), also as a subcontractor, assisted in the AA land access and field data collection.

CDFW's goal is to develop fine-scale vegetation maps for local and regional planning purposes, as specified in the California Biodiversity Initiative roadmap of 2018. The Southern Sierra Nevada Foothills (SSNF) ecological region is one of several that are considered as having potential for the greatest increase in urban, suburban, and rural residential development within California. AIS had previously mapped the vegetation for the adjacent Northern Sierra Nevada Foothills area for CDFW from 2008 to 2011 (Menke et al., 2011).

Work performed for this effort, including the development of the mapping classification, is based on the floristic classification provided by CDFW (Ratchford 2022), and mapping standards as outlined in the Survey of California Vegetation, Classification, and Mapping Standards developed by the Vegetation Classification and Mapping Program (VegCAMP) (VegCAMP 2020). The mapping classification includes sparsely vegetated and non-vegetative classes, such as rock outcrops, water bodies, and land use that may not be part of the floristic classification.

Field reconnaissance was conducted by staff from AIS, accompanied on a few trips by VegCAMP and/or CNPS staff. AIS photointerpreters then created a geographic information systems (GIS) geodatabase of vegetation map units representing Vegetation Types (vegetation alliances) and Percent Cover of different vegetative life forms. Map polygons were assessed for Exotics, Development Disturbance, and other attributes (see Appendix A). The minimum mapping unit (MMU) for vegetation is 2 acres; exceptions are made for wetlands and riparian types, which are mapped to a 1-acre MMU. Land use polygons are mapped to a 1-acre MMU.

The geodatabase was produced using on-screen heads-up digitizing, with the data georeferenced to 2018 one-meter National Agricultural Imagery Program (NAIP) imagery. Ancillary data and imagery sources were used to supplement attribution. The geodatabase passed quality control procedures before being finalized. AA was conducted by VegCAMP and CNPS staff. Sample allocation sites for AA were created by VegCAMP for field crews to use during the field data collection. Once the field plot information was entered into a database, the point data was analyzed and scored by VegCAMP.

1.2 The Study Area

The project study area consists of three geographic subareas, the Southern Sierra Nevada Foothills Proper, the Horsethief Mountain subarea north of the Tejon Ranch, and the San Emigdio Range subarea west of Tejon Ranch. Each subarea is described in the following subsections. The study area was divided into 6 Delivery Areas, 2 of which were further subdivided, for a total of 8 interim Delivery Areas. Figure 1 below shows the project study area, subareas, and the 8 Delivery Areas.

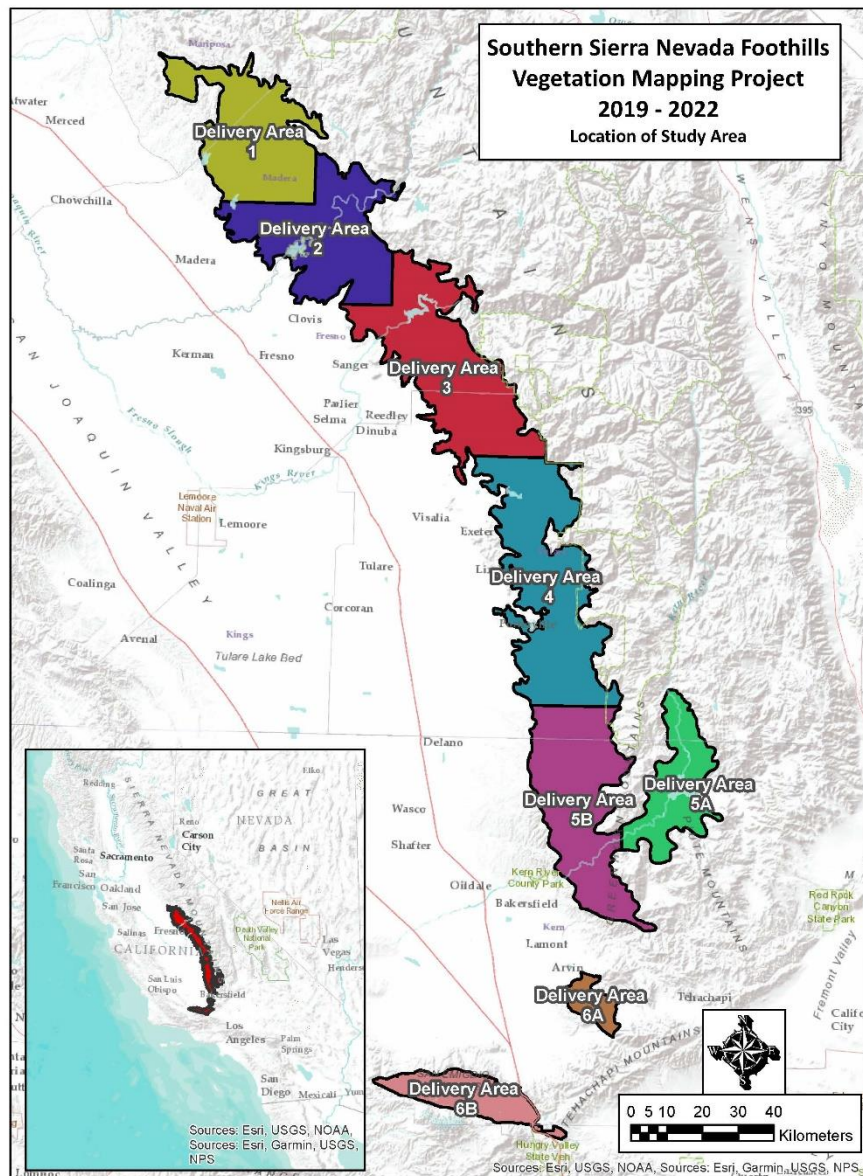


Figure 1: Location of the Study Area

The Southern Sierra Nevada Foothills Proper is consists of Delivery Areas 1, 2, 3, 4, and 5. The Horsethief Mountain subarea is entirely within Delivery Area 6A, and the San Emigdio Range subarea is entirely within Delivery Area 6B.

1.2.1 Southern Sierra Nevada Foothills Proper Subarea

The Southern Sierra Nevada Foothills Proper, in general, encompasses what is considered the blue oak zone of the southern Sierra Nevada foothill region. The western border of the study area includes the lower elevation grasslands that abut the previously mapped Great Valley Ecoregion Vegetation Map geodatabase. The Northern Sierra Nevada Foothills Ecoregion Vegetation geodatabase, also previously mapped, borders the study area on the north. On the eastern side, the study area follows the upper edge of the blue oak-interior live oak zone as it transitions to the canyon live oak-black oak and conifer zone (at approximately 3000 feet on some canyon bottoms to 8000 feet in elevation on the higher slopes). A small portion of the eastern border abuts the previously mapped Sequoia-Kings Canyon National Park vegetation geodatabase.

This subarea is home to a number of significant river systems (with corresponding vegetated riparian corridors), as well as several major reservoirs, all feeding the agricultural areas and communities of the San Joaquin Valley. They also serve recreational purposes for the state. These include the Fresno River (with Hensley Lake), the San Joaquin River (with Millerton Lake), the Kings River (with Pine Flat Lake), the Kaweah River (with Lake Kaweah), the Tule River, and the Kern River (with Lake Isabella).

The western third of the subarea consists primarily of heavily grazed annual grasslands occurring on rolling hills that rise out from the edge of the San Joaquin Valley floor. Oval patterns of vernal pools pockmark the grasslands in the shallow draws and confined basins of the northwestern portion of the subarea. Widely scattered open stands of California coffeeberry (*Frangula californica*) occur on rocky outcroppings within the grassy matrix. Sparse stands of Fremont cottonwood (*Populus fremontii*) begin to appear in the riparian corridors, along with stands of blue oak (*Quercus douglasii*) woodlands on the toe/side slopes.

Advancing to the east as one climbs further into the hills and higher in elevation (below 3000 feet), the blue oak cover and frequency increases on variable aspects where interior live oak (*Quercus wislizeni*) begins to establish in the protected concavities and north faces with California buckeye (*Aesculus californica*). Chaparral species such as wedgeleaf ceanothus (*Ceanothus cuneatus*), whiteleaf manzanita (*Arctostaphylos viscida*), and birch leaf mountain mahogany (*Cercocarpus montanus*) occur as a minor component to stands and occasionally form small patches. Chaparral whitethorn (*Ceanothus leucodermis*) stands, more commonly found in the northern third of the study area, are observed on rocky/thin soil substrates and gradually sloping north faces. Riparian areas consist of mixed Fremont cottonwood and California sycamore (*Platanus racemosa*) in the upper canopy with an understory of narrowleaf willow (*Salix exigua*), button willow (*Cephalanthus occidentalis*), and/or mulefat (*Baccharis salicifolia*). Oregon ash (*Fraxinus latifolia*) also begins to establish in the creeks within this subregion.

Valley oak (*Quercus lobata*) starts to occupy the drier margins of the floodplain terraces adjacent to more significant drainages that usually contain a core of riparian tree/shrub species next to the active channel. Sparse stands of either deer weed (*Lotus scoparius*), silver bush lupine (*Lupinus albifrons*), and/or yerba santa (*Eriodictyon* spp.) occur on human-disturbed areas recovering from fire or clearing, as well as on small rocky outcrops with grassy interludes.

Foothill pine (*Pinus sabiniana*) is absent within a large gap (almost half the study area) from Pine Flat Reservoir southward, until it picks up again in the higher elevations west of the Greenhorn Mountains and in the areas surrounding Lake Isabella. Chamise (*Adenostoma fasciculatum*) occurs in three localized areas and is limited in its distribution. The northern half of the subarea boasts a small concentration of chamise stands that occur near the Fresno River, west of the town of Coarsegold. It should be noted that chamise is largely absent from the northern half and southern third of the subarea. In the southern half, chamise stands appear again in pockets along the eastern edge of the subarea, in the higher elevations between Shadequarter Mountain in the north to the middle fork of the Tule River in the south. One other outlier patch occurs on the toe slopes along the Kern River, north of the town of Kernville.

Further east, above 3000 feet in elevation, the terrain becomes steeper and more variable, with tree and shrub dominated stands averaging higher overall covers of mixed conifer, hardwood, and chaparral types. Higher elevation conifers such as ponderosa pine (*Pinus ponderosa*) and incense cedar (*Calocedrus decurrens*) mix in the upper canopy above interior live oak and canyon live oak (*Quercus chrysolepis*). Black oak (*Quercus kelloggii*) also occurs more in this region on gradual convexities or flats, with components of ponderosa pine, canyon live oak, interior live oak, and chaparral. Significant conifer dieback was observed in many of these stands. Chaparral stands in this region vary between whiteleaf manzanita, wedgeleaf ceanothus, California flannelbush (*Fremontodendron californicum*), and birch leaf mountain mahogany dominance. Riparian corridors occurring in the upper elevations of this region contain stands of California sycamore and Fremont cottonwood, with a higher frequency of Oregon ash cover. Rocky/bouldery stream beds with fast moving water boast small densely homogenous sections of white alder (*Alnus rhombifolia*).

The southern third of the subarea is influenced by more xeric conditions and is within close proximity to the Mojave Desert. Southern California and desert species such as singleleaf pinyon (*Pinus monophylla*), California juniper (*Juniperus californica*), Joshua tree (*Yucca brevifolia*), cup leaf ceanothus (*Ceanothus greggii*), California flannelbush, big sagebrush (*Artemisia tridentata*), California buckwheat (*Eriogonum fasciculatum*), Wright's buckwheat (*Eriogonum wrightii*), chaparral yucca (*Hesperoyucca whipplei*), scale broom (*Lepidospartum squamatum*), California joint fir (*Ephedra californica*), Acton's brittle brush (*Encelia actonii*), and rubber rabbitbrush (*Ericameria nauseosa*) occur primarily along the Kern River corridor. Rare stands of Paiute cypress (*Hesperocyparis nevadensis*) also occur on protected slopes above 4000 feet in elevation within the Kern River corridor.

1.2.2 Horsethief Mountain Subarea

The Horsethief Mountain subarea lies at the western end of the Tehachapi Mountains, west of Cummings Valley and north of Tejon Ranch. It is in the blue oak-interior live oak zone. The grasslands on the west abut the Great Valley Ecoregion Vegetation Map geodatabase. A portion of the northern border is adjacent to the Tehachapi Rail Corridor Vegetation geodatabase and borders the Bear Valley and the Bear Valley Springs development. The eastern boundary is adjacent to Cummings Valley. The southern border follows the Rancho El Tejon cadastral line.

The southwestern portion of the subarea features extensive steep southwest-trending slopes dominated by California annual grasslands. At the higher elevations on more protected slopes, stands of blue oak dominate. On larger slopes California buckeye and canyon live oak are prevalent, with some stands of interior live oak and some patches of big sagebrush. As the terrain flattens out near the community of Stallion Springs, at the southern end of the Cummings Valley, valley oaks become prominent in the developed areas. Cummings Valley drains into Chanac Creek which features stands of Fremont cottonwood, and some valley oak (riparian) and red willow.

The gentle hills dotted with homes northwest of Stallion Springs proper are dominated by blue oak, with some stands of interior live oak and California buckeye in the protected draws. As the hills become steeper further north, the blue oak and interior live oak stands continue, with canyon live oak and California buckeye on the protected slopes. Valley oak dominates Oak Flat with a stand of cup leaf ceanothus and California flannelbush on an adjacent north slope. The highest elevation slopes, northwest of Oak Flat, feature stands of birch leaf mountain mahogany, some foothill pine, and more extensive areas of interior live oak.

Over the ridge, on the north-facing slopes above the private community of Bear Valley Springs, there are extensive stands of cup leaf ceanothus, California flannel bush, birch leaf mountain mahogany, and big sagebrush, along with blue oak stands and interior live oak and canyon live oak in the steeper protected canyons.

The northwestern part of the subarea, features west-trending grasslands coming up the slopes of the Tejon Mountains from the valley below. These grasslands are broken up by areas of narrowleaf goldenbush (*Ericameria linearifolia*) on protected north-trending facets on the lower elevations, and blue oak woodlands at the higher elevations. The north slopes in this area feature broader stands of California buckeye, dense stands of both interior live oak shrub and tree types, and some stands of foothill pine and wedgeleaf ceanothus as well. At the bottom of the broad north slope is Sycamore Canyon which contains canyon live oak, California sycamore, and Fremont cottonwood. North of this canyon is a steep south slope, at the very northern edge of the subarea, which features an extensive California buckwheat stand.

1.2.3 San Emigdio Range Subarea

The San Emigdio Range subarea consists of the mountains at the southern end of the San Joaquin Valley. The northern boundary abuts the Great Valley Ecoregion

Vegetation Map geodatabase. The southern border lies along the San Andreas Rift Zone from Bitter Creek on the west to just west of Quail Lake on the east. A small portion of the eastern boundary abuts the Desert Renewable Energy Conservation Plan (DRECP) Vegetation geodatabase. Another portion of the eastern border follows the Interstate 5 (I-5) corridor. The remainder of the eastern border steps its way from the I-5 freeway to the DRECP study area. This portion east of the I-5 forms an appendage of the study area within the Tehachapi Mountains.

The southern edge of this subarea follows along the steep, south-facing slope of the San Emigdio Mountains, between the Blue Ridge-Tecuya Ridge and the San Andreas Rift Zone. On the west end of the subarea, these south-facing slopes start out dominated by grasslands with areas of allscale saltbush (*Atriplex polycarpa*) and California buckwheat on the lower elevation slopes, while stands of birch leaf mountain mahogany and Tucker oak (*Quercus john-tuckeri*) dominate the more extensive, higher elevation slopes. Further east, stands of canyon live oak, Jeffrey pine (*Pinus jeffreyi*) and singleleaf pinyon occur where the upper slope is more undulating. These three types also occur along the ridge, and continued to dominate to the east along the south face above the Pine Mountain Club.

Further east, near the Pinon Pines Estates, where the south face is not as extensive, the canyon live oak and Jeffrey pine drop out and interior live oak, Tucker oak, and California buckwheat stands occur with the singleleaf pinyon stands. The lower slopes have big sagebrush and rubber rabbitbrush stands in this area.

This south-facing slope of the San Emigdio Mountains becomes more undulating and the diversity increases near Frazier Park. Upper slopes have stands of canyon live oak, singleleaf pinyon, and mormon tea (*Ephedra viridis*) while lower slopes are dominated by stands of bigberry manzanita (*Arctostaphylos glauca*), Tucker oak, birch leaf mountain mahogany, and singleleaf pinyon. The south face begins to diminish as the range nears Lebec, at the eastern end of the San Emigdio Mountains. The south-trending, gentler slopes above Lebec feature stands of big sagebrush, California buckwheat, rubber rabbitbrush, with Tucker oak as well as some blue oak on the upper slopes.

South of Lebec, the subarea extends east of I-5 and includes a portion of the Tehachapi Mountains just north of Gorman. This area is predominately grassland with canyon live oak, Tucker oak, and interior live oak stands in the concavities, with some areas of rubber rabbitbrush.

North of Lebec, the eastern limit of the San Emigdio Range reaches the I-5 corridor. These lower slopes are dominated by grasslands, Tucker oak, and bigberry manzanita, with some stands of rubber rabbitbrush and California buckwheat. At the higher elevations, the steeper slopes are dominated by dense stands of Tucker oak and canyon live oak with some California buckwheat and singleleaf pinyon.

Near Fort Tejon, stands of red willow and valley oak (riparian) are found along Grapevine Creek. North of Fort Tejon, in the northeastern corner of the subarea, there

is an extensive area of grasslands with blue oak woodlands that were burned in 2003. West of this burned area, along the northern boundary are the Pleito Hills, which has extensive grasslands with patches of California buckwheat, rubber rabbitbrush, and some California juniper on the more exposed slopes, with Tucker oak and blue oak on the more protected slopes. There is also a unique, exposed south face dominated by bigberry manzanita in the area.

Between the Pleito Hills and the previously mentioned Blue Ridge-Tecuya Ridge of the San Emigdio Mountains, is the core of the subarea. The lower slopes are dominated by Tucker oak, with some areas of blue oak, as well as a few stands dominated by California juniper. These stands give way to large dense stands of singleleaf pinyon and canyon live oak at the higher elevations. Some of the higher exposed slopes are dominated by Jeffrey pine, while some of the deeper canyons and protected slopes are dominated by big cone Douglas fir (*Pseudotsuga macrocarpa*). Moving west through the core of the San Emigdio Mountains, there is significantly less singleleaf pinyon, Jeffrey pine, and big cone Douglas fir. Canyon live oak dominates the overall north-trending upper slopes with blue oak, Tucker oak and grasslands on the lower hills.

The northwest portion of the subarea features an extensive grassland that makes up over 12,000 acres. Patches of blue oak, California buckwheat, narrowleaf goldenbush, rubber rabbitbrush, and even some allscale saltbush are scattered throughout.

CHAPTER 2: Methodology

2.1 Overview

The mapping effort began with the compilation of a preliminary mapping classification provided by CDFW based on the existing Northern and Southern Sierra Nevada Foothills floristic classifications. The project team made up of experienced photointerpreters from AIS and field ecologists from CDFW and CNPS, then conducted field reconnaissance visits to prepare for the photointerpretation effort. Using GIS technology, the photointerpreters applied their knowledge and observations of California vegetation to create a map of vegetation types. Codes representing a suite of other attributes were assigned to the vegetation polygons. Several quality control and QA procedures were implemented prior to finalizing the geodatabase. A more detailed discussion of these methodology components follows.

2.2 Project Materials

2.2.1 Computer Software/Hardware

The mapping effort was conducted using Dell workstations with dual monitors. The extra monitor was helpful in viewing ancillary image sources and ground photos while the map was being created on the primary monitor. The maps were produced using Esri's ArcGIS software. The final map was delivered in ArcGIS 10.8.2 file geodatabase format.

2.2.2 Imagery

The digital orthophoto base for the vegetation mapping project was 1-meter 2018 NAIP imagery (true-color and color-infrared). Although other supplemental sources were used to aid in interpretation and attribute assignments, all delineations were based on the NAIP base imagery. Additional true-color digital imagery was available through ArcGIS online (variable dates depending on scale viewed), which the vegetation mappers were able to bring directly into their ArcMap sessions. The photointerpreters also referred to imagery available from the internet, such as Google Earth, Google Maps, and Bing Maps. Google Earth allowed for viewing imagery from various months of previous years, if available, which was helpful in assessing long-term trends and varying phenological appearances of the vegetation. The Google Maps and Bing Maps Street View options were sometimes used where available.

However, in some instances, photointerpreters mapped to more recent conditions than shown on the base imagery. This was done only where field observations indicated large areas of change, such as cleared land, new urbanization, etc., that had been created after the base imagery was flown. These areas were flagged in the field and subsequently evaluated back in the office. Polygons for these situations were mapped if the boundaries could be seen on post-base dated imagery (usually Google Earth) or determined by using visible features on the landscape such as fence lines or roads.

2.2.3 Ancillary Data

The distribution of vegetation on the landscape is influenced by a variety of environmental factors, such as geology, soils, topography, and fire history. Digital data sources addressing these factors helped the photointerpreters in the delineation of vegetation map units. Existing maps of vegetation were also a valuable reference. All of these data sources were georeferenced and viewed by the mappers within their ArcMap sessions.

The following sources, some of which were provided by partnering agencies, were used regularly throughout the mapping effort:

1. CalFIRE – downloaded from <http://frap.cdf.ca.gov/data/frapgisdata-subset.php>
2. CA State Geology Maps – downloaded from <http://datagateway.nrcs.usda.gov>
3. SSNF Classification Plots – provided by CDFW and CNPS
4. Digital Elevation Models – via ArcGIS Online
5. USGS Topo Maps Digital Raster Graphic – via ArcGIS Online
6. Federal Lands – downloaded from <http://www.nationalatlas.gov/atlasftp.html>
7. Indian Lands – downloaded from for <http://www.nationalatlas.gov/atlasftp.html>
8. Roads GTLF – Provided by BLM
 - Fresno County
 - Kern County
 - Los Angeles County
 - Madera County
 - Mariposa County
 - Tulare County
 - Ventura County
9. Surface Management Area – provided by BLM
10. Wetlands CONUS BLM Areas – downloaded from <http://www.fws.gov/wetlands/Data/State-Downloads.html>
11. Wilderness – downloaded from <http://www.blm.gov/wo/st/en.html>
12. California Electric Transmission Line shapefile <https://data.cnra.ca.gov/dataset/california-electric-transmission-lines>
13. Existing Vegetation Databases from CDFW – downloaded from <https://apps.wildlife.ca.gov/bios>
 - Vegetation – Great Valley Ecoregion Vegetation Database [ds2632]
 - Vegetation – McKenzie Preserve [ds703]
 - Vegetation – Sequoia-Kings Canyon National Parks Vegetation Mapping Project [ds984]
 - Vegetation – Western Madera County [ds1057]
 - Vegetation – Northern Sierra Nevada Foothills [ds566]
 - Vegetation – Tehachapi Rail Corridor (not in BIOS)
 - Vernal Pool Complexes – Central Valley, 1989-1998 [ds36]

2.3 Floristic Classification

The floristic vegetation classification developed for the Sierra Nevada foothills region is a means to organize and catalog the vegetation alliance, association, or plant community stands that occur within a given area. Because of the close proximity of the northern and southern Sierra Nevada foothills study areas, both a part of the Foothills ecological region, the classification development was conducted as a full ecoregional analysis. While the data collection occurred as separate efforts, classification analysis from Klein et al. (2007) in the northern Foothills region was reproduced to present work across both the southern and northern Foothills area by Ratchford et al. (2022) as a combined endeavor over the entire region to develop one cohesive classification of the ecoregion from data collected between 2005 and 2015.

The floristic classification is derived from, and is represented by, the classification plot information collected through a limited amount of point data surveyed in and/or extrapolated from an area (Klein et al. 2007, Ratchford et al. 2022). The floristic vegetation classification and corresponding descriptions and keys are developed from a multi-step process through the collaboration of CDFW, CNPS, NatureServe, and other partners, and is based on the hierarchical National Vegetation Classification System (NVCS) and the state Manual of California Vegetation (per Sawyer et al. 2009).

The Floristic Vegetation Classification is presented in **Table 1** below. Also refer to Appendix E for the floristic vegetation key, and **Figures 3-5** for classification plot locations (Survey Type).

Table 1: Vegetation Classification in the Southern Sierra Nevada Foothills, Organized by Lifeform

Count is number of classification survey.

Lifeform	Alliance	Association	Count
Woodland & Forest			Count
	Abies concolor		1
		Abies concolor – Calocedrus decurrens – Quercus kelloggii	1
	Acer macrophyllum – Alnus rubra		3
		Acer macrophyllum – Pseudotsuga menziesii / Dryopteris arguta	1
		Acer macrophyllum / (Rubus ursinus)	2
	Aesculus californica		72
		Aesculus californica	21
		Aesculus californica – Umbellularia californica	4

Lifeform	Alliance	Association	Count
		Aesculus californica / Toxicodendron diversilobum / Moss	44
	Alnus rhombifolia		93
		Alnus rhombifolia	37
		Alnus rhombifolia – Platanus racemosa	3
		Alnus rhombifolia – Salix laevigata	10
		Alnus rhombifolia – Umbellularia californica – (Quercus chrysolepis)	14
		Alnus rhombifolia / Carex (nudata)	13
		Alnus rhombifolia / Darmera peltata	1
		Alnus rhombifolia / Salix exigua – (Rosa californica)	9
		Calocedrus decurrens – Alnus rhombifolia	3
	Arbutus menziesii		1
		Arbutus menziesii – Umbellularia californica	1
	Calocedrus decurrens		2
		Calocedrus decurrens – Quercus chrysolepis – Quercus kelloggii	2
	Fraxinus latifolia		33
		Fraxinus latifolia	8
		Fraxinus latifolia – Alnus rhombifolia	14
		Fraxinus latifolia – Salix laevigata	9
	Hesperocyparis (sargentii, macnabiana)		2
		Hesperocyparis macnabiana / Arctostaphylos viscida	2
	Hesperocyparis forbesii – Hesperocyparis nevadensis		2
		Hesperocyparis nevadensis	2
	Juglans hindsii and Hybrids		3
		Juglans hindsii	3
	Juniperus californica		17
		Juniperus californica – (Cercocarpus montanus – Fraxinus dipetala)	5
		Juniperus californica / herbaceous	12
	Pinus jeffreyi		14
		Pinus jeffreyi – Pinus monophylla	14

Lifeform	Alliance	Association	Count
	Pinus monophylla – (Juniperus osteosperma)		17
		Pinus monophylla – (Juniperus osteosperma) / Cercocarpus ledifolius	1
		Pinus monophylla – (Juniperus osteosperma) / Sparse Understory	4
		Pinus monophylla / Eriogonum fasciculatum	1
		Pinus monophylla / Quercus john-tuckeri	9
	Pinus ponderosa		3
		Pinus ponderosa / Arctostaphylos viscida	2
	Pinus ponderosa – Calocedrus decurrens – Pseudotsuga menziesii		21
		Pinus ponderosa – (Calocedrus decurrens) stream terrace	5
		Pinus ponderosa – Calocedrus decurrens – Quercus kelloggii	11
		Pinus ponderosa – Pseudotsuga menziesii – Quercus chrysolepis / Galium bolanderi	5
	Pinus sabiniana		46
		Pinus sabiniana / Adenostoma fasciculatum	7
		Pinus sabiniana / Arctostaphylos viscida	6
		Pinus sabiniana / Ceanothus cuneatus – (Rhamnus ilicifolia)	17
		Pinus sabiniana / Ceanothus cuneatus / Plantago erecta	2
		Pinus sabiniana / herbaceous	12
	Platanus racemosa – Quercus agrifolia		60
		Platanus racemosa – Aesculus californica	15
		Platanus racemosa – Populus fremontii / Salix lasiolepis	4
		Platanus racemosa – Quercus lobata	16
		Platanus racemosa – Salix laevigata / Salix lasiolepis – Baccharis salicifolia	10
		Platanus racemosa / annual grass	12

Lifeform	Alliance	Association	Count
		Platanus racemosa / Baccharis salicifolia	1
		Umbellularia californica – Platanus racemosa	1
	Populus fremontii – Fraxinus velutina – Salix gooddingii		51
		Populus fremontii – Salix gooddingii	4
		Populus fremontii – Salix laevigata	37
		Populus fremontii – Salix lasiolepis	2
		Populus fremontii / Salix exigua	4
		Populus fremontii / Vitis californica	1
	Quercus chrysolepis		147
		Quercus chrysolepis	47
		Quercus chrysolepis – Pinus jeffreyi	2
		Quercus chrysolepis – Pinus ponderosa	3
		Quercus chrysolepis – Pinus sabiniana	1
		Quercus chrysolepis – Quercus kelloggii	10
		Quercus chrysolepis – Umbellularia californica	12
		Quercus chrysolepis / Arctostaphylos viscida	21
		Quercus chrysolepis / Calycanthus occidentalis – Vitis californica	35
		Quercus chrysolepis / Quercus (wislizeni, parvula)	13
	Quercus douglasii		347
		Quercus douglasii – Aesculus californica / grass	17
		Quercus douglasii – Juniperus californica / Ceanothus cuneatus – Cercocarpus montanus	5
		Quercus douglasii – Juniperus californica / Ericameria linearifolia	1

Lifeform	Alliance	Association	Count
		Quercus douglasii – Pinus sabiniana / Arctostaphylos viscida	11
		Quercus douglasii – Pinus sabiniana / Ceanothus cuneatus – Cercocarpus montanus	4
		Quercus douglasii – Pinus sabiniana / Grass	14
		Quercus douglasii / (Achnatherum lemmonii – Nassella pulchra)	18
		Quercus douglasii / Amsinckia (intermedia, menziesii) – Plagiobothrys nothofulvus	14
		Quercus douglasii / Arctostaphylos manzanita / herbaceous	7
		Quercus douglasii / Bromus spp. – (Daucus pusillus)	203
		Quercus douglasii / Ceanothus cuneatus	24
		Quercus douglasii / Selaginella hansenii – Navarretia pubescens	7
		Quercus douglasii / Toxicodendron diversilobum / grass	14
	Quercus kelloggii		137
		Quercus kelloggii – Pinus ponderosa	6
		Quercus kelloggii – Pinus ponderosa / Arctostaphylos viscida	35
		Quercus kelloggii – Pseudotsuga menziesii – Umbellularia californica	5
		Quercus kelloggii – Quercus chrysolepis / Toxicodendron diversilobum	9
		Quercus kelloggii / annual grass-herb	11
		Quercus kelloggii / Ceanothus integerrimus	14
		Quercus kelloggii / Ribes roezlii provisional	6
		Quercus kelloggii / Toxicodendron diversilobum	27
		Quercus kelloggii / Toxicodendron diversilobum – Styrax redivivus / Triteleia laxa	3
		Quercus wislizeni – Quercus kelloggii / Heteromeles arbutifolia – Toxicodendron diversilobum	16
	Quercus lobata		21
		Quercus douglasii – Quercus lobata	3
		Quercus lobata – Quercus kelloggii	6
		Quercus lobata / grass	11

Lifeform	Alliance	Association	Count
	Quercus lobata Riparian		115
		Quercus lobata – Alnus rhombifolia	13
		Quercus lobata – Fraxinus latifolia / Vitis californica	9
		Quercus lobata – Quercus chrysolepis / Vitis californica	12
		Quercus lobata – Quercus wislizeni	29
		Quercus lobata – Salix lasiolepis	6
		Quercus lobata / Herbaceous Semi-Riparian	18
		Quercus lobata / Rubus armeniacus	23
	Quercus wislizeni – Quercus parvula (tree)		478
		Quercus (wislizeni, parvula) – Arbutus menziesii / Toxicodendron diversilobum	5
		Quercus wislizeni – (Pinus sabiniana) / Arctostaphylos viscida	21
		Quercus wislizeni – Aesculus californica	92
		Quercus wislizeni – Pinus ponderosa	6
		Quercus wislizeni – Pinus sabiniana / annual grass – herb	28
		Quercus wislizeni – Pinus sabiniana / Arctostaphylos manzanita	10
		Quercus wislizeni – Quercus chrysolepis tree	10
		Quercus wislizeni – Quercus douglasii / herbaceous	70
		Quercus wislizeni – Salix laevigata / Frangula californica	44
		Quercus wislizeni / Eriodictyon californicum	9
		Quercus wislizeni / Heteromeles arbutifolia	65
		Quercus wislizeni / Toxicodendron diversilobum	110
	Salix gooddingii – Salix laevigata		64
		Salix gooddingii	17
		Salix laevigata	40
		Salix laevigata – Salix lasiolepis	6

Lifeform	Alliance	Association	Count
	Umbellularia californica		25
		Umbellularia californica	12
		Umbellularia californica – Quercus chrysolepis	1
		Umbellularia californica – Quercus wislizeni	12
	Yucca brevifolia		1
Shrubland			
	Californian mesic chaparral Group		2
	Central and south coastal California seral scrub Group		1
	Adenostoma fasciculatum		66
		Adenostoma fasciculatum	43
		Adenostoma fasciculatum – (Lotus scoparius – Eriodictyon spp.)	15
		Adenostoma fasciculatum – Arctostaphylos manzanita	6
	Ambrosia salsola – Bebbia juncea		1
	Arctostaphylos (canescens, manzanita, stanfordiana)		2
		Arctostaphylos manzanita	2
	Arctostaphylos glandulosa		2
		Arctostaphylos glandulosa – Adenostoma fasciculatum	2
	Arctostaphylos glauca		4
		Arctostaphylos glauca	4
	Arctostaphylos pungens – Arctostaphylos pringlei		9
		Arctostaphylos parryana Provisional	9
	Arctostaphylos viscida		110
		(Arctostaphylos viscida – Adenostoma fasciculatum) / Salvia sonomensis	30
		Arctostaphylos viscida	31
		Arctostaphylos viscida – Adenostoma fasciculatum	35
		Arctostaphylos viscida – Quercus wislizeni	5

Lifeform	Alliance	Association	Count
		Arctostaphylos viscida / Salvia sonomensis – Carex (brainerdii, xerophila)	7
	Artemisia tridentata		25
		Artemisia tridentata – Ceanothus cuneatus	14
		Artemisia tridentata – Ericameria nauseosa	5
		Artemisia tridentata – Eriogonum wrightii	6
	Atriplex canescens		1
		Atriplex canescens Desert Wash	1
	Atriplex polycarpa		3
		Atriplex polycarpa / Annual Herbaceous	3
	Baccharis pilularis		2
		Baccharis pilularis	2
	Baccharis salicifolia		9
		Baccharis salicifolia	9
	Ceanothus cuneatus		156
		Ceanothus cuneatus	118
		Ceanothus cuneatus – Adenostoma fasciculatum	4
		Ceanothus cuneatus – Eriodictyon californicum – (Fremontodendron californicum)	12
		Ceanothus cuneatus / Plantago erecta	20
	Ceanothus greggii – Fremontodendron californicum		14
		Fremontodendron californicum	13
	Ceanothus integerrimus		11
		Ceanothus integerrimus	2
		Ceanothus integerrimus – Quercus garryana var. fruticosa	9
	Ceanothus leucodermis		10
		Ceanothus leucodermis	10
	Cephalanthus occidentalis – Rosa californica		21
		Calycanthus occidentalis	4
		Cephalanthus occidentalis	13
		Rosa californica	4

Lifeform	Alliance	Association	Count
	Cercocarpus ledifolius		1
	Cercocarpus montanus		34
		Cercocarpus montanus – Adenostoma fasciculatum	1
		Cercocarpus montanus – Ceanothus cuneatus	6
		Cercocarpus montanus – Ceanothus cuneatus – Quercus john-tuckeri	2
		Cercocarpus montanus – Fremontodendron californicum	4
		Cercocarpus montanus var. glaber	18
	Cornus sericea – Rosa woodsii – Ribes spp.		1
		Cornus sericea	1
	Cytisus scoparius – Genista monspessulana – Cotoneaster spp.		1
		Cytisus scoparius	1
	Diplacus aurantiacus		3
		Diplacus (aurantiacus, puniceus)	3
	Encelia (actonii, virginensis) – Viguiera reticulata		1
		Encelia actonii	1
	Ephedra viridis		5
		Ephedra viridis	5
	Ericameria linearifolia – Cleome isomeris		9
		Cleome isomeris	6
		Ericameria linearifolia	3
	Ericameria nauseosa		16
		Ericameria nauseosa	16
	Ericameria teretifolia		1
		Ericameria teretifolia	1
	Eriogonum fasciculatum		57
		Eriogonum fasciculatum	28

Lifeform	Alliance	Association	Count
		Eriogonum fasciculatum var. foliolosum – Hesperoyucca whipplei	15
		Hesperoyucca whipplei	13
	Eriogonum fasciculatum – Viguiera parishii		3
		Eriogonum fasciculatum – Ericameria (laricifolia, linearifolia)	1
		Eriogonum fasciculatum (Wash)	2
	Eriogonum wrightii – Eriogonum heermannii – Buddleja utahensis		13
		Eriogonum wrightii – Eriophyllum confertiflorum / Monardella antonina ssp. Benitensis	1
		Eriogonum wrightii (ssp. subscaposum, ssp. wrightii)	11
	Frangula californica – Rhododendron occidentale – Salix breweri		1
		Frangula californica ssp. tomentella / Hoita macrostachya	1
	Lepidospartum squamatum		9
		Lepidospartum squamatum – Baccharis salicifolia	2
		Lepidospartum squamatum – Eriodictyon trichocalyx – Hesperoyucca whipplei	2
		Lepidospartum squamatum / ephemeral annuals	5
	Lotus scoparius – Lupinus albifrons – Eriodictyon spp.		91
		Eriodictyon californicum / Herbaceous	42
		Eriodictyon crassifolium	4
		Eriodictyon parryi provisional	1

Lifeform	Alliance	Association	Count
		Lotus scoparius	11
		Lupinus albifrons	24
		Lupinus albifrons – Senecio flaccidus var. douglasii	5
	Malacothamnus fasciculatus – Malacothamnus spp.		1
	Prunus fasciculata – Salazaria mexicana		1
	Lotus scoparius – Lupinus albifrons – Eriodictyon spp.		1
		Prunus fasciculata	
	Prunus ilicifolia – Heteromeles arbutifolia – Ceanothus spinosus		7
		Heteromeles arbutifolia Serpentine	7
	Prunus virginiana		4
		Prunus subcordata	1
		Prunus virginiana	3
	Quercus berberidifolia		26
		Quercus berberidifolia	5
		Quercus berberidifolia – Adenostoma fasciculatum	1
		Quercus berberidifolia – Ceanothus cuneatus	11
		Quercus berberidifolia – Cercocarpus montanus	3
		Quercus berberidifolia – Heteromeles arbutifolia	4
	Quercus durata		4
		Quercus durata – Adenostoma fasciculatum / Salvia sonomensis	4
	Quercus garryana (shrub)		21

Lifeform	Alliance	Association	Count
		Quercus garryana – Cercocarpus montanus	6
		Quercus garryana shrub	14
	Quercus john-tuckeri		11
		Quercus john-tuckeri	11
	Quercus wislizeni – Quercus chrysolepis (shrub)		38
		Quercus wislizeni – Carpenteria californica	4
		Quercus wislizeni – Ceanothus leucodermis	7
		Quercus wislizeni – Cercocarpus montanus	17
		Quercus wislizeni var. frutescens	10
	Rhus trilobata – Crataegus rivularis – Forestiera pubescens		3
		Forestiera pubescens – Sambucus nigra	2
		Rhus trilobata	1
	Ribes quercetorum – Rhus trilobata – Frangula californica		52
		Cercis occidentalis Provisional	6
		Frangula californica ssp. tomentella	12
		Rhus trilobata Sierran	10
		Ribes quercetorum	21

Lifeform	Alliance	Association	Count
		Sambucus nigra	1
	Rubus armeniacus – Sesbania punicea – Ficus carica		10
		Rubus armeniacus	9
	Salix exigua		31
		Salix exigua	20
		Salix exigua – (Salix lasiolepis) – Rubus armeniacus	10
		Salix exigua – Brickellia californica	1
	Salix lasiolepis		8
		Salix lasiolepis – Rubus spp.	6
		Salix lasiolepis / Artemisia douglasiana	1
	Suaeda moquinii		1
		Isocoma acradenia Alkaline Wet	1
	Tamarix sp.		1
	Toxicodendron diversilobum		42
		Toxicodendron diversilobum / Herbaceous	38
	Vitis arizonica – Vitis girdiana		6
		Vitis californica	6
Herbaceous & Sparsely Vegetated			
	California Annual and Perennial Grassland Macrogroup		3
	California annual herb / grass Group		7
	Vancouverian and Rocky Mountain naturalized perennial grassland Group		1
	Californian Cliff, Scree & Rock Vegetation Group		4
	Achnatherum speciosum		4
		Achnatherum speciosum	2

Lifeform	Alliance	Association	Count
	Amsinckia (menziesii, tessellata) – Phacelia spp.		30
		Amsinckia (intermedia, menziesii)	14
		Phacelia cicutaria Provisional	9
		Phacelia tanacetifolia	6
	Anemopsis californica – Helianthus nuttallii – Solidago spectabilis		2
		Anemopsis californica	2
	Aristida purpurea – Elymus elymoides – Poa secunda		15
		Poa secunda – (Elymus sp.) – Clarkia cylindrica	15
	Artemisia dracunculus		4
		Artemisia dracunculus	4
	Avena spp. – Bromus spp.		109
		Avena barbata – Avena fatua	12
		Avena barbata – Bromus hordeaceus	2
		Brachypodium distachyon	6
		Bromus diandrus	1
		Bromus diandrus – Mixed herbs	15
		Bromus hordeaceus – (Vicia villosa – Lolium perenne) – Trifolium hirtum	15
		Bromus hordeaceus – Erodium botrys	43
		Bromus hordeaceus – Hordeum spp. – Medicago polymorpha	3
		Bromus hordeaceus – Taeniatherum caput-medusae	12
	Bidens cernua – Euthamia occidentalis – Ludwigia palustris		2
		Artemisia douglasiana	2
	Brassica nigra – Centaurea (solstitialis, melitensis)		12

Lifeform	Alliance	Association	Count
		Brassica nigra	4
		Centaurea solstitialis	8
	Bromus carinatus – Elymus glaucus		4
		Elymus glaucus	1
		Pteridium aquilinum – Grass	3
	Bromus tectorum – Taeniatherum caput- medusae		3
		Bromus tectorum	3
	Carex barbarae		2
		Carex barbarae	2
	Carex nudata		2
		Carex nudata	2
	Carex utriculata – Calamagrostis canadensis		22
		Eleocharis macrostachya	22
	Centromadia (pungens)		3
	Corethrogyne filaginifolia – Eriogonum (elongatum, nudum)		17
		Corethrogyne filaginifolia	9
		Eriogonum elongatum	1
		Eriogonum nudum	3
		Lupinus excubitus – Mentzelia albicaulis – Eriogonum spp.	3
	Cynodon dactylon – Crypsis spp. – Paspalum spp.		1

Lifeform	Alliance	Association	Count
		Cynodon dactylon	1
	Distichlis spicata		4
		Distichlis spicata	4
	Equisetum (arvense, variegatum, hyemale)		1
	Eschscholzia (californica) – Lupinus (nanus)		60
		Bromus hordeaceus – Lupinus nanus – Trifolium spp.	7
		Eschscholzia californica	11
		Lupinus benthamii – Chorizanthe membranacea	32
		Lupinus bicolor	6
	Heterotheca (oregona, sessiliflora)		4
		Heterotheca sessiliflora	4
	Holocarpha (heermannii, virgata)		55
		Holocarpha heermannii	39
		Holocarpha virgata	13
	Juncus (effusus, patens) – Carex (pansa, praegracilis)		7
		Carex densa	2
		Carex praegracilis	1
		Juncus effusus	3
		Carex serratodens	1
	Juncus (oxymeris, xiphioides)		4
		Juncus oxymeris	2
		Juncus xiphioides	1

Lifeform	Alliance	Association	Count
	Juncus arcticus (var. balticus, mexicanus)		23
		Juncus arcticus var. balticus – (var. mexicanus)	16
		Juncus arcticus var. balticus – Carex praegracilis	4
	Lasthenia californica – Plantago erecta – Vulpia microstachys		190
		Lasthenia (californica, gracilis)	26
		Layia pentachaeta – Plagiobothrys (canescens)	2
		Lepidium nitidum – Trifolium gracilentum – Vulpia microstachys	2
		Vulpia microstachys	5
		Vulpia microstachys – Elymus elymoides – Achnatherum lemmonii	8
		Vulpia microstachys – Navarretia tagetina	28
		Vulpia microstachys – Plantago erecta	20
		Vulpia microstachys – Sedella pumila – Lasthenia californica	23
		Vulpia microstachys – Selaginella hansenii	71
	Lasthenia fremontii – Downingia (bicornuta)		37
		Downingia (bicornuta, cuspidata)	10
		Eryngium (vaseyi, castrense)	12
		Lasthenia fremontii	6

Lifeform	Alliance	Association	Count
		Lasthenia fremontii – Downingia bicornuta	2
		Lasthenia fremontii – Downingia ornatissima	7
	Lasthenia glaberrima		9
		Eleocharis acicularis – Eryngium castrense	6
		Eleocharis macrostachya Vernal Pool	3
	Layia fremontii – Achyrachaena mollis		29
		Layia fremontii – Achyrachaena mollis	24
		Zigadenus fremontii – Lolium perenne	4
	Lemna (minor) and Relatives		1
		Lemna (minor)	1
	Leymus cinereus – Leymus triticoides		10
		Leymus cinereus	5
		Leymus triticoides	4
		Leymus triticoides – Bromus spp. – Avena spp.	1
	Lolium perenne		21
		Lolium perenne	2
		Lolium perenne – (Centaurium muehlenbergii)	14
		Lolium perenne – Hordeum marinum – Ranunculus californicus	5
	Lotus unifoliolatus		16
		Lotus unifoliolatus	16
	Ludwigia (hexapetala, peploides) – Eichhornia crassipes		2
		Ludwigia (hexapetala, peploides)	2
	Mimulus guttatus – Cirsium spp. – Stachys spp.		20

Lifeform	Alliance	Association	Count
		Mimulus guttatus	10
		Mimulus guttatus – Vulpia microstachys	7
	Monolopia (lanceolata) – Coreopsis (calliopsidea)		1
		Coreopsis calliopsidea – Mentzelia pectinata	1
	Montia fontana – Sidalcea calycosa		1
		Montia fontana – Sidalcea calycosa	1
	Muhlenbergia rigens		10
		Muhlenbergia rigens	9
	Nassella spp. – Melica spp.		24
		Melica californica	1
		Nassella cernua	7
		Nassella pulchra	14
		Nassella pulchra – Avena spp. – Bromus spp.	2
	Phalaris aquatica – Phalaris arundinacea		3
		Phalaris aquatica – Bromus hordeaceus – Centaurea solstitialis	3
	Plagiobothrys nothofulvus		61
		Madia elegans – Plagiobothrys nothofulvus	16
		Plagiobothrys nothofulvus – Castilleja exserta – (Lupinus nanus)	3
		Plagiobothrys nothofulvus – Daucus pusillus – Trifolium microcephalum	41
	Poa pratensis – Agrostis gigantea – Agrostis stolonifera		2
	Poa secunda – Muhlenbergia richardsonis – Carex douglasii		2
		Poa secunda Moist	1
	Polygonum lapathifolium – Xanthium strumarium		8

Lifeform	Alliance	Association	Count
		Xanthium strumarium	4
	Ranunculus aquatilis – Callitriche palustris – Callitriche heterophylla		2
		Ranunculus aquatilis	2
	Schoenoplectus (acutus, californicus)		7
		Schoenoplectus acutus	5
		Schoenoplectus acutus – Typha domingensis	2
	Schoenoplectus americanus		1
		Schoenoplectus americanus	1
	Sporobolus airoides – Muhlenbergia asperifolia – Spartina gracilis		2
		Sporobolus airoides	2
	Trifolium variegatum		47
		(Trifolium variegatum – Vulpia bromoides) – Hypochaeris glabra – Leontodon saxatilis	8
		Trifolium variegatum	21
		Trifolium variegatum – Juncus bufonius	18
	Typha (angustifolia, domingensis, latifolia)		7
		Typha latifolia	7

2.4 Mapping Classification

Mapping of the vegetation using the floristic classification may be limited by the constraints of the aerial imagery (color limitations and resolution), the minimum mapping unit (MMU) resolution for the project, or the complexity of the stands on the ground and their relationships with one another. Therefore, a mapping classification is developed to outline and catalog mappable vegetation units. The mapping classification contains mappable vegetation types, as well as what are called Mapping Units. Mapping Units are units that are not included in the floristic vegetation classification, such as sand,

rock, mud, or approved units composed of multiple individual types that are not mappable due to MMU constraints but consistently occur together on the ground as ecologically related complexes (the latter being a rare exception). The mapping classification also includes additional attributes outside of the vegetation type, such as percent cover of conifer trees, hardwood trees, shrubs, and herbaceous vegetation; disturbance attributes, and others (See Appendix A).

For the current project, the map classification was generally based on the existing Northern Sierra Nevada Foothills vegetation mapping effort conducted by AIS, CNPS, and VegCAMP (Menke et al., 2011). CNPS and VegCAMP, under separate contract, developed a new floristic classification for the entire Sierra Nevada Foothills ecoregion. The floristic classification was based on the original Northern Sierra Nevada Foothills floristic classification (2009) with newer plot data collected for the Southern Sierra Nevada Foothills region (2015) and data analyses for the entire region. Based on the new floristic classification the existing Northern Sierra Nevada Foothills mapping classification was augmented to reflect the new differences at the alliance level while retaining the upper levels of the older hierarchy (2009).

As AIS mapping proceeded, potential changes to the mapping classification and/or key were brought to the attention of both CNPS and VegCAMP staff for possible floristic classification revision or key clarification. At the completion of the project, the mapping classification for the Sierra Nevada Foothills ecoregion were all reconciled to one comprehensive classification for the entire region.

2.5 Field Reconnaissance

Field reconnaissance/verification visits serve multiple functions. First, they enable photointerpreters to relate the vegetation on the ground at each observation site to the signatures on the aerial imagery. Second, is to answer questions regarding vegetation assemblages that arise during the photointerpretation process and to check the mapping and attribution prior to delivering the data for AA. In addition, with guidance from ecologists in the field, the photointerpreters become familiar with the flora, vegetation assemblages, and local ecology of the study area. At the same time, ecologists test the floristic key and gain understanding from the photointerpreters' perspective about assessing vegetation through the framework of map creation.

From May 2019 through June 2021, AIS conducted seven field reconnaissance/verification trips dispersed throughout the mapping area with one crew per trip. The trips are summarized in **Table 2**.

Table 2: Summary of Field Reconnaissance Trips

Trip No.	Dates	Staff from:	Location
1	May 13-17, 2019	AIS/CDFW	Reconnaissance: Mariposa, Madera, Fresno Counties (Delivery Areas 1, 2, 3)
2	July 30-August 2, 2019	AIS/CDFW	Reconnaissance: Los Angeles, Ventura Counties (Delivery Area 6B)
3	January 6-10, 2020	AIS/CNPS	Verification: Mariposa, Madera Counties (Delivery Area 1)
4	March 2-6, 2020	AIS	Verification: Madera, Fresno Counties (Delivery Area 2)
5	June 27-July1, 2020	AIS/CDFW	Reconnaissance: Kern, Los Angeles, Kern Counties (Areas 5A) Verification: Los Angeles, Ventura Counties (Delivery Areas 6A, 6B)
6	September 14-17, 2020	AIS	Verification: Kern, Tulare Counties (Delivery Areas 5A, 5B)
7	June 21-25, 2021	AIS/CNPS	Verification: Fresno, Tulare Counties (Delivery Areas 3, 4)

Field crews from AIS collected over 2450 reconnaissance/verification observations as shown in **Figure 2**.

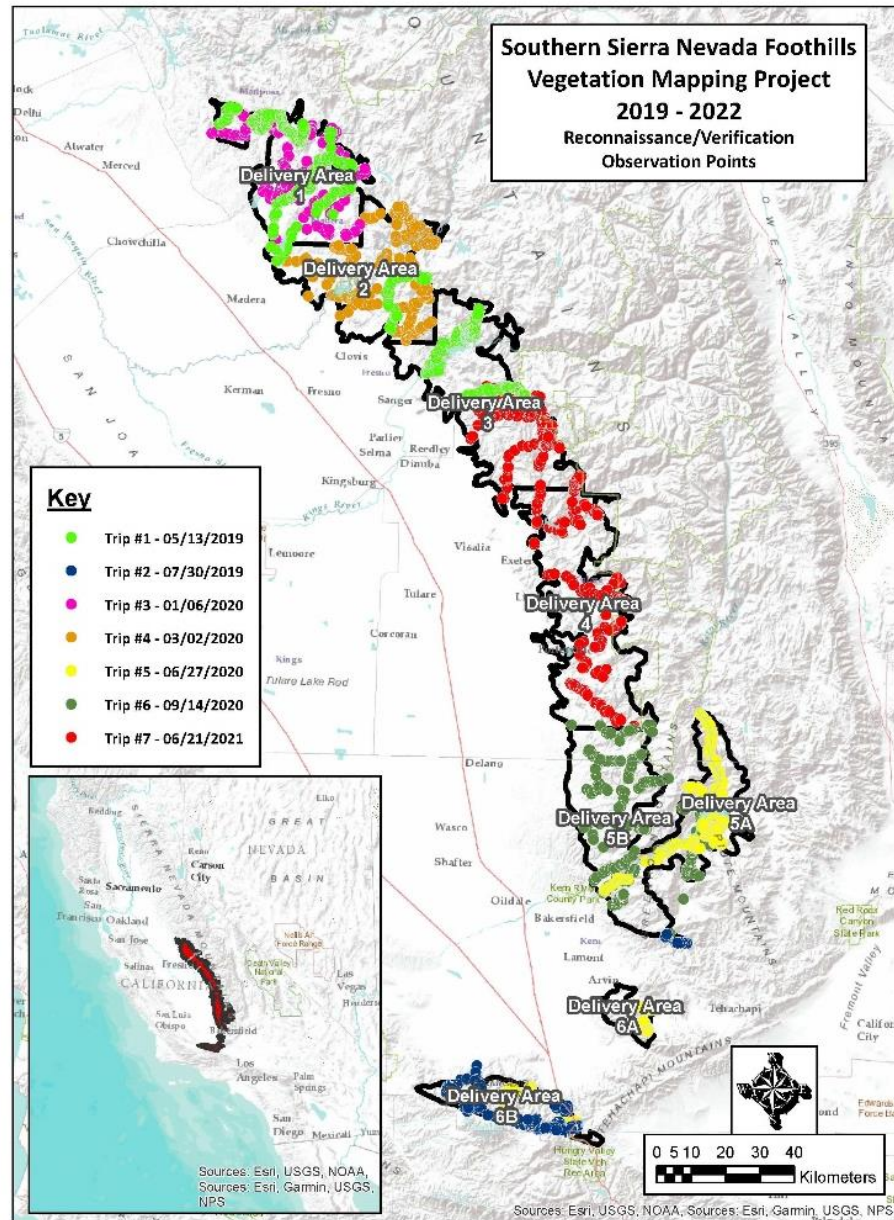


Figure 2: Location of Reconnaissance/Verification Observation Points

Prior to each trip, AIS staff reviewed imagery on-screen to identify and select potential reconnaissance sites in close proximity to roads. Sites were selected to represent different vegetation types and percent cover, as well as variations in geography, landform, and abiotic factors such as percent slope, aspect, shape of the slope, and elevation. Multiple sites were chosen to provide alternatives in case one or more sites proved inaccessible. Field routes were planned to maximize the number of vegetation types and ecological regions visited while taking into consideration time constraints and accessibility.

The field crew used the Collector application for ArcGIS on Apple computer tablets to facilitate navigation and data collection. The vegetation database imagery, roads, and any other pertinent ancillary data were loaded onto the tablet prior to the field trip.

During reconnaissance/verification, crews traversed the areas in 4WD vehicles and stopped at the preselected sites. Areas encountered in transit between initially selected sites, and areas of noteworthy or unusual significance, were sometimes added in the field as observation points. Also, observation points were frequently taken to mark the transition between vegetation types, with the intent of helping photointerpreters determine the edges of stands. A single observation point may have contained information about two or more stands. It was also possible for a given stand to be assessed in multiple places. Some stands of vegetation were remotely observed at a distance with the aid of binoculars. The location of these remote stands was typically determined using a compass and laser rangefinder. Field crew members recorded each location visited on a GPS unit and logged pertinent information into the Collector app on the tablet.

At many observation points, the crew took digital color ground photos. The corresponding field point, and other pertinent information were recorded and available for reference during the mapping effort. The field data and ground photos were essential for correlating conditions seen on the aerial imagery to conditions on the ground.

2.6 Photointerpretation Mapping Procedures

There are two distinct aspects of the photointerpretation mapping process. In what can be called the “photointerpretation process,” the photo interpreter applies his or her understanding of photo signature and knowledge of the geographic characteristics of ground features to formulate a reasoned decision about how to represent a feature and what to call it. The “mapping process” involves the creation of the digital geodatabase through the use of computer hardware and software. In other words, the mapping process captures for subsequent users a permanent record of the results of the photointerpretation process. Both aspects happen simultaneously as a map is created.

2.6.1 *Photointerpretation Process*

Photointerpretation is the process of identifying map units based on their photo signature. All land cover features have a photo signature. These signatures are defined by the color, texture, tone, size, and pattern exhibited on the aerial imagery. By observing the context and extent of the photo signatures associated with specific land cover types, the photo interpreter is able to identify and delineate the boundaries between plant communities or signature units.

It should be noted that vegetation stature, as well as the scale and resolution of the aerial imagery, determine the visibility of individual plants, and the degree to which they can be photointerpreted. Trees and shrubs are usually visible as individuals on high-resolution digital imagery. However, grasses (other than bunch grass clumps) are rarely seen as individual plants.

Environmental factors, such as elevation, slope, and aspect, also play an important part in the photointerpretation decision-making process. Knowledge of these factors, and how plant communities respond to them, guides a photo interpreter in choosing from among alliances with similar photo signatures. Beyond this, such knowledge enables vegetation mappers to create biogeographical models of expected vegetation communities where the vegetation types are indistinct on the imagery. This ecological approach produces a more accurate product than would be created by relying solely on extracting information from the imagery, which is subject to variations in clarity and ground conditions.

Ancillary data sources (see Section 2.2.3) and field reconnaissance data are used to complement and assist the mapper in their photointerpretation and attribute code assignment process. For example, classification plot point data contains the location of the plot as well as miscellaneous data related to the species composition and cover of the stand, abiotic and ecological information, and site history, such as fire information.

The detailed descriptions of each vegetation type found in Appendix B include numerous examples of the types of information the photointerpreters incorporate into their understanding of the models. To give some examples, one shrub alliance may favor rocky slopes, while another is found at the perimeters of dry lakes. Some alliances flourish on disturbed sites, while others cannot tolerate the cool temperatures at higher elevations. And, some alliances are ubiquitous and found in a variety of settings.

The descriptions also discuss the relative percent cover of various plant species in the alliance. Frequently, complicated relationships exist between the relative covers of plants, such as in alliances named for indicator species having lower percent cover than other species present. Thus, both environmental setting and rules regarding relative cover factor into the intelligent delineation of vegetation polygons.

2.6.2 Mapping Process

Just as the use of mental models by experienced photointerpreters contributed to the production of a high-quality vegetation map, the use of tried-and-true mapping procedures allowed for the map to be produced in a highly efficient manner. For example, the study area was divided into production modules that for the most part corresponded to USGS 7.5-minute topographic quadrangles or portions thereof. This expedited project work flow by enabling several staff members to work on the mapping effort simultaneously.

Each vegetation mapper brought one of the modules into his or her ArcMap session. Using an on-screen heads-up digitizing method, the photointerpreters had at their disposal a suite of standard and custom ArcMap tools to facilitate the creation of polygons. The photointerpreters generally viewed the imagery at scales ranging from below 1:1000 to 1:3000. They used variations in signature to draft boundaries separating areas of different vegetation types and/or distinct categories of percent cover of several stature levels. To assist in boundary placement and coding decisions, photointerpreters also referenced supplemental imagery, vegetation field data, and

other data, such as elevation contours and fire history. These sources were displayed in the ArcMap sessions as needed.

Photointerpreters assigned each polygon the appropriate attribute code string: Vegetation Type (VegCode/PI), five different Percent Cover types, Conifer Dieback, Exotics, Roadedness Disturbance, Development Disturbance, Anthropogenically Altered Disturbance, Land Use, Tree Size, Tree Height, and Method ID. The map classification is presented in Appendix A.

A custom coding menu enabled values to be assigned efficiently, minimizing the possibilities for entry errors. The codes themselves were entered as numeric values, which are easier to input and manipulate than alphanumeric codes or drop-down menus. Numeric code values also allow for the hierarchical grouping of like vegetation communities, reminding the mapper at a glance which alliances are found in a particular hierarchical grouping. Once the geodatabase neared completion, the actual vegetation type names were correlated to their numeric value and added to the geodatabase.

As the individual modules were completed, they were edge-matched and checked for invalid codes and topology errors. As mapping progressed, completed modules within a subarea unit were joined together. These database units were subject to further processing, edge-match checks, and review by a senior staff member before being delivered to VegCAMP for AA allocation, prior to AA data collection by CNPS. Quality control procedures implemented during the mapping effort and before final delivery of the data improved the consistency and accuracy of the overall database. Quality control and AA will be discussed in greater detail in later sections of this report.

2.6.3 Mapping Criteria

As discussed above, reference sources, photointerpretation training, knowledge of vegetation communities, as well as the use of appropriate GIS tools, are all essential in creating a quality vegetation map. However, without the establishment and refinement of mapping criteria, a given vegetation map could contain a number of discrepancies, as different staff members can approach the task with different assumptions and styles. Guidelines and rules regarding exceptions, special situations, and minimum feature size are discussed and disseminated to all staff members before and during the mapping effort. This creates a clear and consistent product. Establishing criteria also makes the mapping process more efficient, as individual photointerpreters do not have to pause too long to consider how best to capture the more common ambiguous situations that are confronted.

The specific criteria for each attribute type are discussed below under the appropriate heading.

2.6.3.1 Vegetation Type (VegCode/PI)

AIS was contracted to map to the Alliance level. However, at the time of mapping there were several vegetation types for which the final vetting had not been completed. By the end of the project these types were determined to be associations rather than alliances and assigned to their corresponding place in the vegetation hierarchy. The result was

that 9 of the types became Associations. So rather than lump up to the Alliance level it was decided to keep them as Associations and not lose that detail.

The final map contains 111 types that were mapped, composed of 75 Alliances and Alliance-level types such as Provisional Alliances, Semi-natural Alliances, and Mapping Units; 9 Associations, and 15 Miscellaneous Classes relating to features such as agriculture, water, and urban disturbance; and 12 upper-level hierarchical types, such as Class, Subclass, Macrogroup and Group. When the photo interpreter could not confidently classify a polygon at the alliance level, the polygon was assigned a broader upper-level code. This was most common with herbaceous communities, whose differences at the alliance level are often not readily discernible on imagery. Each map unit is described in Appendix B; the map classification is presented in Appendix A; and summary tables of polygon counts and acreage by VegCode are presented in Appendix C.

2.6.3.1.1 Minimum Mapping Unit Size Considerations

Minimum polygon size is an important consideration when creating and viewing a vegetation geodatabase. The choice of an MMU is influenced by the clarity of the imagery, the purpose of the data, and time and budget constraints. MMU can vary for different categories of features being mapped.

The map classification presented in Appendix A indicates the MMU for each map unit class. In this project, the MMU for upland vegetation is 2 acres. This encompasses the majority of the stands mapped. Exceptions were created for vegetation stands of special significance. In this mapping effort, riparian vegetation and wetland types were mapped to a 1-acre MMU. Polygons representing land use were also mapped with a 1-acre MMU.

In addition to establishing MMU size, guidelines were formulated for the minimum mapping width (MMW) of a map polygon, which for the project was approximately 100 feet. The rule of thumb was to make the minimum width roughly half the width of a square MMU box. This guideline did not preclude the creation of polygons where a small section fell below the minimum width, as long as the greater portion of the polygon met the stated criteria in an attempt to capture the continuity of linear types, such as riparian or wetland units. Percent cover MMU considerations are discussed in Section 2.6.3.2.

CDFW's long-range goal is to map vegetation for the entire state of California. This is accomplished as funding or need allows, one area or project at a time. The Southern Sierra Nevada Foothills vegetation geodatabase created in this project is to be incorporated into the Statewide vegetation mapping effort. The general Statewide mapping criteria (VegCAMP 2020) specifies an MMU of 1 acre for non-desert environs, however to be consistent with the previously mapped Northern Sierra Nevada Foothills vegetation database, the MMU for upland vegetation is 2 acres.

A summary of the minimum mapping units for this mapping effort is presented in **Table 3**.

Table 3: Minimum Mapping Unit Size

Mapped Features	Minimum Mapping Unit
Riparian vegetation; wetlands	1 acre
Water bodies, perennial streams and lakes/ponds, dammed ephemeral ponds	1 acre
Land Use/built-up, agriculture, water impoundment features, rock outcrops	1 acre
Upland vegetation	2 acres

The establishment of an MMU entails the need for making rules for aggregating stands below MMU. In general, similar life forms are aggregated together: tree-dominated types are aggregated with other tree-dominated types, shrub types with other shrub types, and herbaceous types with other herbaceous vegetation types. However, if possible, wetland vegetation types are not aggregated with upland types, even if they are in the same life form. Another guideline is that a unit below MMU is aggregated with the vegetation type that completely surrounds it. Finally, if a unit that is below MMU is the same life form as two adjacent larger stands, and the adjacent stand types are very dissimilar in environment, the unit may be aggregated with the more similar adjacent type.

2.6.3.1.2 Miscellaneous Classes

Miscellaneous classes include types that are not covered by the floristic classification. In order to have a comprehensive vegetation map, these types need to be accounted for in the mapping classification. Miscellaneous classification categories include types such as agriculture, urban/disturbance, and water features.

The relationship between vegetation and land use is sometimes complicated because of the possibility of natural vegetation and land use occurring on the same extent of land. For planning purposes, it is important to represent both the natural vegetation extent as well as the urban/land use component. For instance, in a dense forest setting, residential areas with houses are often in the understory of the trees. The geodatabase was created to allow for dual coding of both the natural vegetation and overlapping land use component. The geodatabase handles this situation by having a separate Land Use attribute field (see Section 2.6.3.9). Without the ability to dual code a polygon the photo interpreter would have to choose between calling out a vegetation type or a land use for a given area, one or the other would be lost in areas where the two overlap. The natural vegetation rather than the land use miscellaneous class typically took precedence when assigning a VegCode value. For example, a polygon would be coded as the *Pinus ponderosa* Alliance – a vegetation type – but in the Land Use layer, the same polygon would be coded as having an urban component.

An attempt was made to correlate code values between the VegCode assignment for Miscellaneous Classes and the Land Use attribute field code values where “dual

coding” was not involved. A polygon that had a Miscellaneous Class code value Built-up & Urban Disturbance, Agriculture, or Water in VegCode field, was automatically populated with a corresponding land use code value in the Land Use layer.

In this project, the concept of an “urban window” was also applied. Urban window, one of the Miscellaneous Classes in the vegetation map unit classification, is defined as a fully developed contiguous area of built-up and disturbed lands greater than one square mile in size. Natural vegetation stands may exist within an urban window, but they generally are not viable candidates for mitigation, preservation, and/or conservation measures, due to the surrounding urbanization. Therefore, natural vegetation was not mapped within an urban window unless it formed an area at least 10 acres in size and was not split by roads or other manmade features.

Agriculture includes woody agriculture and non-woody row and field crops. An important consideration in mapping agriculture is deciding whether a plot of land that was farmed in the past should still be considered as active agriculture. A currently inactive plot of agricultural land may have been abandoned permanently, or it may just be in a fallow phase before farming resumes. To handle the uncertainty in such cases, a decision was made to review image sets covering the five years prior to the base imagery date. If the imagery showed that the land had been actively farmed in any of those years, then it was mapped as agriculture.

Areas of non-agricultural human activity were categorized as either the generic Built-up & Urban Disturbance (all built-up land use activities), or Areas of Little or No Vegetation (non-built-up clearings).

Water was mapped with an MMU of 1 acre. Distinctions were made between perennial stream channels, small earthen-dammed lakes and ponds, and other undifferentiated water features.

It should be noted that percent cover was not evaluated for most of the Miscellaneous Classes. A description of each of the Miscellaneous Classes can be found in Appendix B.

2.6.3.2 Percent Cover

Percent cover, also referred to as “density,” is a quantitative estimate of the aerial extent of the living plants for each vegetation strata within a stand. Cover is the primary metric used to quantify the importance or abundance of a life form and/or species.

Vegetative cover for a given polygon is assigned for woody vegetation (conifer, hardwood, shrubs) as a whole integer. Herbaceous vegetation is attributed to the following range categories:

- 1 = None or Not Observable, <2%
- 2 = >2-10%
- 3 = >10-40%
- 4 = >40%
- 999 = Not Applicable/Not Assessed

Photointerpreters formed separate polygons when there were changes in cover within the same vegetation type or mapping unit as long as the cover differences were consistent and visually significant, minimally greater than 3-5 percent difference. The MMU for overstory cover breaks within the same upland vegetation types was typically 5 acres, and 3 acres for special types. If the primary difference between mappable stands of upland vegetation is the result of a cover break in the understory, emergent vegetation, or a cover break in the difference between the conifer and the hardwood component of the tree layer, then the MMU was 10 acres, and 5 acres for special types.

The photointerpreters considered the coverage pattern of each life form before assigning a cover code to the polygon. To ensure consistency, it was helpful to compare percent cover values of polygons with clumped and unevenly distributed vegetation to those of similar-sized polygons with an even distribution of plant cover.

Photointerpreters assessed the total cover of vegetation by considering the cover of the different life forms visible on the imagery, including nonvegetated areas. The total percent cover of trees, shrubs, herbaceous and nonvegetated areas must add up to 100 percent. The cover percentages for each life form were then assigned to each corresponding attribute field for each polygon.

2.6.3.2.1 Percent Cover Mapping Considerations

It is important to note that the photointerpreters could only accurately quantify the vegetation that is visible on the aerial imagery. Therefore, “bird’s eye” total cover was mapped, meaning that the cover of understory strata that were obscured by overstory strata was not included. For this reason, total cover for shrubs and herbaceous plants may be underestimated if their extent was hidden under the crowns of overstory trees and/or shrubs, and may differ from assessments done on the ground by field crews.

Where the cover of a particular life form is very sparse, it can be difficult to determine between a cover class “0” (None or Not Observable) and “1” or “2” percent. The photointerpreters looked for the consistent presence of very sparse vegetative cover throughout a polygon before assigning it a cover class of “1” or higher.

Where overstory cover exceeds 40 percent, such as closed canopy forest, dense riparian, or shrub stands, it was considered too dense to give a reliable estimate of lower tier canopy or understory percent cover. In these situations, the code assigned for percent cover for the understory life forms would be “Not Applicable/Not Assessed.” This same criterion is used in Statewide mapping efforts.

The date that the base aerial photography mission was flown influences the percent cover assigned to vegetation types. Subsequent field verification and AA must take into

consideration the following factors that can cause apparent discrepancies between the percent cover evident on the imagery and percent cover seen in the field:

- Seasonality - The percent cover of most plants is variable due to their annual growth cycle. Depending on whether the aerial imagery was taken during the wet season or the dry season, a mapped unit could show a different percent cover on the aerial imagery than is observed during an on-site visit at a different time of the year. Differences in leafiness (cold deciduous, drought deciduous) can affect plant cover determination. Leaf-on conditions obscure the understory. Imagery of leaf-off conditions would allow photointerpretation of the understory, but make it difficult to identify the overstory species since there is no foliage present.
- Annual variability - The environmental conditions at the time of the imagery (wet vs. drought years, flooding, etc.) may contrast with the conditions seen during on-site field visits thus resulting in differences of the percent cover assigned to a polygon in the field versus those assigned during photointerpretation.
- Dead vegetation – When vegetation is dead, it is not counted in the cover class analysis; however, vegetation in a stressed phenology state is included in the cover class density. Determining the difference between dead and stressed vegetation solely through photointerpretation is difficult, so field information reflecting the conditions on the ground is used when possible. Where dead vegetation is so dense as to obscure the understory vegetation, then the understory vegetation cover class is coded as “Not Applicable/Not Assessed.”

2.6.3.3 Conifer Dieback

Conifer Dieback is a True/False modifier attribute to indicate the mere presence of tree conifer death within a polygon. The amount of death is not assessed. Using the base imagery, the photo interpreter simply assessed the polygon for any standing dead conifer trees (even only one tree in a polygon). The modifier is an indication of “natural death” and not death caused as a result of fire. Hardwood and shrub death were not assessed.

2.6.3.4 Exotics

Photointerpreters assigned each existing polygon a code reflecting the level of impact by exotic invasive species such as *Bromus diandrus* grass. Polygons were not created or split because of differences in the presence of exotics. **Table 4**, adapted from *2013 California Desert Vegetation Map and Accuracy Assessment in Support of the Desert Renewable Energy Conservation Plan* (VegCAMP 2013) presents the map classes for Exotics.

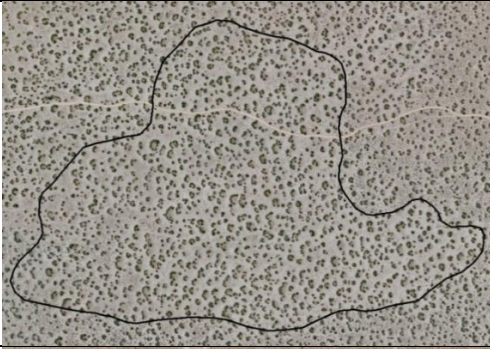


Table 4: Map Classes for Exotics

Code	Range	Discussion
0	None observed	Sparse herbaceous vegetation with a minimal to low relative cover of exotic species; based on field data, no evidence of exotics in sampling, no evidence of exotics on imagery and based on modeling, assumed not present or not regular in the stand.
1	Patches of exotics visible, but cover not significant (relative cover to total <33%)	Sparse to moderate cover of herbaceous vegetation with a low to moderately high relative cover of exotic species. Patches of exotics are visible, but cover is not significant.
2	Exotics (particularly herbaceous) significant and cover may exceed dominant vegetation strata (relative cover <66%)	Exotics are significant and cover may exceed the dominant vegetation strata. Areas of higher disturbance are likely to be in this category.
3	Stand characterized by exotics (vegetation type is “exotic”) (relative cover >66%)	This is reserved primarily for alliance-level calls which are defined by exotics; stands are characterized by exotic vegetation (as defined by the map unit). Examples of this are stands of <i>Bromus diandrus</i> .
9	Not Applicable/Not Assigned	Exotics are not applicable when the VegCode is 9300, 9310, 9404, 9600, 9800, 9801, 9802, 9803, 9804

2.6.3.5 Roadedness Disturbance

Roadedness Disturbance is defined as the level of impact in a polygon by paved and unpaved roads, off highway vehicle (OHV) trails, railroads, berms, and covered aqueducts. Impact is defined by the proportion of any polygon that is contiguously without these features, as shown in **Table 5**. The table is adapted from VegCAMP (2013). Roads following polygon boundaries were included in the assessment. Each existing vegetation polygon was assigned a Roadedness Disturbance class. Polygons were not created or split because of differences in roadedness.

Table 5: Map Classes for Roadedness Disturbance

Code	Range	Example
0	None observed	
1	Low: at least 2/3 (67% to 100%) of the vegetation polygon area is roadless	
2	Moderate: between 1/3 and 2/3 (33% to 66%) of the vegetation polygon is intersected by roads of any kind	
3	High: less than 1/3 (<33%) of the vegetation polygon lacks roads of any kind	
9	Not Applicable/Not Assigned	Roadedness is not applicable when the VegCode is 9200, 9300, 9310, 9800, 9801, 9802, 9803, 9804

The Roadedness Disturbance code reflects the combination of the expanse of roads in the polygon and the roads' effect on the contiguous space that has no roads – that is, where the roads fall within the polygon. This definition of roadedness has the advantage of helping to identify roadless areas, but the disadvantage of being scale independent. For example, any polygon with a road more or less bisecting it will be assigned a code of Moderate, regardless of size. This means that a very large polygon with a “Moderate” Roadedness Disturbance code might still contain an extensive roadless area.

2.6.3.6 Development Disturbance

Development Disturbance accounts for the level of impact by structures and settlements that are smaller than the MMU criteria for land use. Structures may include buildings, tanks, trailers, metal electrical towers, communication towers, and utility and mining structures. This attribute includes paved parking lots and collapsed structures. Note that it also includes debris such as junked vehicles, major trash dumping, etc., the removal of which could result in a vegetation stand that could be in very good to pristine ecological condition. Disturbance that does not involve these types of features is accounted for in Anthropogenically Altered Disturbance. Polygons were not created or split because of differences in Development Disturbance, but existing vegetation polygons were assigned a Development Disturbance class. **Table 6**, adapted from VegCAMP (2013), presents the map classes for Development Disturbance.

Table 6: Map Classes for Development Disturbance

Code	Range	Discussion
0	None observed	There are no noticeable junk piles, isolated homes, structures, etc. within the polygon.
1	Low; less than 2% of polygon affected	Junk piles, structures, cement pads, etc. are inconsistently distributed at very low density.
2	Moderate; between 2% to 5% of the polygon affected	Multiple examples of dispersed junk, buildings, or other structures, etc. are visible throughout the polygon. There may be a dense concentration of development within a single or few parts of the vegetation polygon.
3	High; more than 5% of polygon affected	Multiple examples are evenly distributed in a vegetated polygon; However, mines or open pits, coded as 9300, may be assigned a Development Disturbance code of 0, 1, 2, or 3 depending on the amount of structures or debris present in the polygon. Urban areas under trees included.
4	Built-up	Typically meets the 1-acre threshold to map a “Built-up and Urban Disturbance” (9300) polygon.
9	Not Applicable/Not Assigned	Development Disturbance is not applicable when the VegCode is 9200, 9800, 9801, 9802, 9803, 9804

2.6.3.7 Anthropogenically Altered Disturbance

This indicates the level of impact on vegetation through tillage, scraping, mining, etc. Disturbance from structures, pavement, or debris is not included here but is addressed in Development Disturbance. Anthropogenically Altered Disturbance captures past disturbances in the landscape that are still visible through their impact on vegetation, but do not have enough of an impact to change the vegetation type or percent cover range. For example, striations from former cultivation may be present on parcels of land that have not been under agriculture for decades. Anthropogenically Altered Disturbance is typically bounded by a straight-line feature such as a fenceline or road, implying man-induced activity. Not included are small clearings caused by OHV traffic at road intersections, fire effects, and powerline tower pedestal clearings.

Polygons were not created or split because of differences in anthropogenically altered disturbance, but existing vegetation polygons were assigned one of the classes presented in **Table 7**, which was adapted from VegCAMP (2013).

Table 7: Map Classes for Anthropogenically Altered Disturbance

Code	Range	Discussion
0	None observed	No ghost lines of tilling, differential effects of enclosure/exclosure fencing, effects of grazing/browsing, etc. are visible.
1	Less than 33% of polygon is affected and/or impact is seen but does not affect vegetation cover or type	Less than 1/3 of a vegetation polygon has visible evidence of clearing, prior agricultural activity or other effects.
2	Between 33% to 66% of polygon is affected	A vegetation polygon has more than 1/3 but less than 2/3 visible effects of clearing, prior agricultural or other effects.
3	More than 66% of polygon affected	A vegetation polygon has more than 2/3 visible effects of clearing, prior agricultural or other effects.
9	Not Applicable/Not Assigned	Anthropogenic alteration is not applicable when the VegCode is 9801.

2.6.3.8 Method ID

This attribute was used to indicate how the VegCode coding decision was reached for a polygon by identifying what type of field data (if any) was used to support the vegetation type assignment. For polygons that did not have any corresponding point data, the value of “photo interpretation” was assigned. The Method ID attribute facilitated the AA sample allocation process, as polygons that had reliable field information for type assignment could be identified and omitted from the final allocation.

The following is a list of the values used:

- 1 = Rapid Assessment (current project)
- 2 = Relevé (current project)
- 3 = Field Verification (current project)
- 4 = Photo Interpretation
- 5 = Adjacent Stand Information or Ground Photo
- 6 = AIS Reconnaissance (current project)
- 7 = Other Information
- 8 = Older Plot Data/Other Agency Recent Plot Data)
- 9 = Older Recon Data &/or Other Agency Recon Data
- 10 = Accuracy Assessment (current project)
- 60 = Additional Recon Information/Inconsequential Project Field Info

2.6.3.9 Land Use

Land use is the human use of the land and is embodied through such features as urban centers, towns, mining, agriculture, and individual settlements. As mentioned in Section 2.6.3.1.2, in this mapping effort land use was represented both as a possible vegetation class and as a separate attribute of a vegetated polygon. Every attempt was made to correlate the coding within both layers. A land use polygon was mapped if it was at least 1 acre in size.

The hierarchical format of the land use classification is such that more-detailed classes may be added at lower levels of the hierarchy for future more detailed land use mapping efforts. For example, the Urban (1000) class could be subdivided further into Residential (1100), Commercial (1200), Industrial (1300), Transportation/Communication (1400), and so on. The land use code assignment was mostly at an Anderson Level I (Anderson et al., 1972) with lower levels for specific categories, as shown below:

- 0000 = Not assigned/Not assessed
- 1000 = Urban
 - 1400 = Utility (Canal and aqueduct facilities)
- 2000 = Agriculture (includes nurseries)
- 9502 = Plantation
- 9800 = Undifferentiated Water (contains water at time of imagery)

In this work effort, the definition of the 1400 land use code correlates to the VegCode code of "Major Canals and Aqueducts" (9804).

2.6.3.9 Size (Modal CWHR Size Class)

CWHR Size, corresponding to ranges of diameter at base height (dbh) and life form, were assigned to each mapped vegetation type through a model crosswalk based off the modal size expression of vegetation type at maturity. Code values used are listed below:

T = Tree

S = Shrub

H = Herb

1 = Seedlings (<1" dbh)

2 = Saplings (1-6" dbh)

3 = Pole (6-11" dbh)

4 = Small (11-24" dbh)

5 = Medium-Large (>24" dbh)

6 = Multi-layered medium-large trees over smaller trees in densities >60%

9 = Not Applicable/Not Assessed

2.6.3.10 Height (Modal Tree Height) (meters)

Height attribution was mapped for forest and woodland types only, through a model crosswalk based off the modal height expression of vegetation type at maturity. During the mapping process stands that did not follow that modal expression for the type were flagged to be adjusted accordingly. Note that height categories >35-50m and >50m were not encountered.

0 = Not Applicable/Not Assessed

1 = <.5m

2 = >5-1m

3 = >1-2m

4 = >2-5m

5 = >5-10m

6 = >10-15m

7 = >15-20m

8 = >20-35m

2.6.4 Quality Control

Quality control was an iterative process, conducted at many phases of the mapping effort. For the entire duration of the project, photointerpreters consulted with one another as each module was mapped. This sharing of perspectives and examples ensured consistency in the mapping decisions made throughout the study area.

Completed modules were subjected to a series of automated checks. Any instances of invalid codes, uncoded polygons, adjoining polygons with the same code, or topology problems were flagged for correction by the photo interpreter. Another type of automated check verified that illogical combinations of codes were not used. For instance, a polygon coded as a conifer tree type must have a conifer cover code in the Conifer Cover attribute field. Additionally, a manual visual quality control was conducted, with each photo interpreter reviewing his or her completed module for consistent application of codes and MMU considerations. When adjoining completed modules were edge-matched, any mapping discrepancies found at the edges between

modules were corrected and, if necessary, changes were applied throughout the modules.

When all the modules were joined together, a senior photo interpreter reviewed the data for quality of delineations, code accuracy, consistency of interpretations, adherence to the mapping criteria, and omissions in data capture. Automated final checks were again conducted for invalid codes and code attribute correlations. Topological errors were checked, as were any edge-match problems. Another round of quality control was conducted after AA results had been applied to each of the subarea units.

2.7 Accuracy Assessment

To validate the vegetation maps, an accuracy assessment (AA) was performed for each Delivery Area. After AA of the last Delivery Area was completed, the results were combined for reporting of the project as a whole.

Polygons from the vegetation geodatabases were allocated for AA using a stratified random sampling, in which allocated polygons were distributed across the mapped units so that both rare and common types were represented. For the contracted subareas, CDFW staff provided in-kind time to allocate the accuracy assessment polygons. The sample allocation of polygons to select for visitation took the following parameters into consideration: land ownership, proximity to roads and trails (e.g., within 500 meters), other accessibility issues (e.g., slope steepness), and a targeted number of allocated polygons based on the number of vegetation types. The Southern Sierra Nevada Foothills study area was broken up into four subareas for AA including Delivery Areas 1 and 2, Delivery Areas 3 and 4, Delivery Areas 5, and Delivery Area 6.

Using the field key and descriptions developed during classification analysis, field staff visited allocated polygons to determine the vegetation type, without knowledge of the polygon attribution. For a polygon to be validly assessed for accuracy, at least 20 percent of its area has to be viewed, however, usually greater than 50 percent of the area was viewed in the field. For each AA survey, the location of the survey was marked using a GPS device (i.e., iPad, Garmin), and ground photos were taken at the AA GPS location. The field staff provided a primary vegetation type call and a list of dominant plant species, along with percent cover estimates by species and by vegetation strata. If a polygon contained more than one mappable vegetation type, notes were provided for how the polygon should be divided, and a separate survey was taken for each type meeting the minimum map unit size. See Appendix D for the AA field form.

AA field data was entered into a standardized database developed by CDFW and CNPS. CDFW ecologists, independent from CNPS field and AIS mapping staff, scored the accuracy of the vegetation geodatabase based on a fuzzy logic method as used for the Survey of California Vegetation (VegCAMP 2020). CDFW staff reviewed each AA and removed from consideration any samples that had problems associated with access, vegetation identification, visibility, or significant changes in land use or vegetation since the date of the imagery on which the map was based. If the field crews could not identify the vegetation type based on the field key or incorrectly identified the

type, CDFW staff assigned the correct type based on the species covers recorded in the AA data, any additional notes taken by the field crews, and sometimes the field photos.

AA scores were calculated by vegetation type and results were summarized in the form of a contingency table, so that specific and systematic errors could be addressed by the photointerpreters. Two forms of accuracy (User's and Producer's) can be estimated from the data (Story and Congalton 1986). User's accuracy provides an estimate of commission error, or how well spatial mapping data actually represents what is found on the ground; i.e., when the user goes to a location mapped as a certain class, the resulting probability that it is in fact that class is provided (with a percent accuracy). Producer's accuracy, on the other hand, measures omission error, or the probability that vegetation of a given class in the field is mapped as that class. Producer's accuracy may inform the mappers how well a mapping class can be detected by the photointerpreters (Story and Congalton 1986, Lea and Curtis 2010). Both user's and producer's accuracy were calculated.

A fuzzy logic method was used to score each AA survey, rather than simply denoting whether a sample was correct or incorrect (Congalton and Green 2009, Gopal and Woodcock 1994, Hagen 2003). Each field-verified polygon was scored according to a set of decision rules (**Table 8**), with a total of 5 possible points for each. Scores were summed for each vegetation type, then divided by the total possible score and multiplied by 100 for a percent accuracy. Additionally, a total overall accuracy was calculated by counting the AA surveys that were deemed correct (score of 5, or 100%) or acceptable (score of 3 or 4, or 60% or 80% accurate), and then dividing that count by the total number of AA surveys scored across all vegetation types.

Table 8: Accuracy Assessment Scoring Rules and Points

Code	Reason for Score	Score
A	PI completely correct.	5
B	The PI chose the correct Group OR the next level up in the hierarchy.	4
C	Threshold/transition between PI (Producers') call and Final (Field assessed) call. This was used when cover values of the dominant or indicator species were close to the values that would key to the PI's type (e.g., an AA call of <i>Yucca brevifolia</i> Alliance for a stand with 1% evenly distributed <i>Yucca brevifolia</i> over <i>Larrea tridentata</i> – <i>Ambrosia dumosa</i> would get this score if the PI call was <i>Larrea tridentata</i> – <i>Ambrosia dumosa</i> Alliance with <1% <i>Yucca brevifolia</i>).	4
D	Correct at Macrogroup level OR next level up in hierarchy.	3

Code	Reason for Score	Score
E	Based on close ecological similarity. Ecological similarity addresses assessed and mapped calls that contained vegetation with overlapping diagnostic species but were not technically closely related in the NVCS hierarchy. This was common in stands that contain a mix of species of late and early seral vegetation types and also common in zones of overlap between ecoregions.	3
F	Correct at Division level (OR next level up in hierarchy).	2
G	Some floristic/hydrologic similarity. This addresses cases in which the mapped and the assessed vegetation type had different diagnostic species, but bear some similarity in ecological traits based on predicted and actual setting such as hydrologic regime, overall climate, or successional state.	2
H	Correct only at Lifeform, without any floristic similarity.	1
I	No similarity above Formation and incorrect life form.	0
J	Survey removed because there was a significant change in the polygon (e.g., the stand was burned, developed, or cleared since the date of the base imagery).	no score
K	Survey removed because inadequate portion (<20%) of the polygon was viewed by the field assessment.	no score
L	Survey removed because field/PI data are incomplete, inadequate or confusing (e.g., cover values were not provided for key species in the stand).	no score
M	Supplementary record not scored (for multiple point assessments within a polygon where the AA call was the same).	no score

Once a Delivery Area had been scored, the accuracy assessment results were reviewed by senior photointerpreters. In some cases, the photo interpreter flagged a specific AA finding for follow-up discussion and review with the AA ecologist staff, resulting in either accepting, modifying the AA call, or eliminating the AA point out of the analysis. Once AA review was completed, any types not achieving 80% accuracy were further evaluated in consultation between the ecologists and mapping staff. The photointerpreters then revised the polygons based on the AA results. Therefore, the final map product is better than the stated accuracy.

CHAPTER 3: Results

This section presents results for the vegetation mapping effort and the accuracy assessment.

3.1 Mapping

As noted above in Section 2.6.3.1, AIS was contracted to map to the Alliance level. However, at the time of mapping there were several vegetation types for which the final vetting had not been completed. By the end of the project these types were determined to be associations rather than alliances and assigned to their corresponding place in the vegetation hierarchy. The result was that 9 of the types became Associations. So rather than lump up to the Alliance level it was decided to keep them as Associations and not lose that detail.

The final map contains 111 types that were mapped, composed of 75 Alliances and Alliance-level types such as Provisional Alliances, Semi-natural Alliances, and Mapping Units; 9 Associations, and 15 Miscellaneous Classes relating to features such as agriculture, water, and urban disturbance; and 12 upper-level hierarchical types, such as Class, Subclass, Macrogroup and Group. When the photo interpreter could not confidently classify a polygon at the alliance level, the polygon was assigned a broader upper-level code. This was most common with herbaceous communities, whose differences at the alliance level are often not readily discernible on imagery. Each map unit is described in Appendix B; the map classification is presented in Appendix A; and a summary table of polygon counts and acreage by map unit is presented in Appendix C.

A total of 1,821,092 acres were mapped, with a total of 92,942 polygons. For area (including acreage), and polygon counts by vegetation type for the Southern Sierra Nevada Foothills study area, refer to Appendix C.

3.2 Accuracy Assessment

The AA data collection for the Delivery Areas was conducted at different times by CNPS staff, based on when AIS produced the draft vegetation maps. Due to the timing and location of the Southern Sierra Nevada Foothills Delivery Area mapping, it was determined that the Delivery Areas 1 & 2 would be combined into one area for AA sample allocation, and the AA data collection. AA scoring would be conducted separately by CDFW staff. Then Delivery Areas 5 & 6 were mapped separately for AA data collection and scoring. Delivery Areas 3 & 4, which were the last areas to be mapped, were combined into one area for AA sample allocation, data collection and AA scoring. The locations, timing, and number of AA field surveys are summarized below in **Table 9**. The AAs were stand-based, in which both the vegetation type and the extent of the polygon were evaluated when possible. When a mapped polygon could be divided due to the presence of more than one vegetation type within the given MMU standards, an assessment was done for each type (i.e., a polygon sometimes had more than one AA survey). Also, the survey point locations are displayed in **Figures 3, 4, and 5** below.

Table 9: Locations and Dates for AA Field Surveys

Location	Dates for AA Field Surveying	No. of AA Surveys Collected	No. of Surveys Scored	No. of Polygons Scored
Delivery Areas 1 & 2	June – July 2020	222	117	110
Delivery Areas 3 & 4	October – November 2021	147	133	128
Delivery Area 5	November 2020	176	167	163
Delivery Area 6	August – September 2020	114	114	105

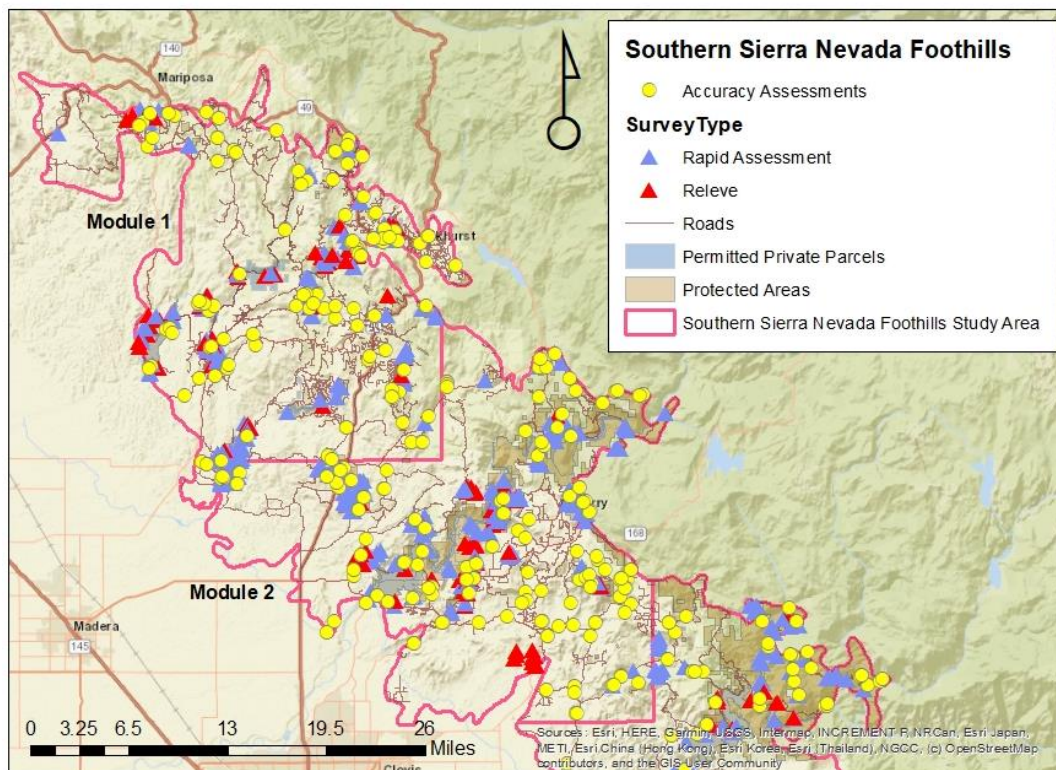


Figure 3: Map of the AA Survey Locations for Delivery Areas 1 and 2

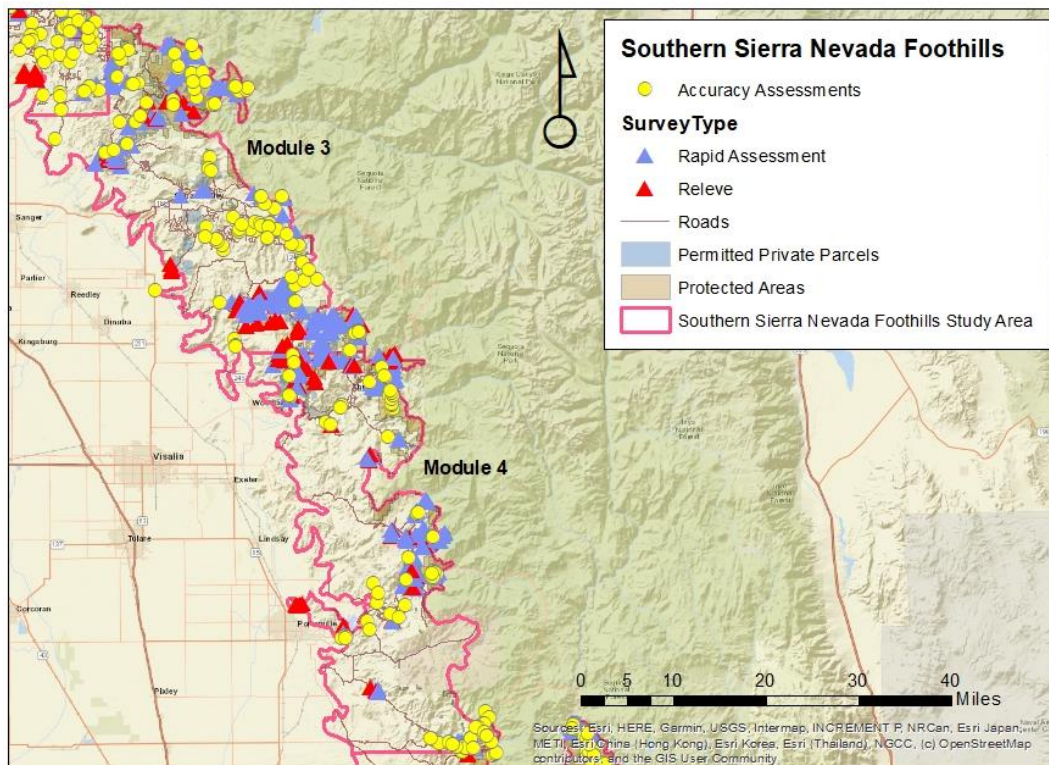


Figure 4: Map of the AA Survey Locations for Delivery Areas 3 and 4

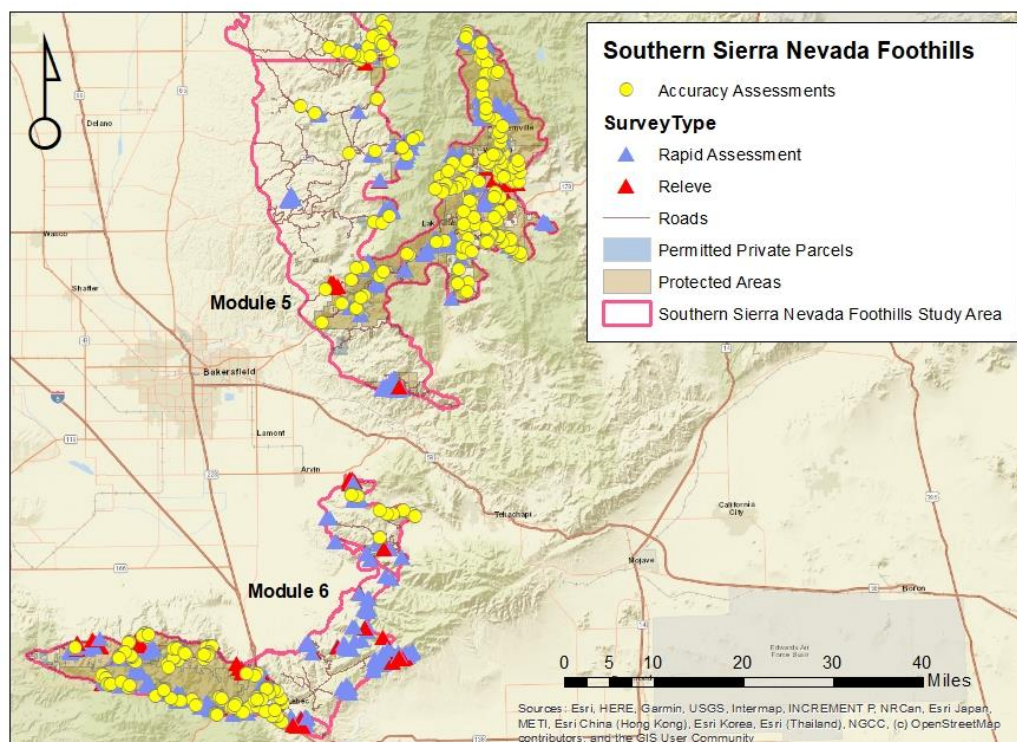


Figure 5: Map of the AA Survey Locations for Delivery Areas 5 and 6

The AA field data were analyzed by CDFW-VegCAMP staff to verify accuracy of the vegetation maps. The resulting calculated percent accuracy for each area was greater than 80% overall for fuzzy scores 3 and above. The overall Fuzzy Accuracy Assessment ratings for the final vegetation map at the Alliance and Group levels were 89.5 percent. Tables with AA scores for the Southern Sierra Nevada Foothills study area is provided in **Table 10** below.

Also, contingency tables displaying assessed types by users (Field assessed types) and producers (PI mapped types) for this accuracy assessment are included in Appendix G. Each column in the table represents a type assessed in the field for each polygon (users), while each row represents the type mapped by the photointerpreters (producers). Numbers on the diagonal are correct calls by the photointerpreters. These contingency tables display the numbers of assessed polygons by type, and do not include fuzzy scores.

Table 10: Alliance Level Accuracy Assessment Scores for the Southern Sierra Nevada Foothills Region

*Values with 5 or more meet the minimum sample size of 5.

Veg Code	Map Unit Name	Users Count	User's Accuracy (%)	Producers Count	Producer's Accuracy (%)
2214	Abies concolor Alliance	2	90.0	1	100.0
5431	Achnatherum speciosum Alliance	1	100.0	1	100.0
4111	Adenostoma fasciculatum Alliance	14	100.0	14	100.0
1310	Aesculus californica Alliance	15	100.0	18	96.7
3210	Alnus rhombifolia Alliance	5	80.0	9	82.2
4118	Arctostaphylos glauca Alliance	5	80.0	3	93.3
4412	Arctostaphylos pungens - Arctostaphylos pringlei Alliance	1	20.0	6	70.0
4112	Arctostaphylos viscida Alliance	12	100.0	15	92.0
5311	Artemisia tridentata Alliance	10	98.0	13	83.1
5111	Atriplex canescens Alliance	2	60.0	0	
5710	Atriplex polycarpa Alliance	4	100.0	5	100.0
6210	Baccharis salicifolia Alliance	9	82.2	9	88.9
7100	California Annual and Perennial Grassland Macrogroup	32	82.5	25	98.4

Veg Code	Map Unit Name	Users Count	User's Accuracy (%)	Producers Count	Producer's Accuracy (%)
7600	Californian mixed annual/perennial freshwater vernal pool/swale bottomland Group	1	60.0	0	
7200	Californian warm temperate marsh/seep Group	4	95.0	4	70.0
4113	Ceanothus cuneatus Alliance	26	84.6	23	93.9
6520	Ceanothus greggii – Fremontodendron californicum Alliance	7	91.4	5	100.0
4413	Ceanothus leucodermis Alliance	3	73.3	2	80.0
6214	Cephalanthus occidentalis Association	3	100.0	4	90.0
4211	Cercocarpus montanus Alliance	9	93.3	14	82.9
9401	Cliffs/Rock Outcrop Mapping Unit	2	60.0	0	
8110	Distichlis spicata Alliance	2	30.0	0	
5417	Ephedra viridis Alliance	5	76.0	6	76.7
4710	Ericameria linearifolia – Cleome isomeris Alliance	2	100.0	5	80.0
5212	Ericameria nauseosa Alliance	12	90.0	15	84.0
5428	Eriogonum fasciculatum – Viguiera parishii Alliance	3	93.3	4	90.0
4810	Eriogonum fasciculatum Alliance	21	84.8	13	93.8
4820	Eriogonum wrightii – Eriogonum heermannii – Buddleja utahensis Alliance	17	95.3	17	95.3
9501	Eucalyptus spp. - Ailanthus altissima - Robinia pseudoacacia Semi-natural Alliance	3	73.3	2	100
9500	Exotic Trees and Planted Trees Mapping Unit	3	86.7	4	75.0
4501	Frangula californica ssp. tomentella Association	1	100.0	2	80.0
3211	Fraxinus latifolia Alliance	25	92.0	22	88.2
1214	Hesperocyparis forbesii - Hesperocyparis nevadensis Alliance	1	100.0	2	70.0
3113	Juglans hindsii and Hybrids Semi-natural Alliance	0		1	60.0

Veg Code	Map Unit Name	Users Count	User's Accuracy (%)	Producers Count	Producer's Accuracy (%)
7216	Juncus arcticus (var. balticus, mexicanus) Alliance	1	100.0	5	60.0
1212	Juniperus californica Alliance	14	97.1	14	98.6
7115	Vulpia microstachys – Selaginella hansenii Association	4	100.0	6	86.7
5610	Lepidospartum squamatum Alliance	6	80.0	8	77.5
4720	Lotus scoparius - Lupinus albifrons - Eriodictyon spp. Alliance	12	91.7	19	71.6
7101	Mediterranean California naturalized annual and perennial grassland Group	1	60.0	0	
5600	Mojavean semi-desert wash scrub Group	1	100.0	0	
7500	Naturalized warm-temperate riparian and wetland Group	3	86.7	0	
2215	Pinus jeffreyi Alliance	7	94.3	10	88.0
2310	Pinus monophylla - (Juniperus osteosperma) Alliance	15	90.7	13	86.2
2212	Pinus ponderosa - Calocedrus decurrens – Pseudotsuga menziesii Alliance	4	95.0	4	85.0
1210	Pinus sabiniana Alliance	15	90.7	21	87.6
3310	Platanus racemosa – Quercus agrifolia Alliance	26	96.2	27	93.3
3110	Populus fremontii - Fraxinus velutina - Salix gooddingii Alliance	26	89.2	22	96.4
2216	Pseudotsuga macrocarpa Alliance	0		1	80.0
4210	Quercus berberidifolia Alliance	2	70.0	0	
1410	Quercus chrysolepis Alliance	12	90.0	16	81.3
1311	Quercus douglasii Alliance	42	91.0	32	98.1
6111	Quercus garryana (shrub) Alliance	11	81.8	10	96.0
6510	Quercus john-tuckeri Alliance	2	90.0	4	65.0
1312	Quercus kelloggii Alliance	13	92.3	16	82.5
3314	Quercus lobata Riparian Alliance	32	96.3	29	97.9
1313	Quercus lobata Alliance	1	20.0	0	

Veg Code	Map Unit Name	Users Count	User's Accuracy (%)	Producers Count	Producer's Accuracy (%)
4410	Quercus wislizeni (Short Stature) Mapping Unit	18	78.9	13	92.3
1111	Quercus wislizeni – Quercus parvula (tree) Alliance	52	88.5	32	97.5
6218	Rhus trilobata Sierran Association	1	100.0	1	100.0
6420	Ribes quercetorum Association	3	100.0	3	100.0
9402	River & Lacustrine Flats & Streambeds Mapping Unit	2	100.0	3	93.3
6213	Rubus armeniacus - Sesbania punicea - Ficus carica Semi-natural Alliance	1	0.0	0	
6211	Salix exigua Alliance	9	93.3	8	95.0
3114	Salix gooddingii - Salix laevigata Alliance	20	87.0	23	88.7
6217	Salix lasiolepis Alliance	0		1	80.0
8200	Southwestern North American alkali marsh/seep vegetation Group	1	40.0	0	
9600	Standing Dead Trees High Cover Mapping Unit	1	100.0	2	70.0
6301	Toxicodendron diversilobum Alliance	5	100.0	6	96.7
7310	Typha (angustifolia, domingensis, latifolia) Alliance	0		4	30.0
1110	Umbellularia californica Alliance	7	97.1	11	83.6
7102	Vancouverian and Rocky Mountain naturalized perennial grassland Group	1	60.0	5	76.0

Veg Code	Map Unit Name	Users Count	User's Accuracy (%)	Producers Count	Producer's Accuracy (%)
	Overall Polygon Count	633		633	
	Polygons with 60-100% Accuracy (Score 3 or above)	594			
	Polygons with 80-100% Accuracy (Score 4 or above)	540			
	Fuzzy Overall Percent Accuracy		89.50%		

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GLOSSARY

Alliance	a vegetation classification unit of low rank (7th level) containing one or more associations, and defined by a characteristic range of species composition, habitat conditions, physiognomy, and diagnostic species, typically at least one of which is found in the uppermost or dominant stratum of the vegetation (Jennings <i>et al.</i> 2006). Alliances reflect regional to subregional climate, substrates, hydrology, moisture/nutrient factors, and disturbance regimes.
Bosque	in arid climates, an oasis-like ribbon of canopied vegetation that only exists near rivers, streams, or other water courses.
Cismontane	refers to the portion of Southern California on the coastal side of the Transverse and Peninsular mountain ranges. The term “Southern California” often refers to this region specifically. See also “ transmontane ”.
Colluvial	referring to loose earth material that has accumulated at the base of a hill through the action of gravity.
Cove (on a hillside)	a hollow or recess in a mountain; a narrow pass or sheltered area between woods or hills.
Cryptobiotic crust	a layer on the surface of desert soils composed of biotic organisms such as blue-green algae, lichens, mosses, green algae, microfungi, and bacteria.
Decadent	(botany) a plant that is dead or dying.
Desiccation	the state of being thoroughly dried up.
Edaphic	related to or caused by particular soil conditions, as of texture or drainage, rather than by physiographic or climatic factors.
Facultative	having the capacity to live under more than one specific set of environmental conditions - as opposed to “obligate”.
Fluvial	of or pertaining to a river; produced by or found in a river.
Geodatabase	a database designed to store, query, and manipulate geographic information and spatial data.
Group	a vegetation classification unit of intermediate rank (6th level) defined by combinations of relatively narrow sets of diagnostic plant species (including dominants and co-dominants), broadly similar composition, and diagnostic growth forms that reflect biogeographic differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes (cf. Pignatti <i>et al.</i> 1994, Specht and Specht 2001).

Hummocky	relating to any topographic surface characterized by rounded or conical mounds.
Hydrophobic (soil)	a condition in which water collects on the soil surface rather than infiltrating into the ground. Wildfires generally cause soils to be hydrophobic temporarily.
Intermontane	a feature between mountains, such as a plateau or a basin.
Lens	a body of rock or ore that is thick in the middle and thinner toward the edges, similar in shape to a biconvex lens.
Lithomorphic	pertaining to a soil with a shallow profile, with organic soil horizons directly overlying bedrock.
Macrogroup	a vegetation classification unit of intermediate rank (5th level) defined by combinations of moderate sets of diagnostic plant species and diagnostic growth forms that reflect biogeographic differences in composition and sub-continental to regional differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes (cf. Pignatti <i>et al.</i> 1994).
Mesic	of, pertaining to, or adapted to an environment having a balanced supply of moisture.
Phenology	the science dealing with the influence of climate on the recurrence of such annual phenomena of plant life as budding and other growth phases.
Pool and swale topography	landscape characterized by shallow depressions where water can collect seasonally (pools), and long, narrow, shallow, troughs or depressions that may slope downward (swales).
Premontane	pertaining to an elevation zone corresponding to foothills or lower mountain slopes.
Rhizomatous	a plant producing rhizomes, which are root-like subterranean stems, commonly horizontal in position, that usually produce roots below and send up shoots progressively from the upper surface.
Scald	a hard impermeable surface on saline or sodic soils as a result of wind or sheet erosion (dry scald) or by surface sealing through deposition of salts and clays following evaporation of surface water (wet scald).
Sclerophyllous	typically scrub, but also forest, in which the leaves of the trees and shrubs are evergreen, hard, thick, leathery, and usually small. A dominant plant form in hot dry areas, especially Mediterranean-type climates.
Seral	referring to a community that is an intermediate stage in ecological succession, preceding the climax community.

Signature	the visual characteristics of objects on an aerial photograph that allow one to differentiate them. The characteristics include tone, shape, size, pattern, texture, and shadow.
Stoloniferous	producing or bearing stolons, which are prostrate stems, at or just below the ground surface, that produce new plants from buds at their tips or nodes.
Transmontane	refers to the largely desert areas of Southern California, on the noncoastal side of the Transverse and Peninsular mountain ranges. See also “ cismontane ”.

Note: Refer to Appendices E and F for further vegetation terminology.

List of Acronyms

AA	Accuracy Assessment
AIS	Aerial Information Systems, Inc.
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife (name changed 1/1/13)
DEM	Digital Elevation Model
DRG	Digital Raster Graphics
FGDC	Federal Geographic Data Committee
GIS	Geographic Information System
GPS	Global Positioning System
MMU	Minimum Mapping Unit
MMW	Minimum Mapping Width
MOLA	Modoc-Lassen
NAIP	National Agricultural Imagery Program
NVCS	National Vegetation Classification Standards
OHV	Off-Highway Vehicle
OHVP	Off-Highway Vehicle Park
PI	Photointerpretation, photointerpreter
ROW	Right-of-way
USGS	US Geological Survey
VegCAMP	Vegetation Classification and Mapping Program

CDFW – Southern Sierra Nevada Foothills Vegetation Mapping Classification Alliance Level Hierarchy 2009 Version 3/31/2022

Appendix A-1: Mapping Classification Alliance Hierarchy 3/31/2022

(Includes vegetation types mapped in the Northern Sierra Nevada Foothills (NSNF))

Class

Subclass

Formation

Division

Macrogroup

Group

Alliance (VegCode indicates mapped alliance)

Association (VegCode indicated mapped association)

Mesomorphic Tree Vegetation (Forest and Woodland) Class

Temperate Forest SubClass

Cool Temperate Forest Formation

North American Intermountain Basins Scrub Woodland Division

Intermountain Basins Pinyon–Juniper Woodland Macrogroup

Western Great Basin montane conifer woodland Group

Pinus monophylla – (*Juniperus osteosperma*) Alliance (2310)

Western North America Cool Temperate Forest Division

Californian–Vancouverian Montane and Foothill Forest Macrogroup

Vancouverian evergreen broadleaf and mixed forest Group

Arbutus menziesii Alliance

Californian montane conifer forest Group (2200) [mapped in NSNF] (includes managed conifer stands)

Abies concolor Alliance (2214)

Calocedrus decurrens Alliance [mapped in NSNF as 2213]

Pinus jeffreyi Alliance (2215)

Pinus ponderosa – *Calocedrus decurrens* – *Pseudotsuga menziesii* Alliance (2212) [mapped in NSNF as PiPo-CaDe 2212 and PsMe 2110]

Pinus ponderosa Alliance

Pseudotsuga macrocarpa Alliance (2216)

Upland Vancouverian mixed woodland and forest Group

Acer macrophyllum – *Alnus rubra* Alliance [mapped in NSNF with AcMa as 2111]

Warm Temperate Forest Formation

Madrean Forest and Woodland Division

California Forest and Woodland Macrogroup

Californian broadleaf forest and woodland Group

Quercus chrysolepis Alliance (1410) [mapped in NSNF]

Quercus douglasii Alliance (1311) [mapped in NSNF]

Quercus kelloggii Alliance (1312) [mapped in NSNF]

Quercus lobata Alliance (1313) [mapped in NSNF]

Quercus wislizeni – Quercus parvula (tree) Alliance (1111) [mapped in NSNF as QuWi tree]

Umbellularia californica Alliance (1110) [mapped in NSNF]
Aesculus californica Alliance (1310) [mapped in NSNF]

Californian evergreen coniferous forest and woodland Group

Hesperocyparis forbesii – Hesperocyparis nevadensis Alliance (1214)
Hesperocyparis (sargentii, macnabiana) Alliance [mapped in NSNF as
Callitropsis (Cupressus) macnabiana 1213]
Juniperus californica Alliance (1212) [mapped in NSNF]
Pinus attenuata Alliance [mapped in NSNF as 1211]
Pinus sabiniana Alliance (1210) [mapped in NSNF]

Temperate Flooded and Swamp Forest Formation

Western North America Flooded and Swamp Forest Division

Western Cordilleran montane–boreal riparian scrub Macrogroup

Vancouverian riparian deciduous forest Group

Alnus rhombifolia Alliance (3210) [mapped in NSNF]
Fraxinus latifolia Alliance (3211) [mapped in NSNF]

Vancouverian coastal riparian scrub Group

Frangula californica – Rhododendron occidentale – Salix breweri Alliance
[mapped in NSNF as Frangula californica 4501]

Western cool temperate scrub swamp Macrogroup

Western dogwood thicket Group

Cornus sericea – Rosa woodsia – Ribes spp. Alliance

Western North America Warm Temperate Flooded and Swamp Forest Division

Southwestern North American Riparian, Flooded and Swamp Forest Macrogroup

Southwestern North American introduced riparian scrub Group

Tamarix spp. Semi-Natural Alliance (6212) [mapped in NSNF]

Southwestern North American riparian evergreen and deciduous woodland Group
(3100)

Juglans hindsii and Hybrids Semi-Natural Alliance (3113) [mapped in NSNF]
Platanus racemosa – Quercus agrifolia Alliance (3310) [mapped in NSNF]
Populus fremontii – Fraxinus velutina – Salix gooddingii Alliance (3110) [mapped
in NSNF]
Quercus lobata Riparian Alliance (3314) [mapped in NSNF as QuLo 1313]
Salix gooddingii – Salix laevigata Alliance (3114) [mapped in NSNF separately as
SaGo 3112 and SalLaev 3111]

Southwestern North American riparian/wash scrub Group

Baccharis salicifolia Alliance (6210) [mapped in NSNF]
Cephalanthus occidentalis – Rosa californica Alliance (6250)
Cephalanthus occidentalis Association (6214) [mapped in NSNF as an
alliance]
Rosa californica Association (6401) [mapped in NSNF as an alliance]
Calycanthus occidentalis (Provisional) Association (6216)
Rhus trilobata – Crataegus rivularis – Forestiera pubescens Alliance (6230)
Rhus trilobata Association (6231)

Heterotheca (oregona, sessiliflora) Alliance (6221)
Salix exigua Alliance (6211) [mapped in NSNF]
Salix lasiolepis Alliance (6217) [mapped in NSNF]
Vitis arizonica – Vitis girdiana Alliance (6220)

Mesomorphic Shrub and Herb Vegetation (Shrubland and Grassland) Class
Mediterranean Scrub and Grassland SubClass

Mediterranean Grassland and Forb Meadow Formation

California Grassland and Meadow Division

California Annual and Perennial Grassland Macrogroup (7100)

California annual herb/grass Group (7110)

Amsinckia (menziesii, tessellata) – Phacelia spp. Alliance
Artemisia dracunculus Alliance (7112)
Eschscholzia (californica) – Lupinus (nanus) Alliance
Holocarpha (heermannii, virgata) Alliance (7114)
Lasthenia californica – Plantago erecta – Vulpia microstachys Alliance (7104)
Vulpia microstachys – Selaginella hansenii Association (7115)
Lotus unifoliolatus Provisional Alliance (7116)
Monolopia (lanceolata) – Coreopsis (calliopsidea) Alliance
Plagiobothrys nothofulvus Alliance

California perennial grassland Group

Corethrogyne filaginifolia – Eriogonum (elongatum, nudum) Alliance (7121)
Nassella spp. – Melica spp. Alliance
Leymus condensatus Alliance (7122)

Mediterranean California naturalized annual and perennial grassland Group (7101)
[mapped in NSNF]

Avena spp. – Bromus spp. Semi-Natural Alliance (7191)
Brassica nigra – Centaurea (solstitialis, melitensis) Semi-Natural Alliance
Lolium perenne Semi-Natural Alliance

Mediterranean Scrub Formation

California Scrub Division

California Chaparral Macrogroup

Californian mesic chaparral Group [mapped in NSNF as 4200]

Cercocarpus montanus Alliance (4211) [mapped in NSNF]
Prunus ilicifolia – Heteromeles arbutifolia – Ceanothus spinosus Alliance
[mapped in NSNF as 4212]
Quercus berberidifolia Alliance (4210) [mapped in NSNF]

Californian pre-montane chaparral Group

Arctostaphylos glandulosa Alliance
Ceanothus leucodermis Alliance (4413)
Quercus wislizeni (Short Stature) Mapping Unit (includes Quercus wislizeni –
Quercus chrysolepis (shrub) Alliance) (4410) [mapped in NSNF]

Californian serpentine chaparral Group

Quercus durata Alliance [mapped in NSNF as 4310]

Californian xeric chaparral Group

- Adenostoma fasciculatum Alliance (4111) [mapped in NSNF]
- Arctostaphylos (canescens, manzanita, stanfordiana) Alliance [mapped in NSNF as 4115]
- Arctostaphylos glauca Alliance (4118)
- Arctostaphylos viscida Alliance (4112) [mapped in NSNF]
- Ceanothus cuneatus Alliance (4113) [mapped in NSNF]

California Coastal Scrub Macrogroup

Central and south coastal California seral scrub Group

- Ericameria linearifolia – Cleome isomeris Alliance (4710)
- Lotus scoparius – Lupinus albifrons – Eriodictyon spp. Alliance (4720)
- Malacothamnus fasciculatus – Malacothamnus spp. Alliance

Central and south coastal Californian coastal sage scrub Group

- Diplacus aurantiacus Alliance
- Eriogonum fasciculatum Alliance (4810)

Naturalized non-native Mediterranean scrub Group

- Cytisus scoparius – Genista monspessulana – Cotoneaster spp. Semi-Natural Alliance

Temperate and Boreal Shrubland and Grassland SubClass

Temperate and Boreal Freshwater Marsh Formation

Western North American Freshwater Marsh Division

Western North America Vernal Pool Macrogroup

Californian mixed annual/perennial freshwater vernal pool/swale bottomland Group (7600) [mapped in NSNF]

Vernal Pool & Californian Annual and Perennial Grassland Matrix Mapping Unit (7400) [mapped in NSNF]

- Centromadia (pungens) Alliance
- Lasthenia fremontii – Downingia (bicornuta) Alliance
- Lasthenia glaberrima Alliance
- Layia fremontii – Achyrachaena mollis Alliance
- Montia fontana – Sidalcea calycosa Alliance
- Trifolium variegatum Alliance

Western North America Wet Meadow and Low Shrub Carr Macrogroup

Californian warm temperate marsh/seep Group (7200) [mapped in NSNF]

- Bidens cernua – Euthamia occidentalis – Ludwigia palustris Alliance
- Carex barbarae Alliance
- Carex nudata Alliance
- Carex utriculata – Calamagrostis canadensis Alliance
- Equisetum (arvense, variegatum, hyemale) Alliance
- Juncus (oxymeris, xiphioides) Alliance
- Juncus arcticus (var. balticus, mexicanus) Alliance (7216)
- Mimulus guttatus – Cirsium app. – Stachys spp. Alliance
- Muhlenbergia rigens Alliance
- Polygonum lapathifolium – Xanthium strumarium Alliance

Naturalized warm-temperate riparian and wetland Group (7500)
Cynodon dactylon – Crypsis spp. – Paspalum spp. Semi-Natural Alliance

Western North American Freshwater Marsh Macrogroup
Arid West freshwater emergent marsh Group (7300) [mapped in NSNF]
Schoenoplectus (acutus, californicus) Alliance (7320)
Typha (angustifolia, domingensis, latifolia) Alliance (7310)

Vancouverian coastal/tidal marsh and meadow Group (7800)
Juncus (effusus, patens) – Carex (pansa, praeegracilis) Alliance (7830)
Juncus effusus Association (7820)

Temperate and Boreal Salt Marsh Formation
Temperate and Boreal Pacific Coastal Salt Marsh Division
North American Pacific Coastal Salt Marsh Macrogroup
Temperate Pacific tidal salt and brackish meadow Group
Distichlis spicata Alliance (8110)

Western North American Interior Alkali–Saline Wetland Division
Warm Semi-Desert/Mediterranean Alkali–Saline Wetland Macrogroup
Southwestern North American alkali marsh/seep vegetation Group (8200)
Anemopsis californica – Helianthus nuttallii – Solidago spectabilis Alliance (8210)
Leymus cinereus – Leymus triticoides Alliance (8211)
Schoenoplectus americanus Alliance (8212)
Sporobolus airoides – Muhlenbergia asperifolia – Spartina gracilis Alliance

Southwestern North American salt basin and high marsh Group
Suaeda moquinii Alliance

Temperate and Boreal Scrub and Herb Coastal Vegetation Formation
Pacific Coast Scrub and Herb Littoral Vegetation Division
Vancouverian Coastal Dune and Bluff Macrogroup
California Coastal evergreen bluff and dune scrub Group
Baccharis pilularis Alliance [mapped in NSNF as 4420]

Temperate Grassland, Meadow, and Shrubland Formation
Vancouverian and Rocky Mountain Grassland and Shrubland Division
Vancouverian Lowland Grassland and Shrubland Macrogroup
Naturalized non-native deciduous scrub Group
Rubus armeniacus – Sesbania punicea – Ficus carica Semi-Natural Alliance
(6213) [mapped in NSNF]

Vancouverian coastal deciduous scrub Group
Toxicodendron diversilobum Alliance (6301) [mapped in NSNF]

Western Cordilleran Montane Shrubland and Grassland Macrogroup
Southern Vancouverian montane deciduous scrub Group
Ceanothus integerrimus Alliance (6110) [mapped in NSNF]
Quercus garryana (shrub) Alliance (6111) [mapped in NSNF]

Western Cordilleran montane deciduous scrub Group

Prunus virginiana Alliance

Ribes quercetorum – *Rhus trilobata* – *Frangula californica* Alliance (6440)

Ribes quercetorum Association (6420)

Rhus trilobata Sierran Association (6218)

Frangula californica ssp. *tomentella* Association (4501)

Sambucus nigra Association (6219)

Western Cordilleran montane moist graminoid meadow Group

Poa secunda – *Muhlenbergia richardsonis* – *Carex douglasii* Alliance

Western North American Temperate Grassland and Meadow Macrogroup

Vancouverian and Rocky Mountain naturalized annual grassland Group

Bromus tectorum – *Taeniatherum caput-medusae* Semi-Natural Alliance (7181)

Vancouverian and Rocky Mountain naturalized perennial grassland Group (irrigated pasture) (7102) [mapped in NSNF]

Poa pratensis – *Agrostis gigantea* – *Agrostis stolonifera* Semi-Natural Alliance

Holcus lanatus – *Anthoxanthum odoratum* Semi-Natural Alliance

Phalaris aquatica – *Phalaris arundinacea* Semi-Natural Alliance

Western dry upland perennial grassland Group

Aristida purpurea – *Elymus elymoides* – *Poa secunda* Alliance

Bromus carinatus – *Elymus glaucus* Alliance

Western North America Interior Sclerophyllous Shrubland Division

Warm Interior Chaparral Macrogroup

Western Mojave and Western Sonoran Desert borderland chaparral Group

Quercus john-tuckeri Alliance (6510)

Mogollon Rim chaparral Group

Ceanothus greggii – *Fremontodendron californicum* Alliance (6520)

Arctostaphylos pungens – *Arctostaphylos pringlei* Alliance (4412)

Xeromorphic Scrub and Herb Vegetation (Semi-Desert) Class

Cool Semi-Desert Scrub and Grassland SubClass

Cool Semi-Desert Scrub and Grassland Formation

Western North American Cool Semi-Desert Scrub and Grassland Division

Cool Semi-desert Wash and Disturbance Scrub Macrogroup

Intermontane seral shrubland Group

Ericameria nauseosa Alliance (5212)

Ericameria teretifolia Alliance

Inter-Mountain Dry Shrubland and Grassland Macrogroup

Intermontane deep or well-drained soil scrub Group

Ephedra viridis Alliance (5417)

Ephedra nevadensis – *Lycium andersonii* – *Grayia spinosa* Alliance

Southern Great Basin semi-desert grassland Group

Achnatherum speciosum Alliance (5431)

Intermountain shallow/calcareous soil scrub Group
Cercocarpus ledifolius Alliance

Western North America Tall Sage Shrubland and Steppe Macrogroup
Inter-Mountain West mesic tall sagebrush shrubland and steppe Group
Artemisia tridentata Alliance (5311)
Purshia tridentata – Artemisia tridentata Alliance

Cool Semi-Desert Alkali-Saline Flats Macrogroup
Shadscale-saltbush cool semi-desert scrub Group
Atriplex canescens Alliance (5111)

Warm Semi-Desert Scrub and Grassland SubClass

Warm Semi-Desert Scrub and Grassland Formation

Sonoran and Chihuahuan Semi-Desert Scrub and Grassland Division

Madrean Warm Semi-Desert Wash Woodland/Scrub Macrogroup

Mojavean semi-desert wash scrub Group (5600)

Encelia (actonii, virginensis) – Viguiera reticulata Alliance (5211)

Lepidospartum squamatum Alliance (5610)

Prunus fasciculata – Salazaria mexicana Alliance (5415)

Ambrosia salsola – Bebbia juncea Alliance

Ephedra californica – Ephedra trifurca Alliance (5620)

Mojavean–Sonoran Desert Scrub Macrogroup

Lower Bajada and Fan Mojavean–Sonoran desert scrub Group

Atriplex polycarpa Shrubland Alliance (5710)

Mojavean upper desert scrub Group

Yucca brevifolia Alliance (5423)

Eriogonum wrightii – Eriogonum heermannii – Buddleja utahensis Alliance (4820)

Eriogonum fasciculatum – Viguiera parishii Alliance (5428)

Hydromorphic Vegetation (Aquatic Vegetation) Class

Freshwater Aquatic Vegetation SubClass

Freshwater Aquatic Vegetation Formation

North American Freshwater Aquatic Vegetation Division

Western North American Freshwater Aquatic Vegetation Macrogroup

Naturalized temperate Pacific freshwater vegetation Group

Ludwigia (hexapetala, peploides) – Eichhornia crassipes Semi-Natural Alliance

Lemna (minor) and Relatives Provisional Alliance

Western North American Temperate Freshwater Aquatic Vegetation Group

Azolla (filiculoides, microphylla) Alliance

Ranunculus aquatilis – Callitriche palustris – Callitriche heterophylla Alliance

Miscellaneous Classes (code indicates mapped mapping unit)

- Agriculture (9200) (without fallow annual grasses dominating) [mapped in NSNF]
- Built-Up & Urban Disturbance (9300) [mapped in NSNF]
 - Urban Window [mapped in NSNF as 9310]
- Areas of Little or No Vegetation (9400) [mapped in NSNF]
 - Cliff/Rock Outcrop (9401) (Includes Cliff, Scree, and Other Rock Vegetation Group) [mapped in NSNF]
 - River and Lacustrine Flats & Streambeds (9402) [mapped in NSNF]
 - Undefined Areas with Little or No Vegetation (Anthropogenic clearing) (9403) [mapped in NSNF]
 - Sparsely Vegetated Recently Burned Areas (9404) [mapped in NSNF]
- Exotic Trees and Planted Trees (9500) [mapped in NSNF]
 - Eucalyptus spp. – Ailanthus altissima – Robinia pseudoacacia Semi-Natural Alliance (9501) [mapped in NSNF]
- Standing Dead Trees High Cover (9600)
- Water (9800) [mapped in NSNF]
 - Perennial Stream Channel (9801) [mapped in NSNF]
 - Reservoirs (9802) [mapped in NSNF]
 - Small Earthen Dam Ponds & Natural Lakes (9803) [mapped in NSNF]
 - Major Canals and Aqueducts (9804) [mapped in NSNF]

Other Attributes

Percent Cover - Woody (Conifer, Hardwood, Total Tree, Shrub)

Absolute Cover 1% increment

nnn = Absolute Cover

000 = None or None Observable

999 = Not Applicable, Not Assessed

Conifer Dieback (Dead) Modifier

0 = Not Assessed or Not Observed

1 = Dead Conifer Present in Stand

Percent Cover – Herbaceous

1 = 0-2%

2 = >2-10%

3 = >10-40%

4 = >40%

9 = Not Applicable, Not Assessed

Roadedness Disturbance

0 = No observed roads or trails.

1 = Minimal Roadedness: Less than one-third of the polygon is crossed by roads or trails. Polygons adjacent to paved roads are also placed into this category.

2 = Moderate Roadedness: Between one-third and two-thirds of the polygon is crossed by roads or trails.

3 = High Roadedness: Over two-thirds of the polygon is crossed by roads or trails.

9 = Not Applicable/Not Assigned

Development Disturbance

0 = None observed

1 = Low – 0-2% of polygon affected

2 = Moderate – >2-5% of polygon affected

3 = High – >5% of polygon affected

4 = Urban (used to automatically code Land Use=1000)

5 = Agriculture (used to automatically code Land Use = 2000)

9 = Not Applicable/Not Assigned

Anthropogenically Altered Disturbance (Clearing)

0 = No observed clearing

1 = Minimal Anthropogenic Clearing: Less than one-third of the polygon has been cleared of at least the understory vegetation.

2 = Moderate Anthropogenic Clearing: Between one-third and two-thirds of the polygon has been cleared of at least the understory vegetation.

3 = High Anthropogenic Clearing: Over two-thirds of the polygon has been cleared of at least the understory vegetation.

9 = Not Applicable/Not Assigned

Exotics (Invasives)

0 = Little or No Observable Invasive Plant Cover: Less than 5%

1 = Low Invasive Plant Cover: Less than 33% of the polygon but over 5% is covered with invasive plants.

2 = Moderate Invasive Plant Cover: Between 33% and 66% of the polygon is covered with invasive plants.

3 = High Invasive Plant Cover: Over 66% of the polygon's area is covered with invasive plants.

9 = Not Applicable/Not Assigned

Land Use

0000 = Not Assessed

1000 = Urban

1400 = Utility

2000 = Agriculture

9502 = Plantation

9800 = Undifferentiated Water

Modal Overstory Height Class (Trees) (note that categories >35-50m and >50m were not encountered)

0 = Not Applicable/Not Assessed

1 = <.5m

2 = >.5-1m

3 = >1-2m

4 = >2-5m

5 = >5-10m

6 = >10-15m

7 = >15-20m

8 = >20-35m

9 = >35-50m

California Wildlife Habitat Relations (CWHR) Modal Size Class

T = Tree

S = Shrub

H = Herb

1 = Seedlings (<1' dbh)

2 = Saplings (>1"-6" dbh)

3 = Pole (>6"-11" dbh)

4 = Small (>11"-24" dbh)

5 = Medium-large (>24" dbh)

6 = Multi-layered medium-large trees over smaller trees in densities >60%

9 = Not Applicable/Not Assessed

Method ID

- 01 = Rapid Assessment (current project)
- 02 = Releve (current project)
- 03 = Field Verification (current project)
- 04 = Photo Interpretation
- 05 = Adjacent stand information or photo
- 06 = AIS Reconnaissance (current project)
- 07 = Other information
- 08 = Older plot data/Other agency recent plot data
- 09 = Older AIS recon data/Other agency recon data
- 10 = Accuracy Assessment (current project)
- 60 = Inconsequential Project Information

Note

A Comment Field in the database used to add any pertinent additional information, such as significant additional species present not accounted for in the alliance or association name.

CDFW – Southern Sierra Nevada Foothills Vegetation Mapping

Classification 3/31/2022

APPENDIX A-2: Mapping Classification Numeric Short List

VegCode/PI and Map Unit Name (not hierarchical, mapped classes only)

Gray highlight = 1-acre MMU Special (Water/Riparian/Wetland/Mesic Herb/Rock Outcrop/Urban)

Trees

- 1110 = Umbellularia californica Alliance
- 1111 = Quercus wislizeni – Quercus parvula (tree) Alliance
- 1210 = Pinus sabiniana Alliance
- 1212 = Juniperus californica Alliance
- 1214 = Hesperocyparis forbesii – Hesperocyparis nevadensis Alliance
- 1310 = Aesculus californica Alliance
- 1311 = Quercus douglasii Alliance
- 1312 = Quercus kelloggii Alliance
- 1313 = Quercus lobata Alliance
- 1410 = Quercus chrysolepis Alliance
- 2200 = *Californian montane conifer forest Group (includes managed conifer stands)*
- 2212 = Pinus ponderosa – Calocedrus decurrens – Pseudotsuga menziesii Alliance
- 2214 = Abies concolor Alliance
- 2215 = Pinus jeffreyi Alliance
- 2216 = Pseudotsuga macrocarpa Alliance
- 2310 = Pinus monophylla – (Juniperus osteosperma) Alliance
- 3100 = *Southwestern North American riparian evergreen and deciduous woodland Group*
- 3110 = Populus fremontii – Fraxinus velutina – Salix gooddingii Alliance
- 3113 = Juglans hindsii and Hybrids Semi-Natural Alliance
- 3114 = Salix gooddingii – Salix laevigata Alliance
- 3210 = Alnus rhombifolia Alliance
- 3211 = Fraxinus latifolia Alliance
- 3310 = Platanus racemosa – Quercus agrifolia Alliance
- 3314 = Quercus lobata Riparian Alliance
- 5423 = Yucca brevifolia Alliance

Shrubs

- 4111 = Adenostoma fasciculatum Alliance
- 4112 = Arctostaphylos viscida Alliance
- 4113 = Ceanothus cuneatus Alliance
- 4118 = Arctostaphylos glauca Alliance
- 4210 = Quercus berberidifolia Alliance
- 4211 = Cercocarpus montanus Alliance
- 4410 = Quercus wislizeni (Short Stature) Mapping Unit
- 4412 = Arctostaphylos pungens – Arctostaphylos pringlei Alliance
- 4413 = Ceanothus leucodermis Alliance
- 4501 = Frangula californica ssp. tomentella Association of the Ribes quercetorum – Rhus trilobata – Frangula californica Alliance
- 4710 = Ericameria linearifolia – Cleome isomeris Alliance

4720 = *Lotus scoparius* – *Lupinus albifrons* – *Eriodictyon* spp. Alliance
 4810 = *Eriogonum fasciculatum* Alliance
 4820 = *Eriogonum wrightii* – *Eriogonum heermannii* – *Buddleja utahensis* Alliance
 5111 = *Atriplex canescens* Alliance
 5211 = *Encelia (actonii, virginensis)* – *Viguiera reticulata* Alliance
 5212 = *Ericameria nauseosa* Alliance
 5311 = *Artemisia tridentata* Alliance
 5415 = *Prunus fasciculata* – *Salazaria mexicana* Alliance
 5417 = *Ephedra viridis* Alliance
 5428 = *Eriogonum fasciculatum* – *Viguiera parishii* Alliance
 5600 = Mojavean semi-desert wash scrub Group
 5610 = *Lepidospartum squamatum* Alliance
 5620 = *Ephedra californica* – *Ephedra trifurca* Alliance
 5710 = *Atriplex polycarpa* Alliance
 6110 = *Ceanothus integerrimus* Alliance
 6111 = *Quercus garryana* (shrub) Alliance
 6210 = *Baccharis salicifolia* Alliance
 6211 = *Salix exigua* Alliance
 6212 = *Tamarix* spp. Semi-Natural Alliance
 6213 = *Rubus armeniacus* – *Sesbania punicea* – *Ficus carica* Semi-Natural Alliance
 6214 = *Cephalanthus occidentalis* Association of the *Cephalanthus occidentalis* – *Rosa californica* Alliance
 6216 = *Calycanthus occidentalis* Provisional Association of the *Cephalanthus occidentalis* – *Rosa californica* Alliance
 6217 = *Salix lasiolepis* Alliance
 6218 = *Rhus trilobata* Sierran Association of the *Ribes quercetorum* – *Rhus trilobata* – *Frangula californica* Alliance
 6219 = *Sambucus nigra* Association of the *Ribes quercetorum* – *Rhus trilobata* – *Frangula californica* Alliance
 6220 = *Vitis arizonica* – *Vitis girdiana* Alliance
 6230 = *Rhus trilobata* – *Crataegus rivularis* – *Forestiera pubescens* Alliance
 6231 = *Rhus trilobata* Association of the *Rhus trilobata* – *Crataegus rivularis* – *Forestiera pubescens* Alliance
 6250 = *Cephalanthus occidentalis* – *Rosa californica* Alliance
 6301 = *Toxicodendron diversilobum* Alliance
 6401 = *Rosa californica* Association of the *Cephalanthus occidentalis* – *Rosa californica* Alliance
 6420 = *Ribes quercetorum* Association of the *Ribes quercetorum* – *Rhus trilobata* – *Frangula californica* Alliance
 6440 = *Ribes quercetorum* – *Rhus trilobata* – *Frangula californica* Alliance
 6510 = *Quercus john-tuckeri* Alliance
 6520 = *Ceanothus greggii* – *Fremontodendron californicum* Alliance

Herb

5431 = *Achnatherum speciosum* Alliance
 6221 = *Heterotheca (oregona, sessiliflora)* Alliance
 7100 = *California Annual and Perennial Grassland Macrogroup*
 7101 = *Mediterranean California naturalized annual and perennial grassland Group*
 7102 = *Vancouverian and Rocky Mountain naturalized perennial grassland Group (irrigated pasture)*

- 7104 = *Lasthenia californica* – *Plantago erecta* – *Vulpia microstachys* Alliance
- 7110 = *California annual herb/grass Group*
- 7112 = *Artemisia dracunculus* Alliance
- 7114 = *Holocarpha* (*heermannii*, *virgata*) Alliance
- 7115 = *Vulpia microstachys* – *Selaginella hansenii* Association of the *Lasthenia californica* – *Plantago erecta* – *Vulpia microstachys* Alliance
- 7116 = *Lotus unifoliolatus* Alliance
- 7121 = *Corethrogyne filaginifolia* – *Eriogonum* (*elongatum*, *nudum*) Alliance
- 7122 = *Leymus condensatus* Alliance
- 7181 = *Bromus tectorum* – *Taeniatherum caput-medusae* Herbaceous Semi-Natural Alliance
- 7191 = *Avena* spp. – *Bromus* spp. Herbaceous Semi-Natural Alliance
- 7200 = *Californian warm temperate marsh/seep Group*
- 7216 = *Juncus arcticus* (var. *balticus*, *mexicanus*) Alliance
- 7300 = *Arid West freshwater emergent marsh Group*
- 7310 = *Typha* (*angustifolia*, *domingensis*, *latifolia*) Alliance
- 7320 = *Schoenoplectus* (*acutus*, *californicus*) Alliance
- 7400 = Vernal Pool & Californian Annual and Perennial Grassland Matrix Mapping Unit
- 7500 = *Naturalized warm-temperate riparian and wetland Group*
- 7600 = *Californian mixed annual/perennial freshwater vernal pool/swale bottomland Group*
- 7800 = *Vancouverian coastal/tidal marsh and meadow Group*
- 7820 = *Juncus effusus* Association of the *Juncus* (*effusus*, *patens*) – *Carex* (*pansa*, *praegracilis*) Alliance
- 7830 = *Juncus* (*effusus*, *patens*) – *Carex* (*pansa*, *praegracilis*) Alliance
- 8110 = *Distichlis spicata* Alliance
- 8200 = *Southwestern North American alkali marsh/seep vegetation Group*
- 8210 = *Anemopsis californica* – *Helianthus nuttallii* – *Solidago spectabilis* Alliance
- 8211 = *Leymus cinereus* – *Leymus triticoides* Alliance
- 8212 = *Schoenoplectus americanus* Alliance

Miscellaneous Classes (Mapping Units)

- 9200 = Agriculture (without fallow annual grasses dominating)
- 9300 = Built-Up & Urban Disturbance (includes development, mines and borrow pits)
- 9400 = Areas of Little or No Vegetation
- 9401 = Cliffs/Rock Outcrop
- 9402 = River and Lacustrine Flats & Streambeds
- 9403 = Undefined Areas with Little or No Vegetation (Anthropogenic clearing)
- 9404 = Sparsely Vegetated Recently Burned Areas
- 9500 = Exotic Trees and Planted Trees
- 9501 = *Eucalyptus* spp. – *Ailanthus altissima* – *Robinia pseudoacacia* Semi-Natural Alliance
- 9600 = Standing Dead Trees High Cover
- 9800 = Water
- 9801 = Perennial Stream Channel
- 9802 = Reservoirs
- 9803 = Small Earthen Dam Ponds & Natural Lakes
- 9804 = Major Canals and Aqueducts

Other Attributes

Percent Cover - Woody (Conifer, Hardwood, Total Tree, Shrub)

Absolute Cover 1% increment

nnn = Absolute Cover

000 = None or None Observable

999 = Not Applicable, Not Assessed

Conifer Dieback (Dead) Modifier

0 = Not Assessed or Not Observed

1 = Dead Conifer Present in Stand

Percent Cover – Herbaceous

1 = 0-2%

2 = >2-10%

3 = >10-40%

4 = >40%

9 = Not Applicable, Not Assessed

Roadedness Disturbance

0 = No observed roads or trails.

1 = Minimal Roadedness: Less than one-third of the polygon is crossed by roads or trails. Polygons adjacent to paved roads are also placed into this category.

2 = Moderate Roadedness: Between one-third and two-thirds of the polygon is crossed by roads or trails.

3 = High Roadedness: Over two-thirds of the polygon is crossed by roads or trails.

9 = Not Applicable/Not Assigned

Development Disturbance

0 = None observed

1 = Low – 0-2% of polygon affected

2 = Moderate – >2-5% of polygon affected

3 = High – >5% of polygon affected

4 = Urban (used to automatically code Land Use=1000)

5 = Agriculture (used to automatically code Land Use = 2000)

9 = Not Applicable/Not Assigned

Anthropogenically Altered Disturbance (Clearing)

0 = No observed clearing

1 = Minimal Anthropogenic Clearing: Less than one-third of the polygon has been cleared of at least the understory vegetation.

2 = Moderate Anthropogenic Clearing: Between one-third and two-thirds of the polygon has been cleared of at least the understory vegetation.

3 = High Anthropogenic Clearing: Over two-thirds of the polygon has been cleared of at least the understory vegetation.

9 = Not Applicable/Not Assigned

Exotics (Invasives)

0 = Little or No Observable Invasive Plant Cover: Less than 5%

1 = Low Invasive Plant Cover: Less than 33% of the polygon but over 5% is covered with invasive plants.

2 = Moderate Invasive Plant Cover: Between 33% and 66% of the polygon is covered with invasive plants.

3 = High Invasive Plant Cover: Over 66% of the polygon's area is covered with invasive plants.

9 = Not Applicable/Not Assigned

Land Use

0000 = Not Assessed

1000 = Urban

1400 = Utility

2000 = Agriculture

9502 = Plantation

9800 = Undifferentiated Water

Modal Overstory Height Class (Trees) (note that categories >35-50m and >50m were not encountered)

0 = Not Applicable/Not Assessed

1 = <.5m

2 = >.5-1m

3 = >1-2m

4 = >2-5m

5 = >5-10m

6 = >10-15m

7 = >15-20m

8 = >20-35m

9 = >35-50m

California Wildlife Habitat Relations (CWHR) Modal Size Class

T = Tree

S = Shrub

H = Herb

1 = Seedlings (<1' dbh)

2 = Saplings (>1"-6" dbh)

3 = Pole (>6"-11" dbh)

4 = Small (>11"-24" dbh)

5 = Medium-large (>24" dbh)

6 = Multi-layered medium-large trees over smaller trees in densities >60%

9 = Not Applicable/Not Assessed

Method ID

- 01 = Rapid Assessment (current project)
- 02 = Releve (current project)
- 03 = Field Verification (current project)
- 04 = Photo Interpretation
- 05 = Adjacent stand information or photo
- 06 = Reconnaissance (current project)
- 07 = Other information
- 08 = Older plot data/Other agency recent plot data
- 09 = Older recon data/Other agency recon data
- 10 = Accuracy Assessment (current project)
- 60 = Inconsequential Project Information

Note

A Comment Field in the database used to add any pertinent additional information, such as significant additional species present not accounted for in the alliance or association name.

CDFW – Southern Sierra Nevada Foothills Vegetation Mapping Classification 03/31/2022

APPENDIX A-3: Mapping Classification Alliance Alpha Short List

Map Unit Name and VegCode/PI (mapped classes only)

Gray highlight = 1 acre MMU Special (Water/Riparian/Wetland/Mesic Herb/Rock Outcrop/Urban)

Trees

Abies concolor Alliance (2214)
Aesculus californica Alliance (1310)
Alnus rhombifolia Alliance (3210)
Californian montane conifer forest Group (includes managed conifer stands) (2200)
Fraxinus latifolia Alliance (3211)
Hesperocyparis forbesii – Hesperocyparis nevadensis Alliance (1214)
Juglans hindsii and Hybrids Semi-Natural Alliance (3113)
Juniperus californica Alliance (1212)
Pinus jeffreyi Alliance (2215)
Pinus monophylla – (Juniperus osteosperma) Alliance (2310)
Pinus ponderosa – Calocedrus decurrens – Pseudotsuga menziesii Alliance (2212)
Pinus sabiniana Alliance (1210)
Platanus racemosa – Quercus agrifolia Alliance (3310)
Populus fremontii – Fraxinus velutina – Salix gooddingii Alliance (3110)
Pseudotsuga macrocarpa Alliance (2216)
Quercus chrysolepis Alliance (1410)
Quercus douglasii Alliance (1311)
Quercus kelloggii Alliance (1312)
Quercus lobata Alliance (1313)
Quercus lobata Riparian Alliance (3314)
Quercus wislizeni – Quercus parvula (tree) Alliance (1111)
Salix gooddingii – Salix laevigata Alliance (3114)
Southwestern North American riparian evergreen and deciduous woodland Group (3100)
Umbellularia californica Alliance (1110)
Yucca brevifolia Alliance (5423)

Shrubs

Adenostoma fasciculatum Alliance (4111)
Arctostaphylos glauca Alliance (4118)
Arctostaphylos pungens – Arctostaphylos pringlei Alliance (4412)
Arctostaphylos viscida Alliance (4112)
Artemisia tridentata Alliance (5311)
Atriplex canescens (5111)
Atriplex polycarpa Alliance (5710)
Baccharis salicifolia Alliance (6210)
Calycanthus occidentalis Provisional Association of the Cephalanthus occidentalis –
Rosa californica Alliance (6216)
Ceanothus cuneatus Alliance (4113)
Ceanothus greggii – Fremontodendron californicum Alliance (6520)

Ceanothus integerrimus Alliance (6110)
 Ceanothus leucodermis Alliance (4413)
 Cephalanthus occidentalis Association of the Cephalanthus occidentalis – Rosa californica Alliance (6214)
 Cephalanthus occidentalis – Rosa californica Alliance (6250)
 Cercocarpus montanus Alliance (4211)
 Encelia (actonii, virginensis) – Viguiera reticulata Alliance (5211)
 Ephedra californica – Ephedra trifurca Alliance (5620)
 Ephedra viridis Alliance (5417)
 Ericameria linearifolia – Cleome isomeris Alliance (4710)
 Ericameria nauseosa Alliance (5212)
 Eriogonum fasciculatum Alliance (4810)
 Eriogonum fasciculatum – Viguiera parishii (5428)
 Eriogonum wrightii – Eriogonum heermannii – Buddleja utahensis Alliance (4820)
 Frangula californica ssp. tomentella Association of the Ribes quercetorum – Rhus trilobata – Frangula californica Alliance (4501)
 Lepidospartum squamatum Alliance (5610)
 Lotus scoparius – Lupinus albifrons – Eriodictyon spp. Alliance (4720)
 Mojavean semi-desert wash scrub Group (5600)
 Prunus fasciculata – Salazaria mexicana Alliance (5415)
 Quercus berberidifolia Alliance (4210)
 Quercus garryana (shrub) Alliance (6111)
 Quercus john-tuckeri Alliance (6510)
 Quercus wislizeni (Short Stature) Mapping Unit (4410)
 Rhus trilobata – Crataegus rivularis – Forestiera pubescens Alliance (6230)
 Rhus trilobata Association of the Rhus trilobata – Crataegus rivularis – Forestiera pubescens Alliance (6231)
 Rhus trilobata Sierran Association of the Ribes quercetorum – Rhus trilobata – Frangula californica Alliance (6218)
 Ribes quercetorum Association of the Ribes quercetorum – Rhus trilobata – Frangula californica Alliance (6420)
 Ribes quercetorum – Rhus trilobata – Frangula californica Alliance (6440)
 Rosa californica Association of the Cephalanthus occidentalis – Rosa californica Alliance (6401)
 Rubus armeniacus – Sesbania punicea – Ficus carica Semi-Natural Alliance (6213)
 Salix exigua Alliance (6211)
 Salix lasiolepis Alliance (6217)
 Sambucus nigra Association of the Ribes quercetorum – Rhus trilobata – Frangula californica Alliance (6219)
 Tamarix spp. Shrubland Semi-Natural Alliance (6212)
 Toxicodendron diversilobum Alliance (6301)
 Vitis arizonica – Vitis girdiana Alliance (6220)

Herb

Achnatherum speciosum Alliance (5431)
 Anemopsis californica – Helianthus nuttallii – Solidago spectabilis Alliance (8210)
 Arid West freshwater emergent marsh Group (7300)
 Artemisia dracunculus Alliance (7112)
 Avena spp. – Bromus spp. Herbaceous Semi-Natural Alliance (7191)

Bromus tectorum – *Taeniatherum caput-medusae* Herbaceous Semi-Natural Alliance (7181)
California Annual and Perennial Grassland Macrogroup (7100)
California annual herb/grass Group (7110)
Californian mixed annual/perennial freshwater vernal pool/swale bottomland Group (7600)
Californian warm temperate marsh/seep Group (7200)
Corethrogyne filaginifolia – *Eriogonum* (*elongatum*, *nudum*) Alliance (7121)
Distichlis spicata Alliance (8110)
Heterotheca (*oregona*, *sessiliflora*) Alliance (6221)
Holocarpha (*heermannii*, *virgata*) Alliance (7114)
Juncus arcticus (var. *balticus*, *mexicanus*) Alliance (7216)
Juncus effusus Association of the *Juncus* (*effusus*, *patens*) - *Carex* (*pansa*, *praegracilis*) Alliance (7820)
Juncus (*effusus*, *patens*) – *Carex* (*pansa*, *praegracilis*) Alliance (7830)
Lasthenia californica – *Plantago erecta* – *Vulpia microstachys* Alliance (7104)
Leymus cinereus – *Leymus triticoides* Alliance (8211)
Leymus condensatus Alliance (7122)
Lotus unifoliolatus Alliance (7116)
Mediterranean California naturalized annual and perennial grassland Group (7101)
Naturalized warm-temperate riparian and wetland Group (7500)
Schoenoplectus (*acutus*, *californicus*) Alliance (7320)
Schoenoplectus americanus Alliance (8212)
Southwestern North American alkali marsh/seep vegetation Group (8200)
Typha (*angustifolia*, *domingensis*, *latifolia*) Alliance (7310)
Vancouverian and Rocky Mountain naturalized perennial grassland Group (irrigated pasture) (7102)
Vancouverian coastal/tidal marsh and meadow Group (7800)
Vernal Pool & Californian Annual and Perennial Grassland Matrix Mapping Unit (7400)
Vulpia microstachys – *Selaginella hansenii* Association of the *Lasthenia californica* – *Plantago erecta* – *Vulpia microstachys* Alliance (7115)

Miscellaneous Classes (Mapping Units)

Agriculture (9200) (without fallow annual grasses dominating)
 Built-Up & Urban Disturbance (9300) (includes development, mines and borrow pits)
 Areas of Little or No Vegetation (9400)
 Cliffs/Rock Outcrop (9401)
 River and Lacustrine Flats & Streambeds (9402)
 Undefined Areas with Little or No Vegetation (Anthropogenic clearing) (9403)
 Sparsely Vegetated Recently Burned Areas [9404]
 Exotic Trees and Planted Trees (9500)
 Eucalyptus spp. – *Ailanthus altissima* – *Robinia pseudoacacia* Semi-Natural Alliance (9501)
 Standing Dead Trees High Cover [9600]
 Water (9800)
 Perennial Stream Channel (9801)
 Reservoirs (9802)
 Small Earthen Dam Ponds & Natural Lakes (9803)
 Major Canals and Aqueducts (9804)

Other Attributes

Percent Cover - Woody (Conifer, Hardwood, Total Tree, Shrub)

Absolute Cover 1% increment

nnn = Absolute Cover

000 = None or None Observable

999 = Not Applicable, Not Assessed

Conifer Dieback (Dead) Modifier

0 = Not Assessed or Not Observed

1 = Dead Conifer Present in Stand

Percent Cover – Herbaceous

1 = 0-2%

2 = >2-10%

3 = >10-40%

4 = >40%

9 = Not Applicable, Not Assessed

Roadedness Disturbance

0 = No observed roads or trails.

1 = Minimal Roadedness: Less than one-third of the polygon is crossed by roads or trails. Polygons adjacent to paved roads are also placed into this category.

2 = Moderate Roadedness: Between one-third and two-thirds of the polygon is crossed by roads or trails.

3 = High Roadedness: Over two-thirds of the polygon is crossed by roads or trails.

9 = Not Applicable/Not Assigned

Development Disturbance

0 = None observed

1 = Low – 0-2% of polygon affected

2 = Moderate – >2-5% of polygon affected

3 = High – >5% of polygon affected

4 = Urban (used to automatically code Land Use=1000)

5 = Agriculture (used to automatically code Land Use = 2000)

9 = Not Applicable/Not Assigned

Anthropogenically Altered Disturbance (Clearing)

0 = No observed clearing

1 = Minimal Anthropogenic Clearing: Less than one-third of the polygon has been cleared of at least the understory vegetation.

2 = Moderate Anthropogenic Clearing: Between one-third and two-thirds of the polygon has been cleared of at least the understory vegetation.

3 = High Anthropogenic Clearing: Over two-thirds of the polygon has been cleared of at least the understory vegetation.

9 = Not Applicable/Not Assigned

Exotics (Invasives)

0 = Little or No Observable Invasive Plant Cover: Less than 5%

1 = Low Invasive Plant Cover: Less than 33% of the polygon but over 5% is covered with invasive plants.

2 = Moderate Invasive Plant Cover: Between 33% and 66% of the polygon is covered with invasive plants.

3 = High Invasive Plant Cover: Over 66% of the polygon's area is covered with invasive plants.

9 = Not Applicable/Not Assigned

Land Use

0000 = Not Assessed

1000 = Urban

1400 = Utility

2000 = Agriculture

9502 = Plantation

9800 = Undifferentiated Water

Modal Overstory Height Class (Trees) (note that categories >35-50m and >50m were not encountered)

0 = Not Applicable/Not Assessed

1 = <.5m

2 = >.5-1m

3 = >1-2m

4 = >2-5m

5 = >5-10m

6 = >10-15m

7 = >15-20m

8 = >20-35m

9 = >35-50m

California Wildlife Habitat Relations (CWHR) Modal Size Class

T = Tree

S = Shrub

H = Herb

1 = Seedlings (<1' dbh)

2 = Saplings (>1"-6" dbh)

3 = Pole (>6"-11" dbh)

4 = Small (>11"-24" dbh)

5 = Medium-large (>24" dbh)

6 = Multi-layered medium-large trees over smaller trees in densities >60%

9 = Not Applicable/Not Assessed

Method ID

- 01 = Rapid Assessment (current project)
- 02 = Releve (current project)
- 03 = Field Verification (current project)
- 04 = Photo Interpretation
- 05 = Adjacent stand information or photo
- 06 = AIS Reconnaissance (current project)
- 07 = Other information
- 08 = Older plot data/Other agency recent plot data
- 09 = Older recon data/Other agency recon data
- 10 = Accuracy Assessment (current project)
- 60 = Inconsequential Project Information

Note

A Comment Field in the database used to add any pertinent additional information, such as significant additional species present not accounted for in the alliance or association name.

APPENDIX B: Map Unit Descriptions 03/31/2021

Explanation of Map Unit Descriptions

This appendix contains descriptions for each of the Vegetation Types (VegCode) represented in the final geodatabase for the current project.

The descriptions for the majority of vegetation types have the following components:

- A screenshot of aerial imagery and a ground photo are featured on the first page. The screenshots give the reader a sense of the photo signatures. The stand of vegetation being described is outlined in red. The ground photos, taken mostly by CNPS during classification field visits and otherwise by AIS staff, show the appearance of the plants on the landscape.
- The second page outlines three categories (Description, Photo Signature, and Types with Similar Photo Interpretation Signatures) describing the vegetation type. **Description** discusses the alliance membership rules, percent cover considerations, typical environmental settings and geographic locations, and other factors pertaining to each vegetation type, mostly derived from the vegetation key (Appendix E). **Photo Interpretation Signature** describes the color, tone, texture, pattern, etc. commonly seen on the aerial imagery. **Types with Similar Photo Interpretation Signatures** describes the signature traits that differentiate each vegetation type in the list from the vegetation type being described.
- Following the **Types with Similar Photo Interpretation Signatures** is a distribution map and a brief discussion of the **Distribution** of the vegetation type in the study area. For vegetation types with only a few, small polygons in the entire study area, the size of the polygons on the distribution map was enhanced (or represented as a star) so that their locations could be seen.
- Following **Distribution** is an **Elevation Range** chart showing the elevation values (count) for a given vegetation type within the study area. The chart was derived by extracting the elevation data (30-meter pixels) from the Digital Elevation Models (DEMs) in the National Elevation Dataset, available from the USGS, using the areal extent of the vegetation type. Along the vertical axis is the number of pixels occurring in the established elevation ranges. Along the horizontal axis are the elevation in meters. This chart is not an elevation profile of the vegetation type, nor does it represent the geographic distribution of its elevation range. It provides the relative distribution of each vegetation type at a given elevation.

Trees

Abies concolor Alliance (2214)
Aesculus californica Alliance (1310)
Alnus rhombifolia Alliance (3210)
Californian montane conifer forest Group (2200) (includes managed conifer stands)
Fraxinus latifolia Alliance (3211)
Hesperocyparis forbesii – *Hesperocyparis nevadensis* Alliance (1214)
Juglans hindsii and Hybrids Semi-Natural Alliance (3113)
Juniperus californica Alliance (1212)
Pinus jeffreyi Alliance (2215)
Pinus monophylla – (*Juniperus osteosperma*) Alliance (2310)
Pinus ponderosa – *Calocedrus decurrens* – *Pseudotsuga menziesii* Alliance (2212)
Pinus sabiniana Alliance (1210)
Platanus racemosa – *Quercus agrifolia* Alliance (3310)
Populus fremontii – *Fraxinus velutina* – *Salix gooddingii* Alliance (3110)
Pseudotsuga macrocarpa Alliance (2216)
Quercus chrysolepis Alliance (1410)
Quercus douglasii Alliance (1311)
Quercus kelloggii Alliance (1312)
Quercus lobata Alliance (1313)
Quercus lobata Riparian Alliance (3314)
Quercus wislizeni – *Quercus parvula* (tree) Alliance (1111)
Salix gooddingii – *Salix laevigata* Alliance (3114)
Southwestern North American riparian evergreen and deciduous woodland Group
(3100)
Umbellularia californica Alliance (1110)
Yucca brevifolia Alliance (5423)

Abies concolor Alliance (2214)

White fir forest



Aerial view of an open to intermittent cover stand of *Abies concolor* in the San Emigdio Mountains.



Ground view of an *Abies concolor* stand on a steep slope in the San Emigdio Mountains.

***Abies concolor* Alliance (2214)**

DESCRIPTION: *Abies concolor* is dominant with greater than 60% relative cover in the tree canopy. *Quercus kelloggii* may be sub-dominant in the tree layer. If *Pinus jeffreyi* is present at 30% relative cover or greater, then the stand is considered as the *Pinus jeffreyi* Alliance. *Calocedrus decurrens* may be present to co-dominant.

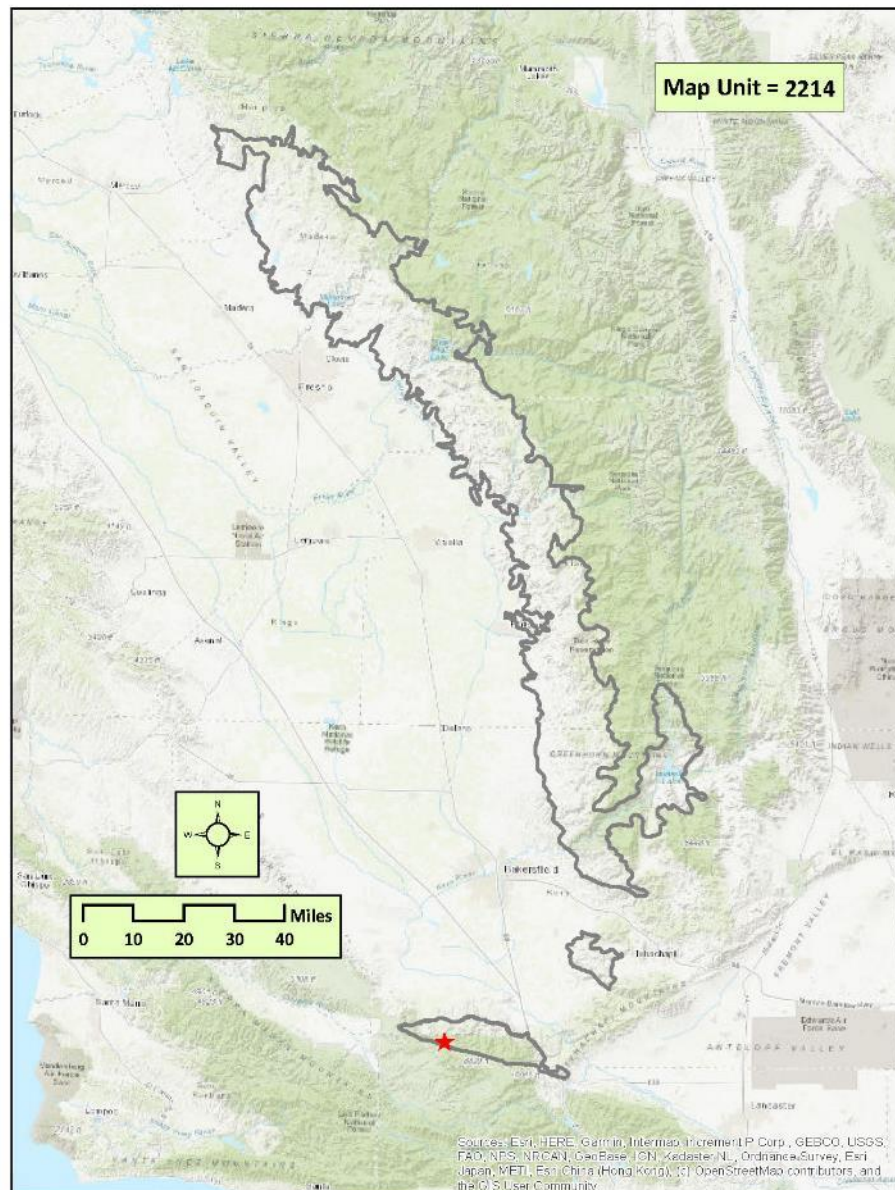
This alliance is mapped only in the San Emigdio Range subarea. Most *Abies concolor* in the region occur as a co-dominant to *Pinus jeffreyi* and are therefore considered as part of the *P. jeffreyi* Alliance. Stands of *A. concolor* co-dominating with *Pinus jeffreyi* occur mainly above 6000 feet, and follow the main summit trending west to east along the Tecuya Ridge in the southern portions of the San Emigdio Mountains. Where the two conifers co-dominate, a significant component of the *Abies concolor* tends to occur as smaller trees in a dense woodland setting often dominating the sub-canopy layer. No sites are mapped in the Horsethief Mountain and Southern Sierra Nevada Foothills Proper subareas.

PHOTO INTERPRETATION SIGNATURE: *Abies concolor* yields a classic conical crown narrowing consistently up the main stem. Many trees yield a small amount of dieback on the uppermost portion of the crown which often appear as a small white dot on the very top of the tree. Typical color ranges from blue-green to medium green without a blue tint.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

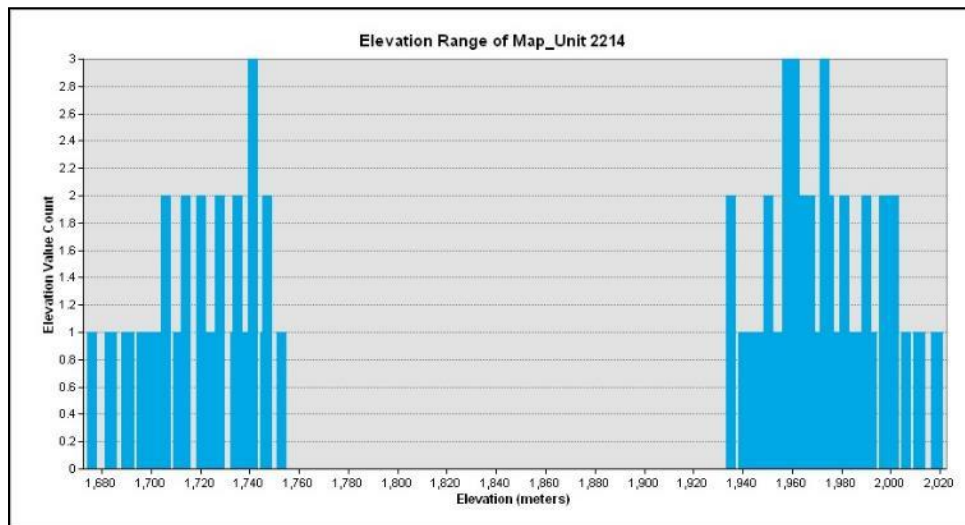
- *Pinus jeffreyi* Alliance (2215) – Young stands of *Pinus jeffreyi* also tend to have conical crowns but are not as symmetrical overall. Mature pines have a rounded crown with broad extending branches well up into the mid-sections of the tree. *Pinus jeffreyi* tends to have a lighter green color, however there is significant overlap between the two conifer species depending on age and leaf phenology. *Abies concolor* occurs only in the most protected settings where winter snow remains the longest. *Pinus jeffreyi* extends beyond these most protected settings on higher elevation ridges and spurs.
- *Pseudotsuga macrocarpa* Alliance (2216) – Stands dominated by *Pseudotsuga macrocarpa* occur at slightly lower elevations than *Abies concolor* on extremely steep settings trending on mid to lower slopes. Cover is significantly lower in these severe settings and the conifers often co-occur with a component of *Quercus chrysolepis*. Crowns of *Pseudotsuga macrocarpa* are also conical but not as consistent along the length of the tree. Substrate characteristics in stands dominated by *P. macrocarpa* are gravelly and appear white on most imagery.

Abies concolor Alliance (2214)



DISTRIBUTION: In the San Emigdio Range subarea, only two small stands are mapped just east of Brush Mountain, one in a protected canyon bottom at 5600 feet, another to the south on a north-trending slope around 6500 feet. No sites are mapped in the Horsethief Mountain and Southern Sierra Nevada Foothills Proper subareas.

Abies concolor Alliance (2214)



Aesculus californica Alliance (1310)

California buckeye groves



A stand of dominant *Aesculus californica* mixed with sub-dominant *Quercus wislizeni* on a north-facing slope.



A stand of light- to white-branched fairly dense *Aesculus californica* with light green leaves at right, adjacent to darker evergreen *Quercus wislizeni* at left, with lighter blue-green *Quercus douglasii* in the foreground with a grassland understory.

***Aesculus californica* Alliance (1310)**

DESCRIPTION: *Aesculus californica* is strongly dominant (greater than 60% relative cover) as a tree or tall shrub in the overstory. If *Aesculus* is co-dominant with *Quercus douglasii* or *Quercus wislizeni*, then the stand is considered as those alliances respectively. *A. californica* is generally mapped in very steep north-trending, rocky settings. In stands where *A. californica* strongly dominates, *Q. wislizeni* is often found adjacent in somewhat less severe settings.

In the Southern Sierra Nevada Foothills Proper subarea, *A. californica* forms small to moderately sized stands spanning the entire study area. Dominant stands are typically found on open rocky settings, congregating around boulders, where other tree species tend to drop out. More mesic, protected slopes can contain densely packed pockets of *Aesculus*, with *Quercus wislizeni* and *Quercus douglasii* occurring at low cover within and around these stands.

Aesculus californica is found in small stands in the San Emigdio Range subarea of the Transverse Ranges and also in the western portions of the Tehachapi Mountains west of Cummings and Bear Valley in the Horsethief Mountain subarea. Stands tend to occur on steep to moderately sloping north-trending aspects. Stands in this region of the study area often have a component of *Quercus douglasii* or *Q. john-tuckeri*. At higher elevations, *Quercus chrysolepis* may be adjacent in deep canyon bottoms and lower side slopes. Some of the southernmost stands of this tree are found adjacent to Lebec just north of the Tejon Summit.

PHOTO INTERPRETATION SIGNATURE: *A. californica* is both drought- and cold-season deciduous. In most settings, early summer NAIP imagery reflects the stressing yellow to brown color of the leaf before it falls off the plant. At higher elevations, where it becomes less common, individual plants tend to be greener, but some stress is still noted. Relatively dense stands are easily recognizable, but it is difficult to ascertain the relative cover of *A. californica* where *Q. wislizeni* or *Q. douglasii* becomes a component to the stand.

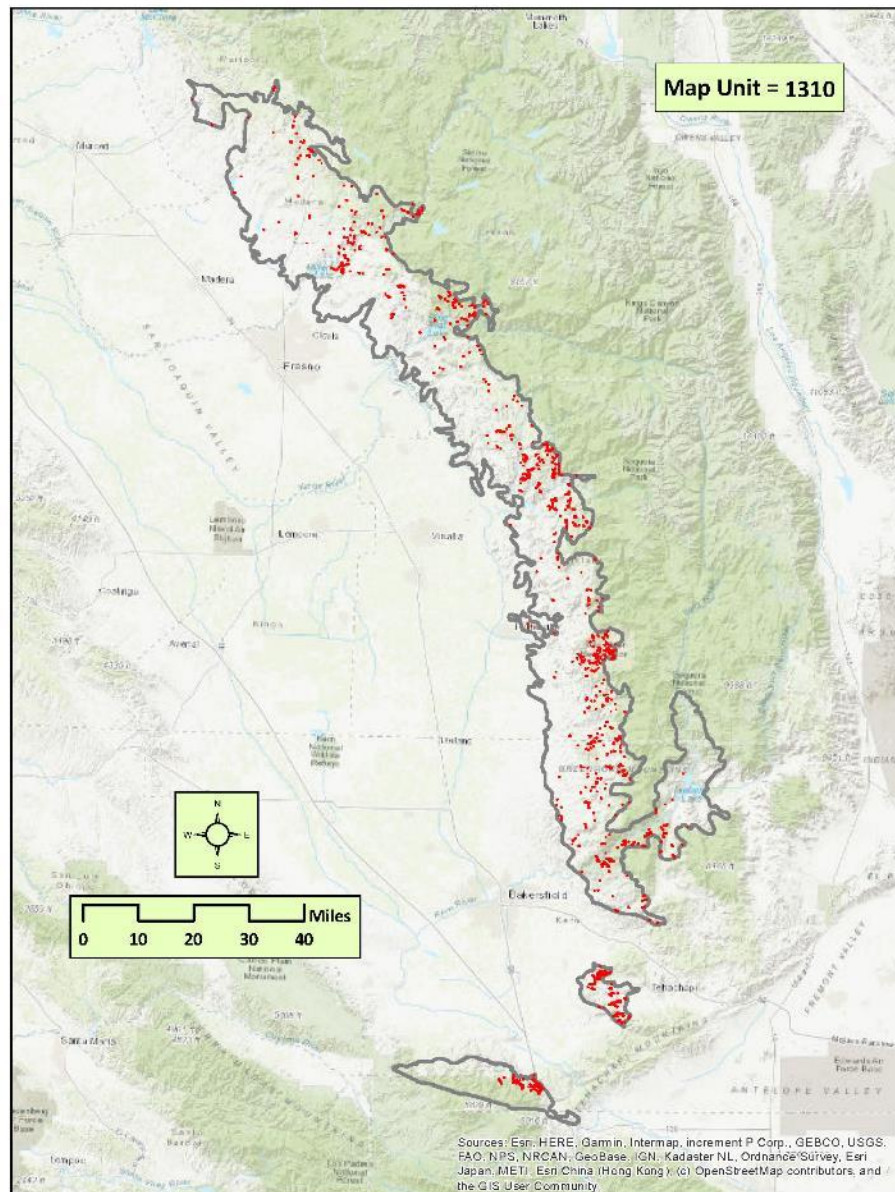
TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

- *Quercus douglasii* Alliance (1311) – In open stands, *Quercus douglasii* is easily recognized from *A. californica*, with the blue-green color of *Q. douglasii* that contrasts with the yellow-brown of *A. californica*. Additionally, *Aesculus* shows a crown of white branching on leaf-off imagery. *Aesculus* favors steep northerly settings, while *Q. douglasii*, for the most part, tends to be on grassy less rocky settings. Quantifying relative abundance of each in low cover stands is difficult. In dense stands, the tree canopy blends together and makes it more difficult to differentiate cover between the two species.
- *Quercus wislizeni* – *Quercus parvula* (tree) Alliance (1111) – Evergreen *Quercus wislizeni* has a distinct signature of a dark green canopy, when juxtaposed to *Aesculus californica*, which is brighter green in full leaf, yellow-brown when senescing, and white branching when leafless. The two species can occur together on the same north-facing rocky slope. In open settings it is difficult to

***Aesculus californica* Alliance (1310)**

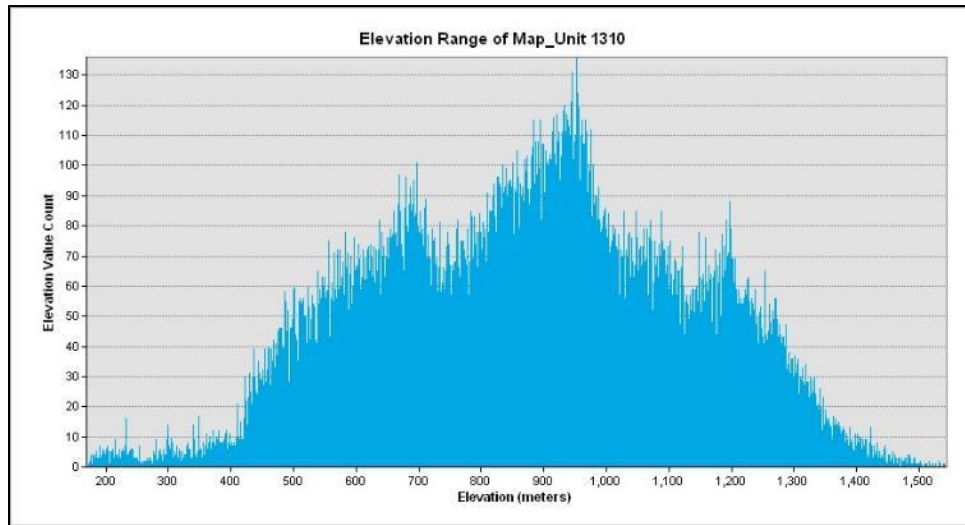
quantify relative abundance. Generally, photo interpreters map to the *Aesculus californica* Alliance more often in a somewhat denser cover where it is easier to see overwhelming dominance of the *Aesculus*.

***Aesculus californica* Alliance (1310)**



DISTRIBUTION: *Aesculus californica* stands are ubiquitous throughout the Southern Sierra Nevada Proper and Horsethief Mountain subareas, mainly at the mid elevations. In the San Emigdio Range it is mapped on north slopes in the northeast area, just west of the I-5 corridor.

Aesculus californica Alliance (1310)



Alnus rhombifolia Alliance (3210)

White alder groves Alliance



Aerial view of a dense stand of *Alnus rhombifolia* adjacent to the straight section of a creek in a narrow canyon. Note the visible individual crowns.



Ground view of a fairly dense multi-age stand of *Alnus rhombifolia* along a rocky creek bed. Note the narrow straight light gray singular trunks.

***Alnus rhombifolia* Alliance (3210)**

DESCRIPTION: *Alnus rhombifolia* is typically dominant or co-dominant with other riparian species in the tree overstory. *Calocedrus decurrens*, *Quercus chrysolepis*, *Salix laevigata*, or *Umbellularia californica* may co-dominate. If co-dominant with *Fraxinus latifolia* or *Platanus racemosa*, then the stands are considered as those alliances. Co-dominance with *Quercus lobata* is considered as *Quercus lobata* Riparian Alliance. Shrubs such as *Toxicodendron diversilobum*, *Vitis californica*, *Calycanthus occidentalis*, *Salix exigua*, *Rubus armeniacus*, and/or *Salix lasiolepis* may be present in the understory.

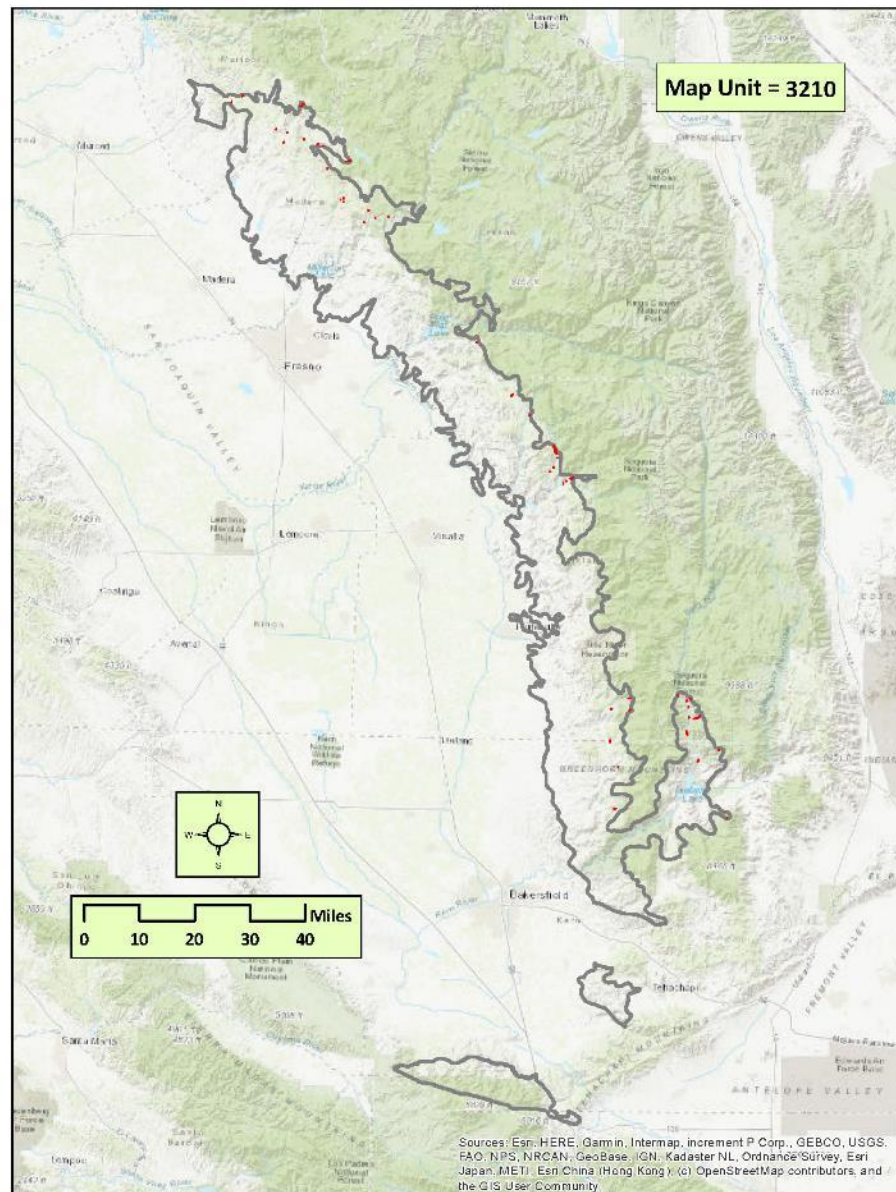
Small stands of *Alnus rhombifolia* are mapped throughout the Southern Sierra Nevada Foothills Proper subarea at mid to upper elevations. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: *Alnus rhombifolia* occurs in dense pockets or clumps, typically as narrow bands on the edge of a drainage channel, and tends to yield a consistent signature throughout the stand. Variability in stand height ranges widely, with major flooding events reducing size and cover, and affecting distribution from year to year. Signature color trends medium green, tree crowns are narrow with a conical top, trunks are straight and upright, but form a dense canopy with minimal crown openings within the stand.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

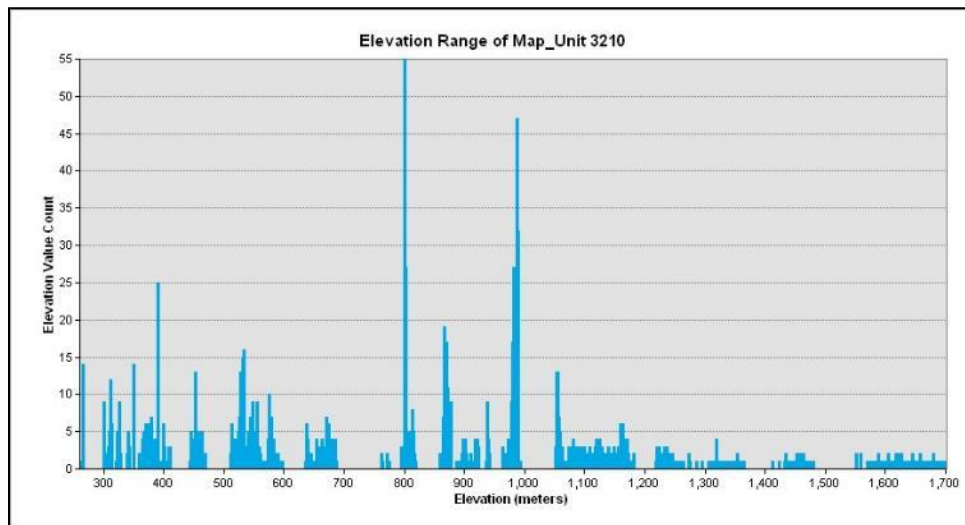
- *Fraxinus latifolia* Alliance (3211) – *Fraxinus* tends to occur, although not exclusively, in rocky streambed setting. In dense stands of *Alnus*, it is difficult to discern if *Fraxinus* is present at minimal cover for *Fraxinus latifolia* Alliance so the photo interpreter errs toward calling the stand as *Alnus rhombifolia* Alliance. If stands of *Alnus* are open in a rocky streambed setting then one may infer *Fraxinus* as possibly enough cover for that type.
- *Salix gooddingii* – *Salix laevigata* Alliance (3114) – *Salix laevigata* often co-occurs in stands which broaden away from the immediate stream banks. *Salix laevigata* has larger crowns and yields a slightly lighter yellow-green color in most settings. In typical settings, *Alnus rhombifolia* occurs along narrow stream sides with fairly steep side slopes close to the channel.

Alnus rhombifolia Alliance (3210)



DISTRIBUTION: Small stands of *Alnus rhombifolia* are mapped throughout the Southern Sierra Nevada Foothills Proper subarea at mid to upper elevations. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Alnus rhombifolia Alliance (3210)



Californian montane conifer forest Group (2200) (includes managed conifer stands)



Aerial view of even-aged stand of replanted conifers with evenly spaced individuals.



Ground view of young planted *Pinus ponderosa* with even age, height, and distribution.

Californian montane conifer forest Group (2200) (includes managed conifer stands)

DESCRIPTION: Mapped in post-logging and replanting settings where conifers overwhelmingly dominate the canopy. Stands are for the most part even-age, varying in density and usually a single species. In most cases, *Pinus ponderosa* is the conifer in the stand. Other conifers may represent the dominant species for a mapped polygon. In most cases, logging and other roads are visible in and adjacent to the plantation stand. Managed stands may lack hardwoods and shrubs in the understory. *Note: This type is also mapped in the land use field as code 9502.*

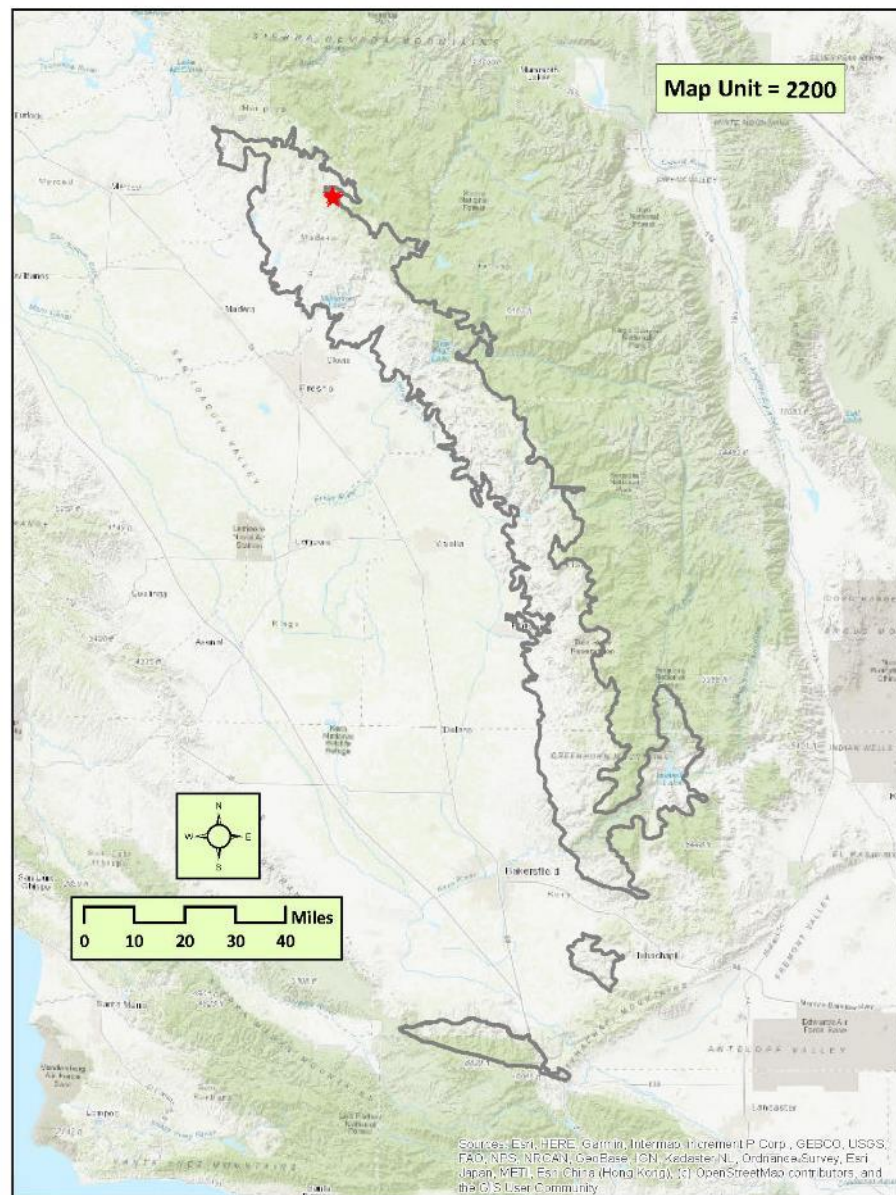
Only three stands of this group are mapped, all located in proximity to each other at the northern end of the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: Stands are overwhelmingly dominated by conifer species; therefore, crowns are narrow and cylindrical. Signature variability is minimal within the stand. Hardwoods, when present are most frequently noticeable in small patches especially toward the margins of the stand.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

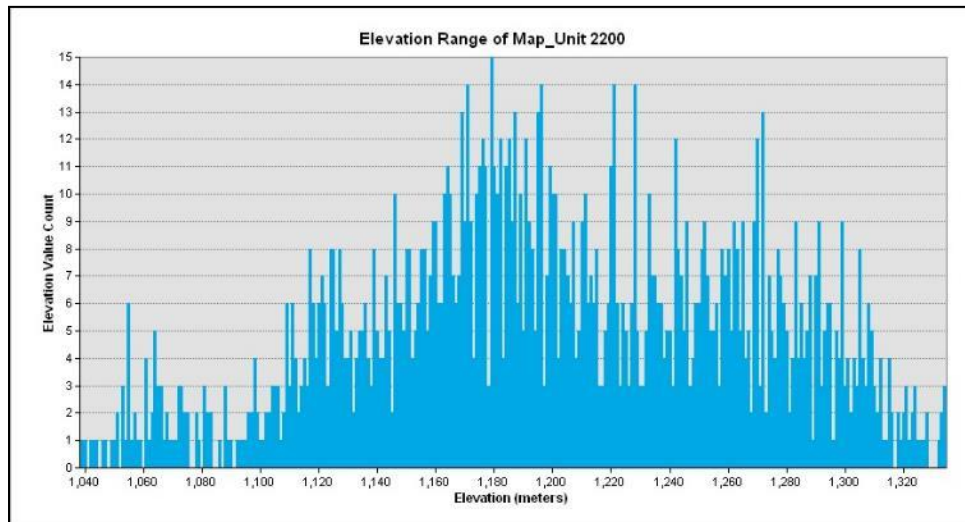
- *Pinus ponderosa* – *Calocedrus decurrens* – *Pseudotsuga menziesii* Alliance (2212) – This alliance has significantly higher signature variability within the stand (multiple tree sizes & canopy openings and cover variability). Signature color varies more due to the mixing of at least two conifer species in the overstory, and at times, as many as four species may be significant in the overstory canopy. Other tree and shrub species may mix in the canopy.

Californian montane conifer forest Group (2200) (includes managed conifer stands)



DISTRIBUTION: Only three stands of this group are mapped, all located in proximity to each other at the northern end of the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Californian montane conifer forest Group (2200) (includes managed conifer stands)



Fraxinus latifolia Alliance (3211)

Oregon ash groves Alliance



Aerial view of *Fraxinus latifolia* mixed with other trees and shrubs in an open riparian stand in a narrow rocky streambed setting.



Ground view of young saplings of *Fraxinus latifolia* occurring as an open stand along a rocky streambed.

***Fraxinus latifolia* Alliance (3211)**

DESCRIPTION: *Fraxinus latifolia* makes up at least 5% absolute cover in the overstory canopy. This species is a strong indicator as a dominant or co-dominant tree. *Alnus rhombifolia* and/or *Salix laevigata* may co-dominate with *Fraxinus*. *Quercus lobata*, *Populus fremontii*, and *Platanus racemosa* must be of low cover. Riparian shrubs, such as *Cephalanthus occidentalis* and *Rubus armeniacus* may be present.

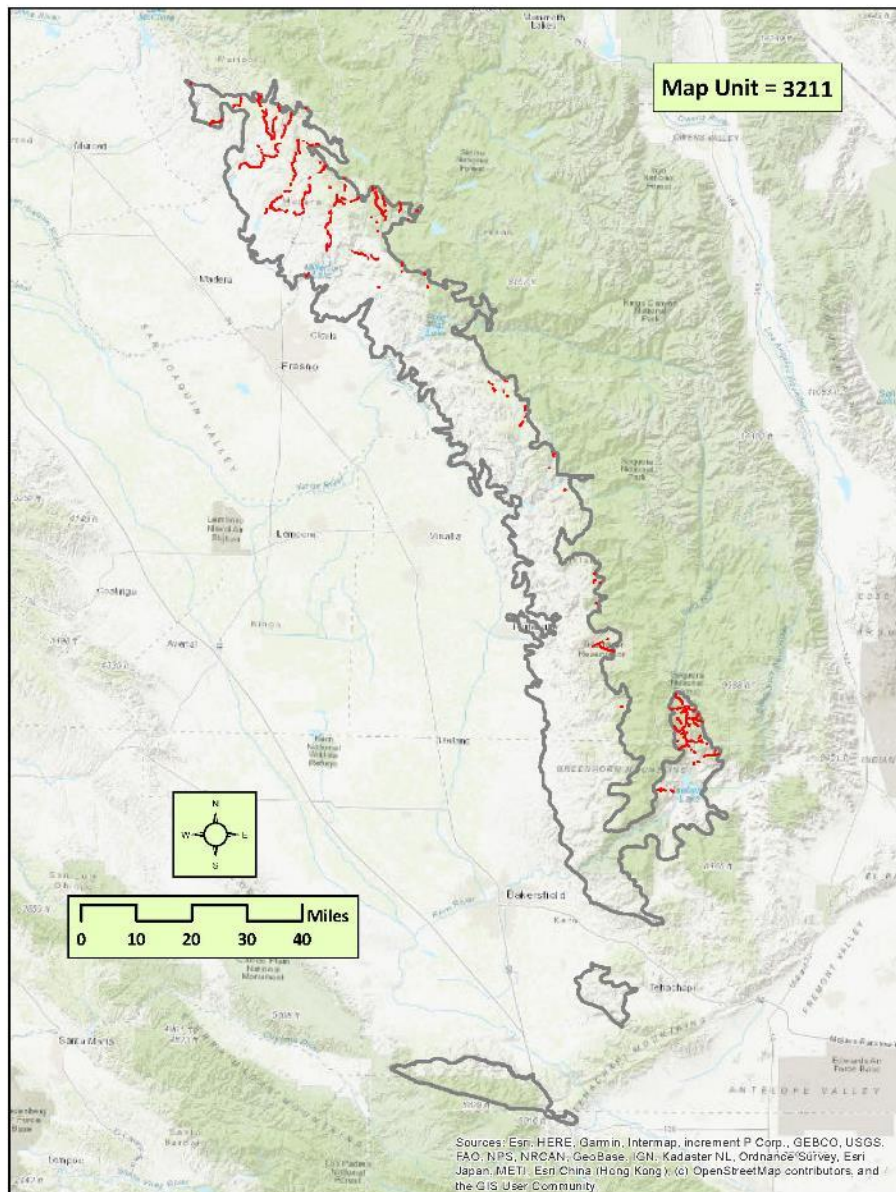
Fraxinus latifolia stands are mapped at mid to upper elevations through most of the Southern Sierra Nevada Foothills Proper subarea. Most stands are mapped in the northern portion of the study area and north of Lake Isabella. No stands are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: *Fraxinus latifolia* stands occur from Cathey's Valley in the north to Lake Isabella in the south. Stands predominantly occur in the higher elevations of the study area, and more frequently are a component to other riparian alliances such as *Platanus racemosa* and *Populus fremontii*. The *F. latifolia* signature is very difficult to distinguish from other riparian species, due to its similar bright green color and height variability. Its primary setting includes narrow, fast-moving seasonally flooded streams with a substrate consisting of large boulders and rocks.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

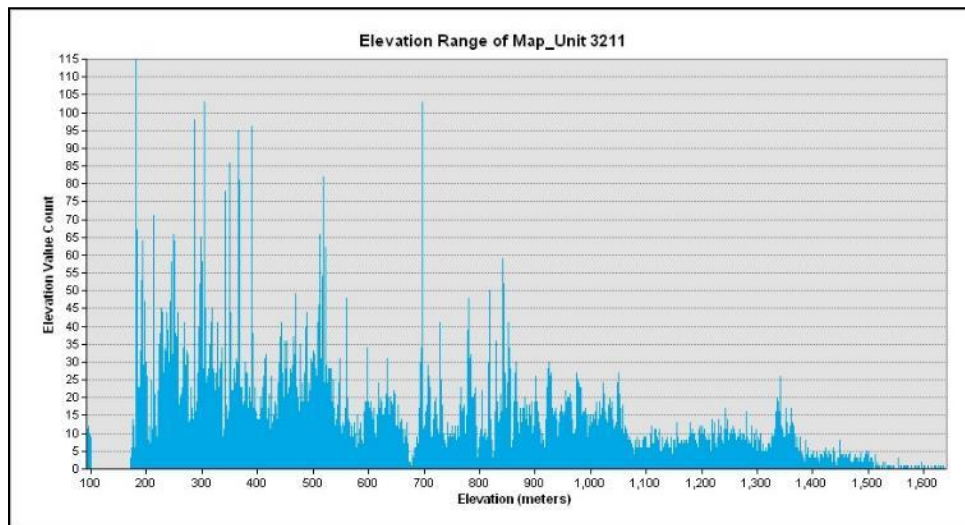
- *Alnus rhombifolia* Alliance (3210) – *Alnus rhombifolia* frequently occurs with *F. latifolia* in the upper elevations of the study area and may obscure its signature in dense stands. *Alnus* tends to form consistent fairly dense strongly dominant linear stands just adjacent to the streambed.
- *Platanus racemosa* – *Quercus agrifolia* Alliance (3310) – Typically mature *P. racemosa* individuals are easily distinguished from *Fraxinus* through their spreading crowns and visible white main branches when viewed on leaf-off imagery. However, on leaf-on imagery shorter stature *P. racemosa* signatures can look very similar to the greener *Fraxinus* trees.
- *Populus fremontii* – *Fraxinus velutina* – *Salix gooddingii* Alliance (3110) – *P. fremontii* usually displays a taller crown with white branching, in contrast with the shorter bright green crowns of *F. latifolia*. They are difficult to distinguish in highly diverse stands with trees and shrubs of mixed-age and stature.
- *Salix gooddingii* – *Salix laevigata* Alliance (3114) – *Salix laevigata* displays a similar color, variable stature, and often mixes with *F. latifolia*. *Salix laevigata* favors broader floodplains with soil, while *Fraxinus* prefers rocky streambeds with fast-moving streams.

***Fraxinus latifolia* Alliance (3211)**

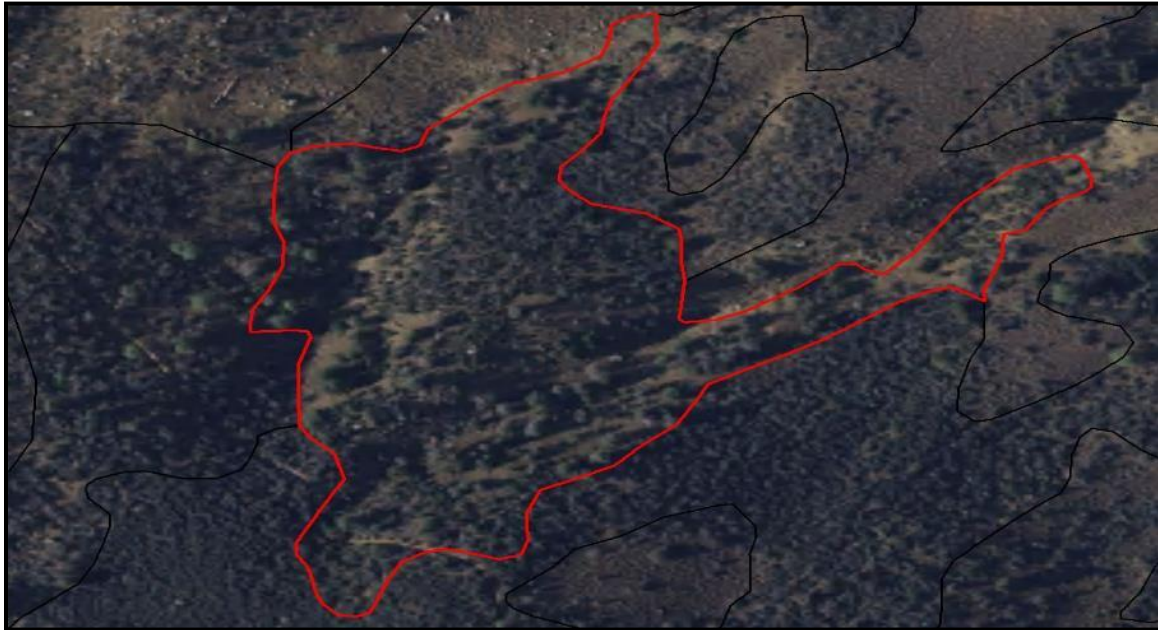


DISTRIBUTION: *Fraxinus latifolia* stands are mapped at mid to upper elevations through most of the Southern Sierra Nevada Foothills Proper subarea. Most stands are mapped in the northern portion of the study area and north of Lake Isabella. No stands are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Fraxinus latifolia Alliance (3211)



Hesperocyparis forbesii – Hesperocyparis nevadensis Alliance (1214)
Tecate cypress – Paiute cypress Stands



Aerial view of an open *Hesperocyparis nevadensis* stand with a shrub understory.



Ground view of dominant *Hesperocyparis nevadensis* as an open stand on a steep slope, with a shrub and herb understory.

***Hesperocyparis forbesii* – *Hesperocyparis nevadensis* Alliance (1214)**

DESCRIPTION: *Hesperocyparis nevadensis* is the dominant to co-dominant tree in the overstory with at least 30% relative cover. In post-fire settings, *Hesperocyparis nevadensis* may occur as seedlings or saplings. *Pinus monophylla* may be present to co-dominant. Found in the southern Sierra Nevada Foothills on granitic substrate. Stands mapped are considered as the *Hesperocyparis nevadensis* Association of the *Hesperocyparis forbesii* – *Hesperocyparis nevadensis* Alliance.

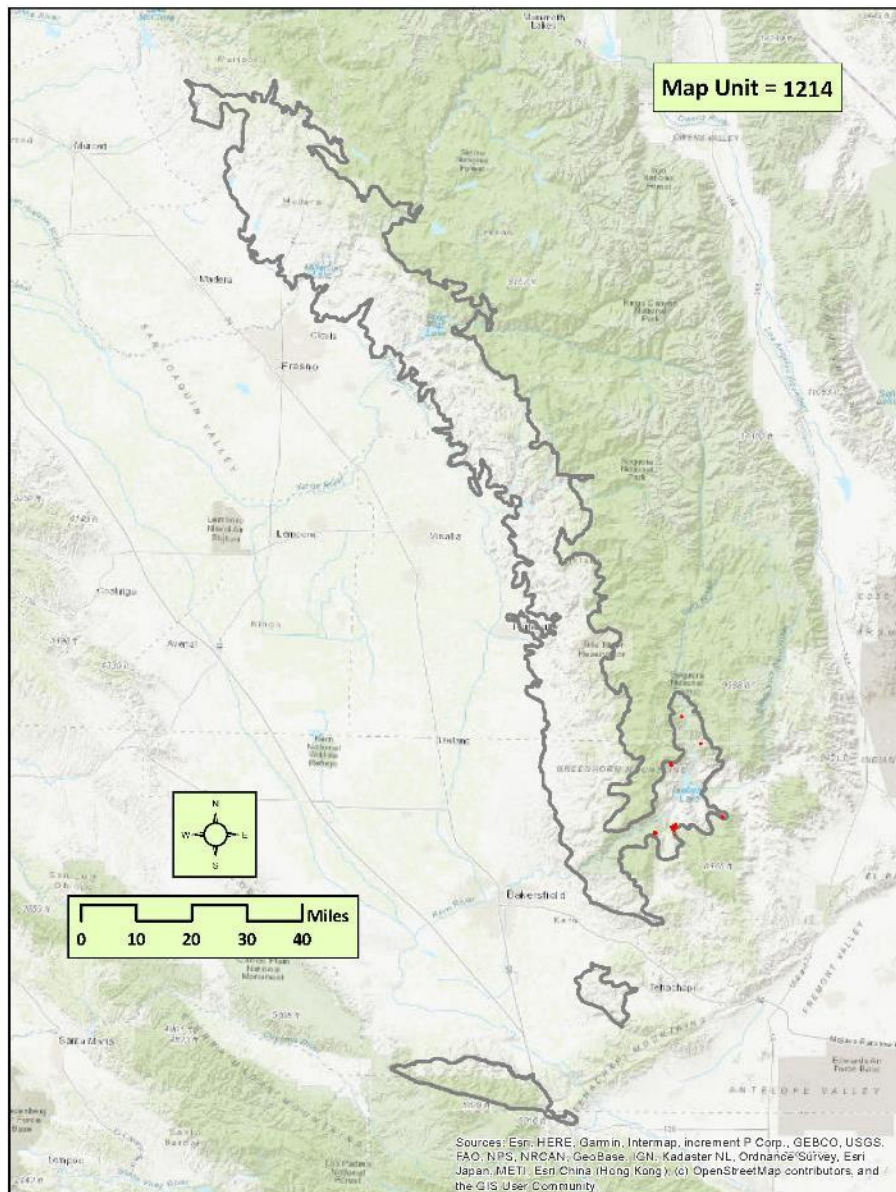
Hesperocyparis nevadensis stands are mapped exclusively in the southern end of the Southern Sierra Nevada Foothills Proper subarea, in the area surrounding Lake Isabella. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: *Hesperocyparis nevadensis* individuals appear dull green in color with a rounded, fuzzy crown edge. Depending on the age, stature can be variable, and cover can be open to very dense with crowns coalescing into a thick bumpy canopy. Stands begin to occur just under 4000 feet in elevation, and are often mixed with *Pinus monophylla* and *Juniperus californica*, with a shrub layer including *Cercocarpus montanus* and *Ceanothus cuneatus*.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

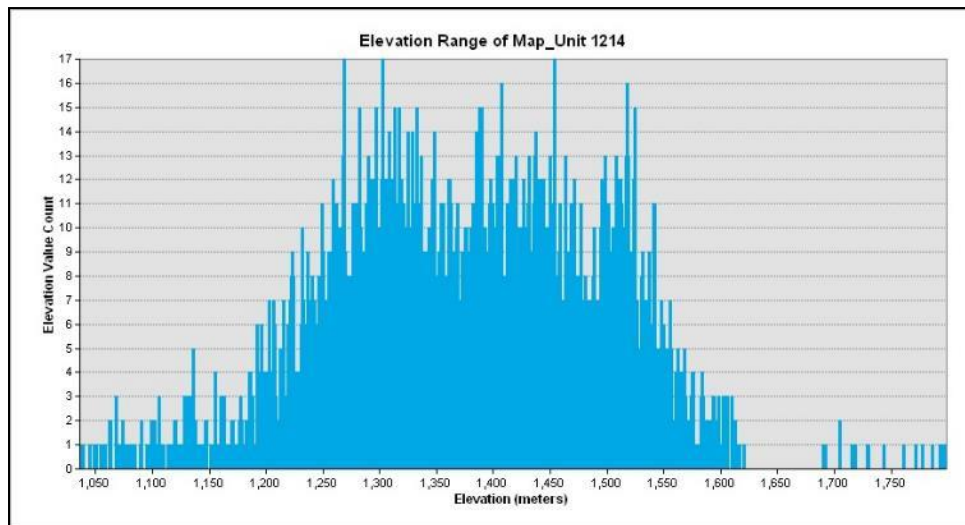
- *Juniperus californica* Alliance (1212) – *Juniperus californica*, with a broader and well-defined crown, appears slightly greener than *Hesperocyparis nevadensis*. Both occur in similar settings and signature confusion stems from young, post-fire recovery shorter stature mixed stands where species signatures indiscriminately blend together.
- *Pinus monophylla* – (*Juniperus osteosperma*) Alliance (2310) – *Pinus monophylla* is a commonly associated species and displays a narrower gray crown, compared to the pale green crown of *H. nevadensis*.

Hesperocyparis forbesii – *Hesperocyparis nevadensis* Alliance (1214)



DISTRIBUTION: *Hesperocyparis nevadensis* stands are mapped exclusively in the southern end of the Southern Sierra Nevada Foothills Proper subarea, in the area surrounding Lake Isabella. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

***Hesperocyparis forbesii* – *Hesperocyparis nevadensis* Alliance (1214)**



Juglans hindsii and Hybrids Semi-Natural Alliance (3113)

Hinds's walnut and related Stands



Aerial view of a small stand of *Juglans hindsii* of intermittent cover in a moist setting.



Ground view of a small open stand of *Juglans hindsii* in a grassy setting. Note pinnate leaf structure of *Juglans*.

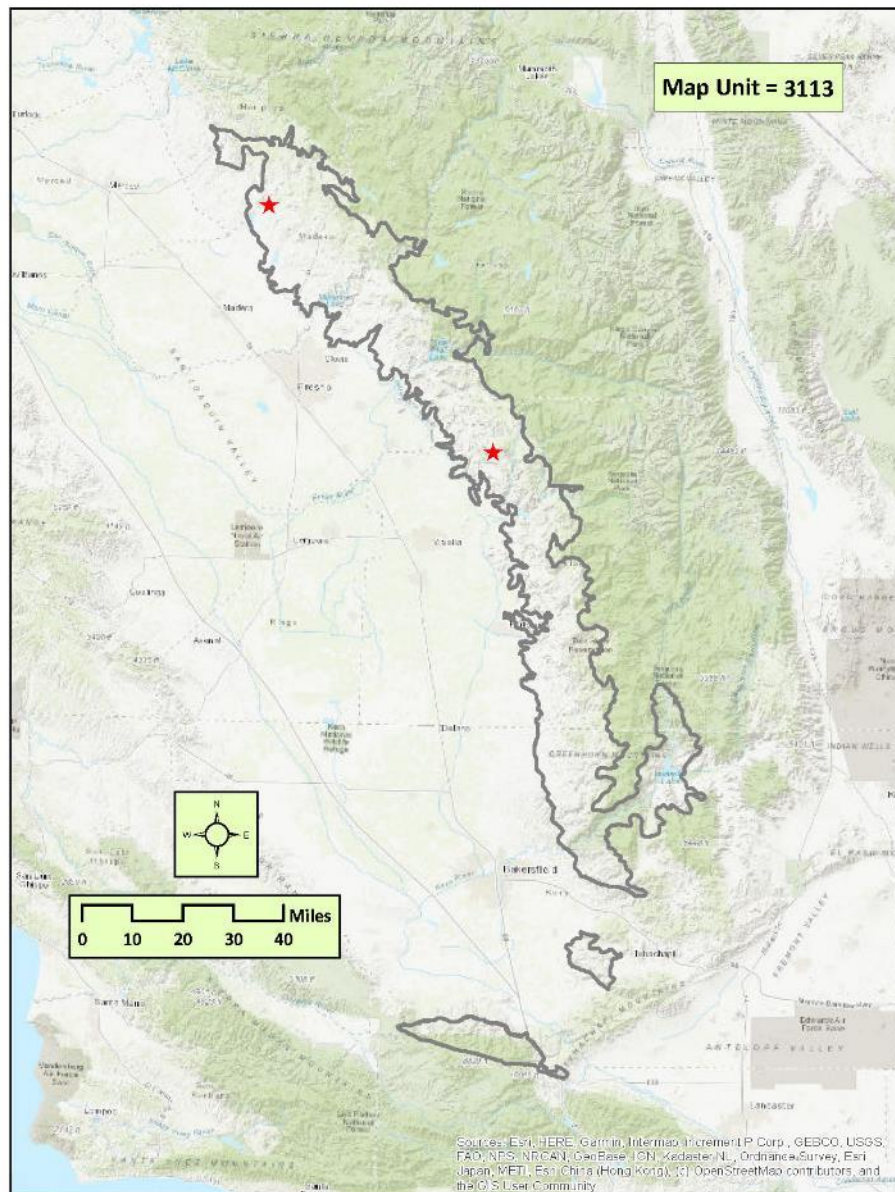
***Juglans hindsii* and Hybrids Semi-Natural Alliance (3113)**

DESCRIPTION: *Juglans hindsii* is strongly dominant in the overstory in a riparian setting. If *Juglans* is co-dominant with other riparian trees, then the stand is considered as those riparian alliances, respectively. All stands in the southern Sierra Nevada Foothills are planted or of hybrid origin.

Stands of this alliance are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project.

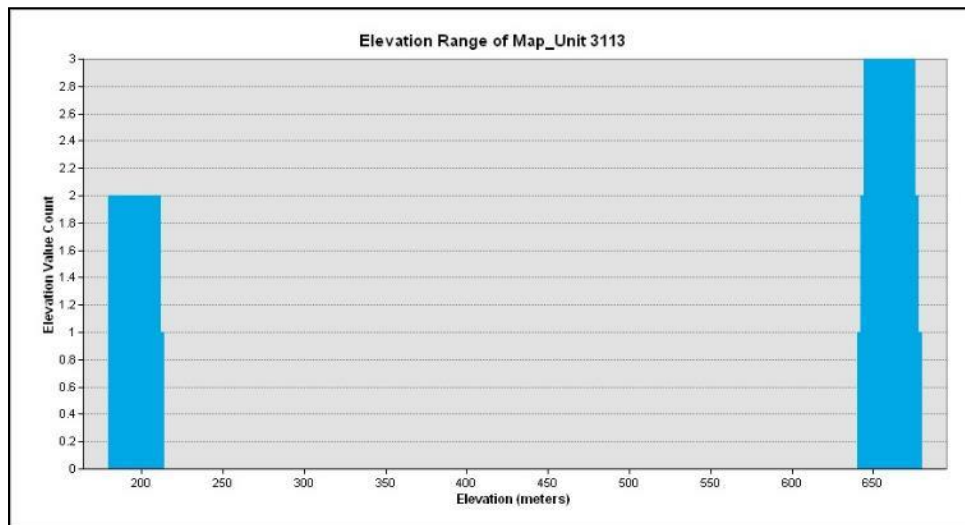
Only two polygons of *Juglans hindsii* are mapped in the Southern Sierra Nevada Foothills Proper subarea, from classification plot field data. No stands are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Juglans hindsii and Hybrids Semi-Natural Alliance (3113)



DISTRIBUTION: Only two polygons of *Juglans hindsii* are mapped in the Southern Sierra Nevada Foothills Proper subarea, from classification plot field data. No stands are mapped in the Horsethief Mountain and San Emigdio Range subareas.

***Juglans hindsii* and Hybrids Semi-Natural Alliance (3113)**



Juniperus californica Alliance (1212)
California juniper woodland Alliance



Aerial view of a relatively dense stand of *Juniperus californica* in a dry setting.



Ground view of a young stand of *Juniperus californica* in rolling hills, in the form of arborescent shrubs. Stand is relatively dense and even-aged, in a dry setting with associated *Hesperoyucca whipplei*.

Juniperus californica Alliance (1212)

DESCRIPTION: *Juniperus californica* is evenly distributed and characterizes the tree or shrub canopy with greater than 4% absolute cover. *Quercus* spp. are typically absent or much lower in cover than *Juniperus californica* in the overstory. Sites tend to be rocky and/or sandy. *Cercocarpus montanus* and/or *Hesperoyucca whipplei* may be characteristically present and may be co-dominant. Other chaparral shrub species may also be present. Open stands may also have annual grasses and forbs as the understory. Where *Quercus douglasii* or *Q. wislizeni* co-dominates, the stand is considered as those alliances respectively. Where *Quercus john-tuckeri* co-dominates, the stand is considered as the *Quercus john-tuckeri* Alliance. Where *Pinus monophylla* co-dominates then the stand is considered as the *Pinus monophylla* – (*Juniperus osteosperma*) Alliance.

Juniperus californica stands are mapped in the Lake Isabella area, which lies in a drier transitional zone along the western edge of the Mojave Desert. A majority of the stands occurred east of Lake Isabella and the Kern River, where desert species such as *Yucca brevifolia*, *Opuntia* sp., and *Ephedra viridis* appear in the stands. As one moves west and south of the lake, further from the desert edge, *J. californica* begins to mix with *Pinus sabiniana*, *Ceanothus cuneatus*, *Cercocarpus montanus*, and *Fremontodendron californicum*. There is also a limited higher elevation zone where *J. californica* occurs with *Pinus monophylla* and *Hesperocyparis nevadensis*.

Juniperus californica commonly occurs on the northern portions of the San Emigdio Range subarea as pure stands in grassland settings, or where it is a component to stands of *Quercus john-tuckeri*. Higher elevation stands tend to mix with oak more frequently, whereas lower elevations have a grassland understory. Steeper settings often have an understory shrub component consisting of *Artemisia tridentata*, or at times *Eriogonum fasciculatum*. Sometimes, *Juniperus* will be a component to or dominate the dry margins of well-drained floodplains such as Pleito Creek and San Emigdio Canyon. Stands occupying the highest elevations transition to *Pinus monophylla* woodlands, but mixing of the two conifers is not widespread, nor does it occur over large areas in this portion of the study area. No sites are mapped in the Horsethief Mountain subarea.

PHOTO INTERPRETATION SIGNATURE: *Juniperus californica* yields a medium green signature; crowns are consistently round with a well-defined crown margin. Crown density is high and transparency is minimal in all but the least healthy individuals. Stress to the stand dulls the signature color and tone making it sometimes difficult to discern individuals, especially in their characteristically open setting.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

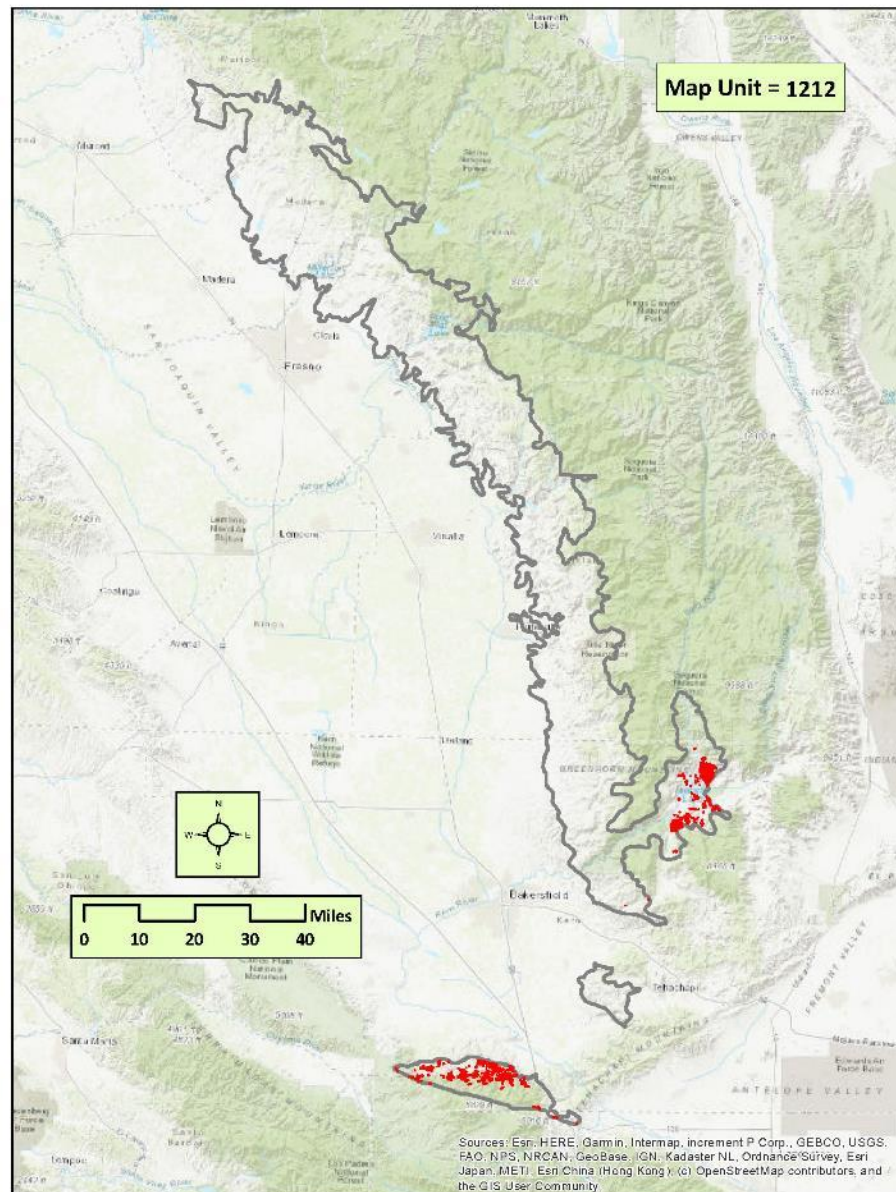
- *Pinus monophylla* – (*Juniperus osteosperma*) Alliance (2310) – *Pinus monophylla* and *Juniperus californica* rarely mix over extensive areas in the study even though they can occur as stands in close proximity to each other. They are fairly easily separable with most imagery. *Pinus monophylla* has an irregular shaped crown, its color is dark gray with minimal green tone, and its

Juniperus californica Alliance (1212)

substrate characteristics differ in that they contain a sparse herbaceous understory over a more gravelly substrate. *Pinus monophylla* woodlands occur in somewhat steeper settings at slightly higher elevations and generally have a higher cover of vegetation.

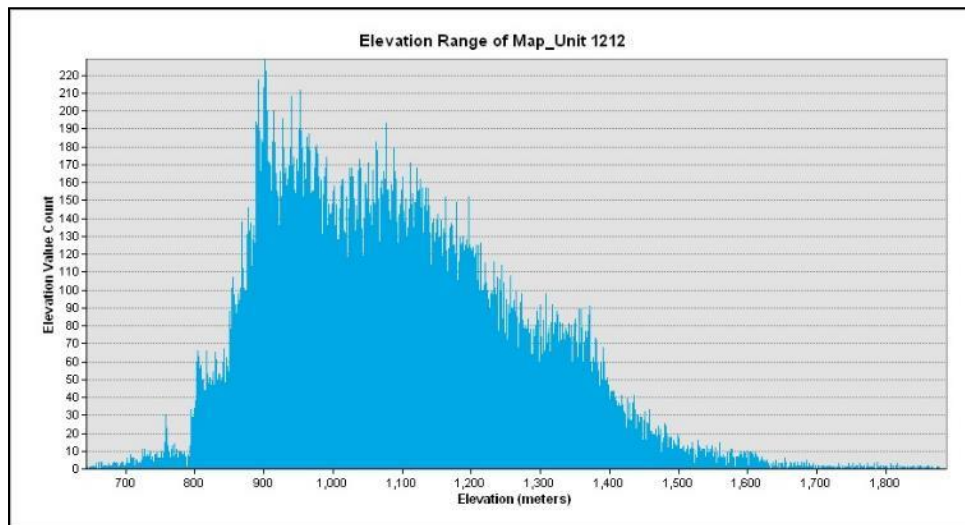
- *Quercus douglasii* Alliance (1311) – In open woodland settings where the two species co-occur, it is often difficult to ascertain relative cover. Thin soil cover can offer some ecological insight in erring with the *Juniperus californica* Alliance. Where the two species co-occur, *Juniperus* will often occupy the somewhat steeper side slopes of small ravines.
- *Quercus john-tuckeri* Alliance (6510): Stands where *Q. john-tuckeri* mix are generally mapped to the *Quercus john-tuckeri* Alliance. Mixing of the two small trees/arborescent shrubs is fairly common and usually occurs in an open juniper-oak woodland with an understory of *Eriogonum fasciculatum*. These stands generally occur with a sparse herbaceous layer so the substrate appears light gray instead of tan. *Juniperus* can be identified by the more rounded crown that yields a medium green signature. Adjacent oaks tend to have a gray-brown tone with a more irregular crown. In these mixed settings, there is generally a very sparse, widely scattered component of *Pinus monophylla*. Where *Quercus john-tuckeri* and *Juniperus* mix, they are usually found at higher elevations and steeper settings than stands dominated solely by *Juniperus californica*.
- *Quercus wislizeni* – *Quercus parvula* (tree) Alliance (1111) – *Quercus wislizeni* often forms denser cover, has a somewhat less rounded more irregularly shaped and larger crown, especially in open settings. *Q. wislizeni* generally is found in more mesic environments and rarely on ultramafic soils where *Juniperus* can occur.

Juniperus californica Alliance (1212)



DISTRIBUTION: *Juniperus californica* stands are mapped only in two areas. Stands are common in the Lake Isabella portion of the Southern Sierra Nevada Foothills Proper subarea, as well as the San Emigdio Range subarea. No sites are mapped in the Horsethief Mountain subarea.

Juniperus californica Alliance (1212)



Pinus jeffreyi Alliance (2215)

Jeffrey pine forest and woodland Alliance



Aerial view of an extensive stand of *Pinus jeffreyi* on steep undulating terrain in the San Emigdio Mountains.



Ground view of an open stand of dominant *Pinus jeffreyi* of uneven age with a sparse herbaceous understory on a locally gentle convex slope.

***Pinus jeffreyi* Alliance (2215)**

DESCRIPTION: *Pinus jeffreyi* is dominant to co-dominant in the tree layer with all or some of the following species: *Quercus chrysolepis*, *Abies concolor*, or *Pinus monophylla*. *A. concolor* may be dominant in the tree canopy but *P. jeffreyi* is at least 1% in cover. Found in the San Emigdio Mountains of the southern Sierra Nevada Foothills. The shrub layer is sparse to open with *Artemisia tridentata*, *Symphoricarpos mollis*, and *Eriogonum wrightii*.

Stands in the San Emigdio Range subarea are found in the higher elevations generally above 5000 feet from Brush Mountain in the west, continuing east along the main ridgeline to San Emigdio Mountain. East of San Emigdio Mountain there is a 2-mile gap where *Pinus jeffreyi* is absent. East of the gap, stands continue from Antimony Peak east to within a short distance of O'Neil Peak. Most stands are on the uppermost spurs and ridges on relatively gentle terrain. *Abies concolor* is a component in higher more protected settings, while *Pinus monophylla* mixes over small areas at lower elevations. Adjacent steeper canyons often have narrow but significant bands of *Quercus chrysolepis* extending north to lower elevations. *Pinus jeffreyi* may sharply transition to *Pseudotsuga macrocarpa* at lower elevations where slopes become steep on north-trending aspects in more protected settings. No sites are mapped in the Southern Sierra Nevada Foothills Proper subarea and the Horsethief Mountain subareas.

PHOTO INTERPRETATION SIGNATURE: *Pinus jeffreyi* has a rounded crown with extensive branching extending well into the mid canopy, especially in more mature stands that have not been subjected to recent burns. Signature color is a medium green, individual crowns are moderately dense, and cover density is often high. Younger stands are a bit more conical in shape and have a brighter green hue.

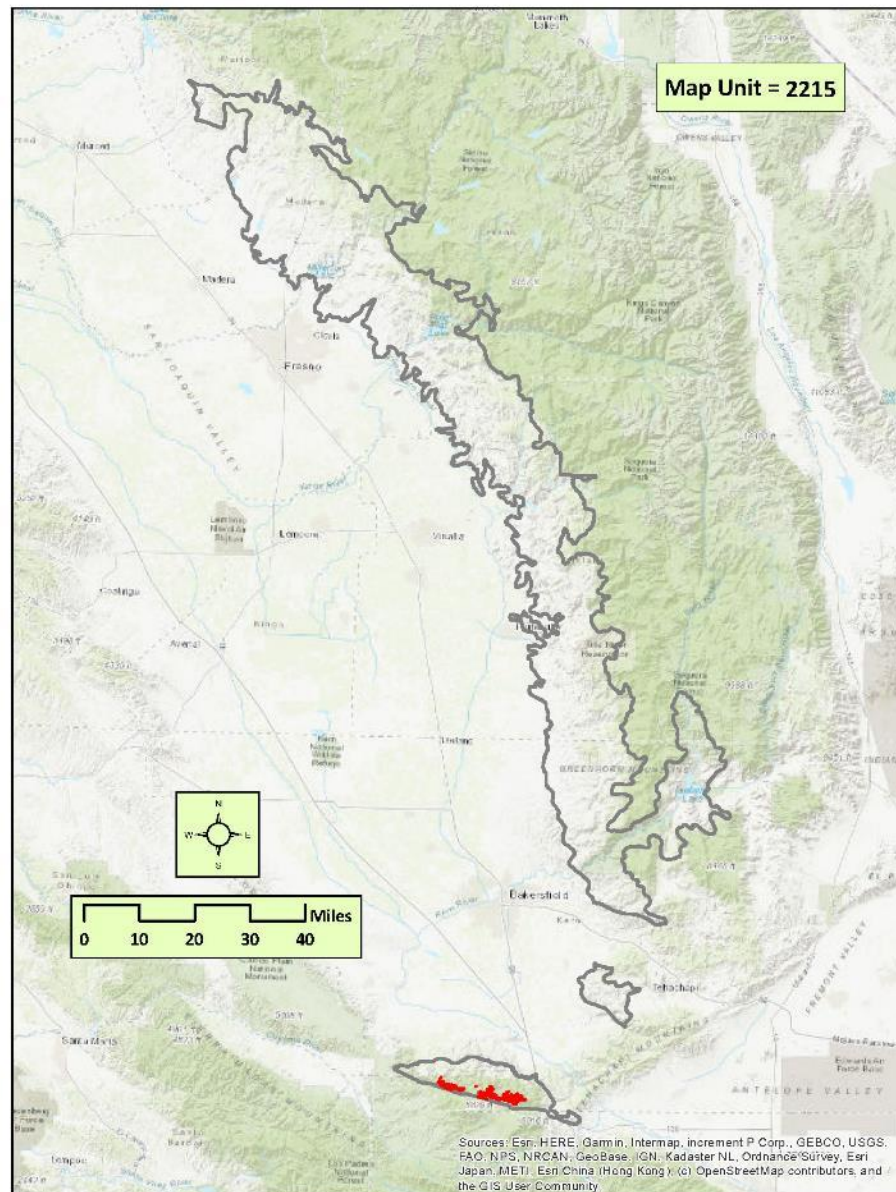
TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

- *Abies concolor* Alliance (2214): Young stands of *Pinus jeffreyi* also tend to have conical crowns but are not as symmetrical overall. Mature *Pinus* have a rounded crown with broad extending branches well up into the mid-sections of the tree. *Pinus jeffreyi* tends to have a lighter green color, however there is significant overlap of the photo signature between the two conifer species depending on age and leaf phenology. *Abies concolor* occurs only in the most protected settings where winter snow remains the longest. *Pinus jeffreyi* extends beyond these most protected settings on higher elevation ridges and spurs.
- *Pinus monophylla* – (*Juniperus osteosperma*) Alliance (2310) – Higher elevation stands dominated by *Pinus monophylla* often have emergent *P. jeffreyi* over the canopy. Stands are elevation-driven, and at lower elevations *Pinus monophylla* becomes the dominant conifer. There is not a substantial amount of mixing within the two woodland communities. *Pinus monophylla* has an irregularly shaped crown, often less than half the size of *P. jeffreyi*. Typical color characteristics of *P. monophylla* is medium to dark gray with no hint of green hue.

***Pinus jeffreyi* Alliance (2215)**

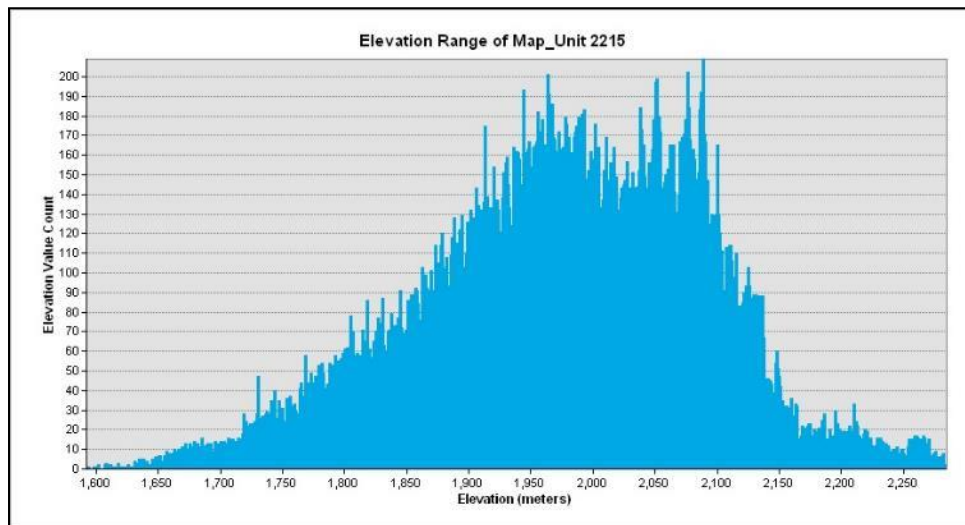
- *Quercus chrysolepis* Alliance (1410) – *Quercus chrysolepis* can be found adjacent to *Pinus jeffreyi* in steeper canyon bottoms and side slopes continuing down below the *P. jeffreyi* elevation range where it eventually gives way to *P. monophylla*. Individual *Q. chrysolepis* trees are significantly brighter green, with denser, more irregularly shaped crowns.

***Pinus jeffreyi* Alliance (2215)**



DISTRIBUTION: *Pinus jeffreyi* Alliance is mapped exclusively in the regional south-facing slopes of the San Emigdio Range subarea. It is not mapped in the Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas.

***Pinus jeffreyi* Alliance (2215)**



Pinus monophylla – (*Juniperus osteosperma*) Alliance (2310)
Singleleaf pinyon – Utah juniper woodlands Alliance



Aerial view of an intermittently covered stand of *Pinus monophylla* over shrubs on a steep north-facing slope.



Ground view of a *Pinus monophylla* stand on a steep slope over an herbaceous understory.

***Pinus monophylla* – (*Juniperus osteosperma*) Alliance (2310)**

DESCRIPTION: *Pinus monophylla* is the dominant tree or is co-dominant (sometimes having as low as 5% absolute cover) with *Juniperus californica* or *Quercus* spp. in open woodlands. If large conifers, such as pines, firs, etc., are present, they do not reach co-dominance. Understory shrubs may include *Q. john-tuckeri*, *Artemisia tridentata*, *Eriogonum fasciculatum*, and *Ephedra* spp. Found in southern Sierra Nevada Foothills and San Emigdio Mountains. Where *Hesperocyparis nevadensis* co-dominates, the stand is considered as the *Hesperocyparis forbesii* – *Hesperocyparis nevadensis* Alliance.

In the Southern Sierra Nevada Foothills Proper subarea, *P. monophylla* stands are limited to the higher elevations (greater than 4000 feet) along the drier eastern fringe of the Lake Isabella/upper Kern River portion of the study area. *Quercus chrysolepis*, *Pinus sabiniana*, *Cercocarpus montanus*, *Fremontodendron californicum*, and *Eriogonum fasciculatum* occur in and around these *P. monophylla* stands.

In the San Emigdio Range subarea, *Pinus monophylla* is common and widespread, and is mapped in this region exclusively along the mid and lower elevations of the San Emigdio Mountains on both the northern and southern slopes. Stands are found from the Blue Ridge eastward to the town of Frazier Park near the Tejon summit. At their higher elevations, they transition to *P. jeffreyi* forests, at lower elevations to *Juniperus californica* and *Quercus john-tuckeri* oak scrub. Most stands mapped have a strong dominance of *Pinus monophylla*, occasionally co-dominating with *Quercus john-tuckeri*. Stands overall are quite dense in cover. No sites are mapped in the Horsethief Mountain subarea.

PHOTO INTERPRETATION SIGNATURE: *Pinus monophylla* is a small conifer with an irregularly shaped medium to dark gray crown. Stands with a younger more vibrant phenology yield a slight bluish tint to the gray color. Signature varies minimally and in the San Emigdio Range subarea is principally determined by associated species such as oaks (either *Q. chrysolepis* or *Q. john-tuckeri*) mixing in the canopy. Dead snags were common in these stands, which appear white or light gray.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

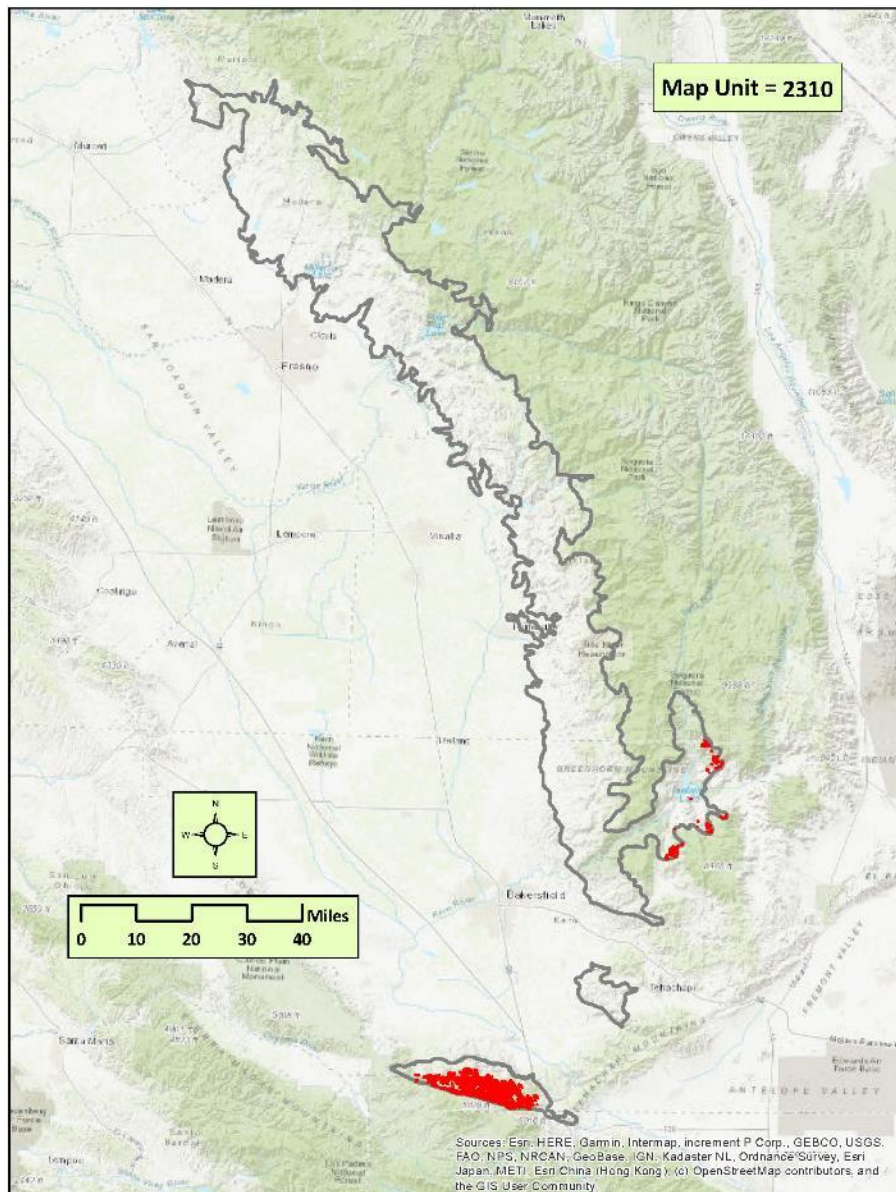
- *Juniperus californica* Alliance (1212) – Stands dominated by this conifer have a more rounded, greener crown and is generally found in more open cover at lower elevations.
- *Pinus ponderosa* – *Calocedrus decurrens* – *Pseudotsuga menziesii* Alliance (2212) – *Pinus ponderosa* is not found in the San Emigdio Range subarea or in the Lake Isabella area where *P. monophylla* occurs.
- *Pinus sabiniana* Alliance (1210) – Within the San Emigdio Range subarea these two conifers do not overlap in range. *Pinus sabiniana* is limited to the western edges of the Tehachapi Range east of Bear Valley in low elevations just above the southeast corner of the San Joaquin Valley. It is found generally in hotter settings at lower elevations. Crowns are similar to *Pinus monophylla* in that it is irregular in shape, but unlike *P. monophylla*, color is a vivid turquoise blue.

***Pinus monophylla* – (*Juniperus osteosperma*) Alliance (2310)**

Understory vegetative cover in stands dominated by this pine is almost always dominated by annual grasses. In the Lake Isabella portion of the study area, *Pinus sabiniana* does occur in an around *P. monophylla* stands. *P. sabiniana* appears as a larger blue-gray crown with large shadows indicating height. Difficulties in differentiating these species arise when the pines exhibit decadence in low cover stands, which creates atypical signature characteristics and uneven distribution of living and dead individuals across stands.

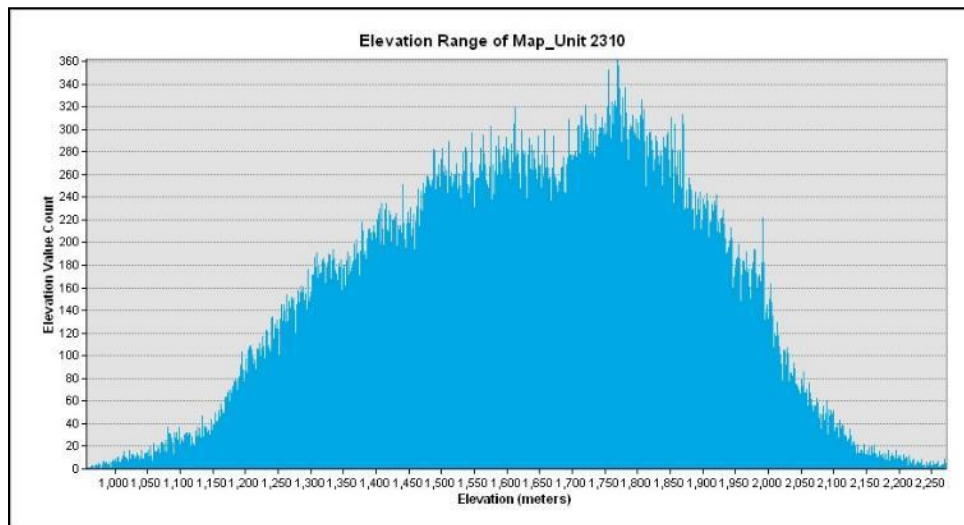
- *Quercus chrysolepis* Alliance (1410) – This alliance is found adjacent to *Pinus monophylla* in the higher elevations in nearby canyons and steeper side slopes. Crowns are larger and somewhat more rounded with medium to dark green colors.
- *Quercus john-tuckeri* Alliance (6510) – In the San Emigdio Mountains portion of the study area, mixing of *Q. john-tuckeri* is fairly common in mid and lower elevation stands of *Pinus monophylla*. *Pinus* are somewhat taller and noticeable where they are adjacent to *Q. john-tuckeri*, often yielding a small shadow. Adjacent stands of *P. monophylla* and *Q. john-tuckeri* can be differentiated by their texture, the pine having a more stipple patterned texture with the oak having a clumpier texture. Overall signature color for both species is a similar medium to dark gray. Occurrence of *Q. john-tuckeri* in the rest of the study area is rare.
- *Quercus wislizeni* – *Quercus parvula* (tree) Alliance (1111) –These two species for the most part do not overlap. Isolated individual oaks were noted in *P. monophylla* woodlands on southerly, low elevations slopes of the San Emigdio Mountains but were not significant in the canopy.

***Pinus monophylla* – (*Juniperus osteosperma*) Alliance (2310)**



DISTRIBUTION: *Pinus monophylla* stands are mapped at mid to higher elevations in the study area. It is very common in the San Emigdio Range subarea, as well as to the northeast, east, and south of Lake Isabella in the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain subarea.

***Pinus monophylla* – (*Juniperus osteosperma*) Alliance (2310)**



Pinus ponderosa – *Calocedrus decurrens* – ***Pseudotsuga menziesii***
Alliance (2212)

Mixed conifer forest and woodland Alliance



Aerial view of an open stand of *Pinus ponderosa* over a grassland understory.



Ground view of an open stand of *Pinus ponderosa* over grassland on flat terrain.

***Pinus ponderosa* – *Calocedrus decurrens* – *Pseudotsuga menziesii* Alliance (2212)**

DESCRIPTION: *Pinus ponderosa*, *Calocedrus decurrens* and/or *Pseudotsuga menziesii* is dominant or are co-dominant, and together comprise greater than 60% relative cover. These are mixed conifer stands with more than one conifer present. *Quercus* spp. are characteristically present, but sub-dominant. Stands of this alliance are typical of elevations greater than the foothill belt. These low elevation examples are often on sheltered north-facing or lower slopes and terraces near bottoms of canyons. *Quercus chrysolepis* may co-dominate with *Pseudotsuga menziesii*, with *P. menziesii* at higher cover than *Q. chrysolepis*. *Pseudotsuga menziesii* was not noted in the study area.

Pinus ponderosa dominates the canopy with a minor component of *Calocedrus decurrens*. This alliance is occasionally mapped throughout the Southern Sierra Nevada Foothills Proper subarea, in the higher elevations, typically around 3900 feet and above. Most stands have been impacted by dieback, resulting in a significant decrease in cover with numerous snags present in the canopy. Stands with oaks, especially *Quercus chrysolepis* and *Quercus kelloggii*, tended to have higher cover than the conifers, which were then classified as the respective oak type. Some areas were being actively managed and tree removal was ongoing from year to year. Note also that planted stands of managed *P. ponderosa* plantations are mapped as the Californian montane conifer forest Group (2200). No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: Stands typify a mixed conifer signature with conical crowns of varying sizes dominating the canopy. Healthy *Pinus ponderosa* individuals display a green color, while dead snags appear tan or gray. The presence of *Calocedrus decurrens* is not detectable on the imagery but can be fairly reliably modeled as an important component in a multi-crown sized conifer forest over 3900 feet in the mapping area.

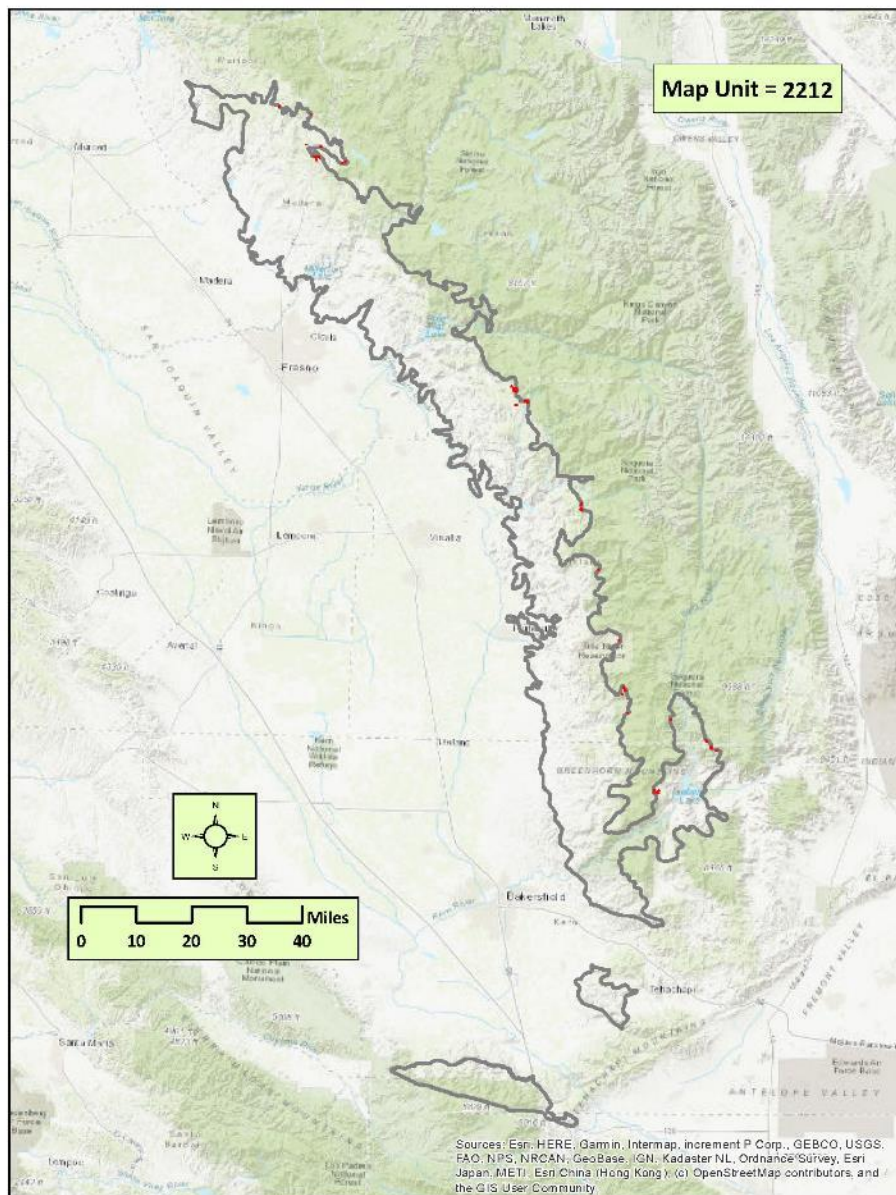
TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

- *Pinus sabiniana* Alliance (1210) – Signatures are distinctively different, with *P. sabiniana* appearing light blue to gray in color with an irregularly shaped crown, contrasted with *P. ponderosa*'s conical green crown. However, difficulties in interpretation occur when there is significant dieback in low cover stands or when younger-aged trees are mixed together.
- *Quercus chrysolepis* Alliance (1410) – *Quercus chrysolepis* is commonly associated with *P. ponderosa* and *C. decurrens* stands, and both signatures are usually very discernable from one another as a conifer versus a hardwood. However, difficulties arise when denser pine stands obscure the amount of *Q. chrysolepis* or understory shrub cover present.
- *Quercus kelloggii* Alliance (1312) – *Quercus kelloggii* is commonly associated with *P. ponderosa* and *C. decurrens* stands, and both signatures are usually very discernable from one another. However, difficulties arise when denser pine stands obscure the amount of *Q. kelloggii* or understory shrub cover present.

***Pinus ponderosa* – *Calocedrus decurrens* – *Pseudotsuga menziesii* Alliance
(2212)**

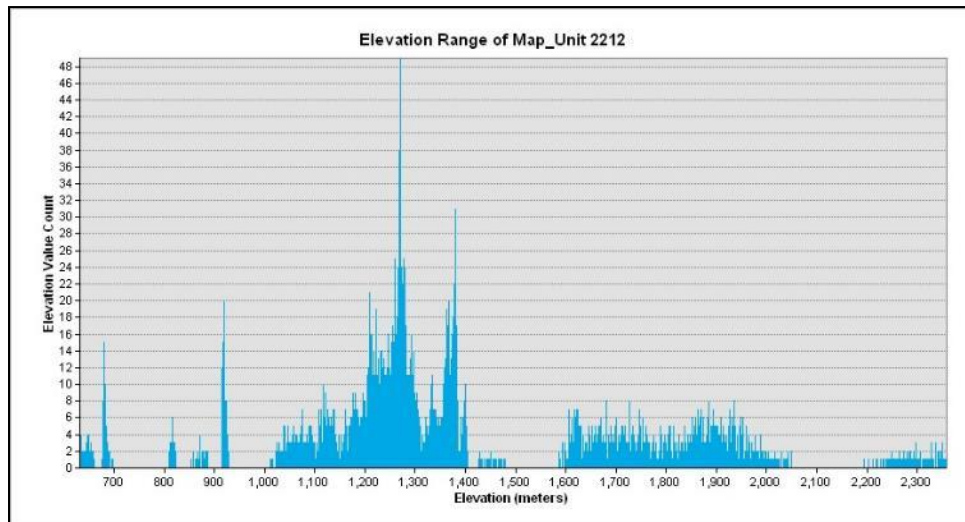
- Standing Dead Trees High Cover Mapping Unit (9600) – *P. ponderosa* and *C. decurrens* stands in this study area have been severely impacted by prolonged drought and western pine beetle infestations, resulting in significant dieback of these pine stands. Determining the stage of dieback and succession in these stands proves difficult, especially due to temporal issues, such as continuing conifer dieback, ongoing dead tree removal, emerging seedling development, and/or seral shrub recruitment in the understory. Difficulties arise when denser pine stands exhibit significant dieback in the canopy, where standing dead snags may obscure the amount of *Q. chrysolepis* and/or *Q. kelloggii* or understory shrub cover present.

***Pinus ponderosa* – *Calocedrus decurrens* – *Pseudotsuga menziesii* Alliance (2212)**



DISTRIBUTION: *Pinus ponderosa* stands are mapped incidentally along the uppermost elevations of the study area in the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

***Pinus ponderosa* – *Calocedrus decurrens* – *Pseudotsuga menziesii* Alliance
(2212)**



Pinus sabiniana Alliance (1210)

Foothill pine woodland Alliance



Aerial view of an open stand of dominant *Pinus sabiniana* over sparse shrubs and grassland in a rather dry environment.



Ground view of an open stand of *Pinus sabiniana* in a rocky setting over sparse shrubs, grasses, and herbs.

***Pinus sabiniana* Alliance (1210)**

DESCRIPTION: *Pinus sabiniana* is the sole dominant tree in the overstory, with mature trees of *P. sabiniana* generally greater than 10% absolute cover. Shrub cover can range from sparse to intermittent, but shrub cover is not significantly higher (more than 3 times greater) than tree cover. Where sparse *P. sabiniana* is over a denser shrub layer, the stand is considered as the appropriate shrubland alliance. Shrub understory may include *Arctostaphylos viscida*, *Ceanothus cuneatus*, and *Adenostoma fasciculatum*. Adjacent patches or small stands of *Cercis occidentalis* may be subsumed into *Pinus sabiniana* Alliance.

Pinus sabiniana stands are ubiquitous at lower to mid elevations throughout the northern portion of the Southern Sierra Nevada Foothills Proper subarea, and in the Lake Isabella area. However, *P. sabiniana* is conspicuously absent between just south of Pine Flat Lake, to California Hot Springs. This absence of *P. sabiniana* is commonly known as the foothill pine gap.

In the Horsethief Mountain subarea, *Pinus sabiniana* is limited to the western edges of the Tehachapi Range east of Bear Valley in low elevations just above the southeast corner of the San Joaquin Valley. For the most part, it is found in hotter settings than other pines, generally in lower elevations on mid to upper slopes. Substrate characteristics in stands dominated by this pine are almost always obscured by a dense cover of annual grasses. One site is mapped at the southern end of the Tehachapi Mountains in the San Emigdio Range subarea, northwest of Quail Lake.

PHOTO INTERPRETATION SIGNATURE: *Pinus sabiniana* is easily recognizable using 1-meter NAIP imagery. The species yields a blue to gray color with an irregularly shaped medium to large-sized crown. Emergent trees are easier to quantify than trees that are approximately the same height as the adjacent oak woodlands. Cover values of very young trees in either oak woodlands or sparse chaparral are difficult to estimate.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

- *Pinus ponderosa* – *Calocedrus decurrens* – *Pseudotsuga menziesii* Alliance (2212) – *Pinus ponderosa* signature has a conical green crown which differs from the irregular blue-gray crown of *P. sabiniana*. These two species do not mix extensively, but do overlap in the lower elevations of the *P. ponderosa* distribution, where usually significant dieback has taken place. In this overlap zone, relative cover differentiation is difficult to discern between species.
- *Pinus monophylla* – (*Juniperus osteosperma*) Alliance (2310) – Higher elevation stands dominated by *Pinus monophylla* often have emergent *P. sabiniana* mixed in the canopy. Stands are elevation-driven, and at lower elevations, *Pinus sabiniana* becomes the dominant conifer. There is not a substantial amount of mixing within the two woodland communities. *Pinus monophylla* has an irregularly shaped crown, often less than half the size of *P. sabiniana*. Typical color characteristics of *P. monophylla* is a medium to dark gray, whereas *P. sabiniana* can be light blue to gray. Unhealthy individuals of both species can have a very similar signature expression exhibiting a lighter gray crown. Within

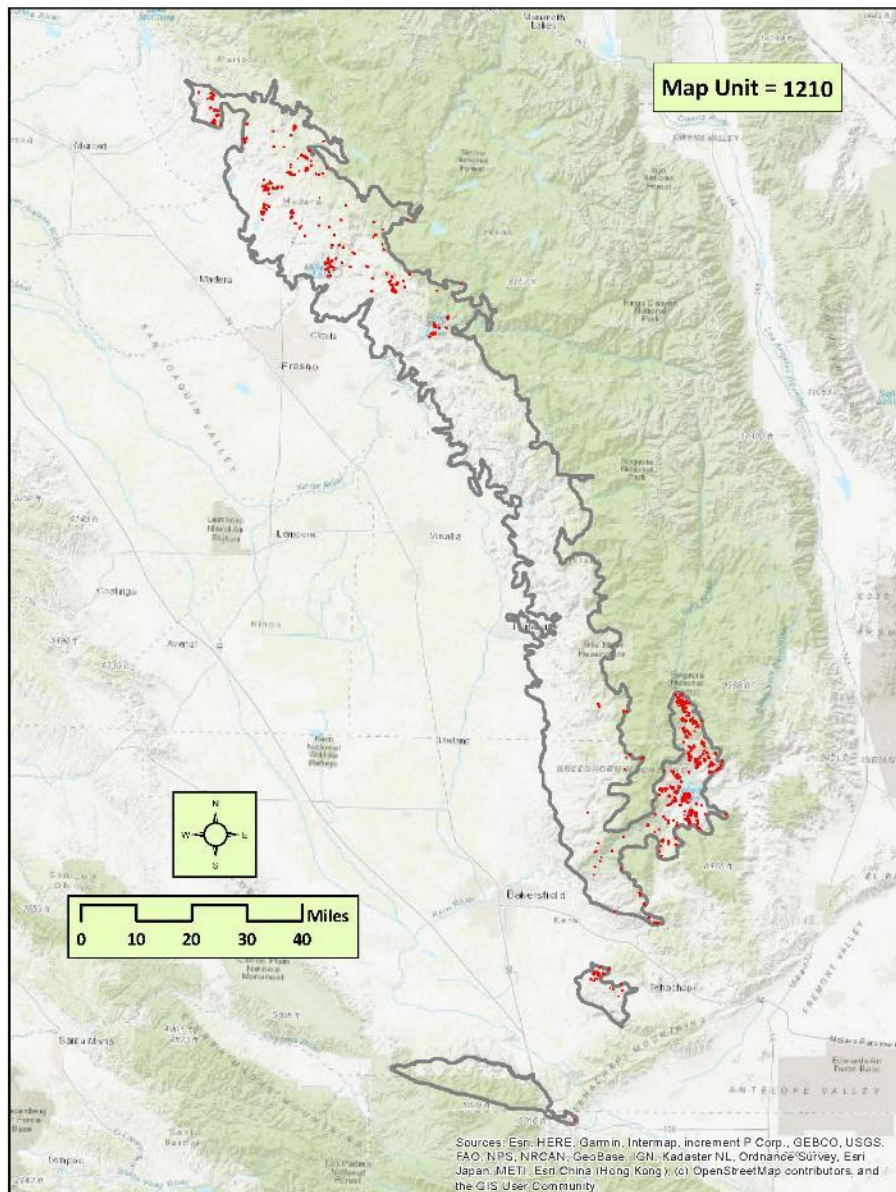
***Pinus sabiniana* Alliance (1210)**

the San Emigdio Range subarea these two conifers do not overlap in range.

Pinus sabiniana is limited to the western edges of the Tehachapi Range east of Bear Valley in low elevations just above the southeast corner of the San Joaquin Valley. It is found generally in hotter settings at lower elevations.

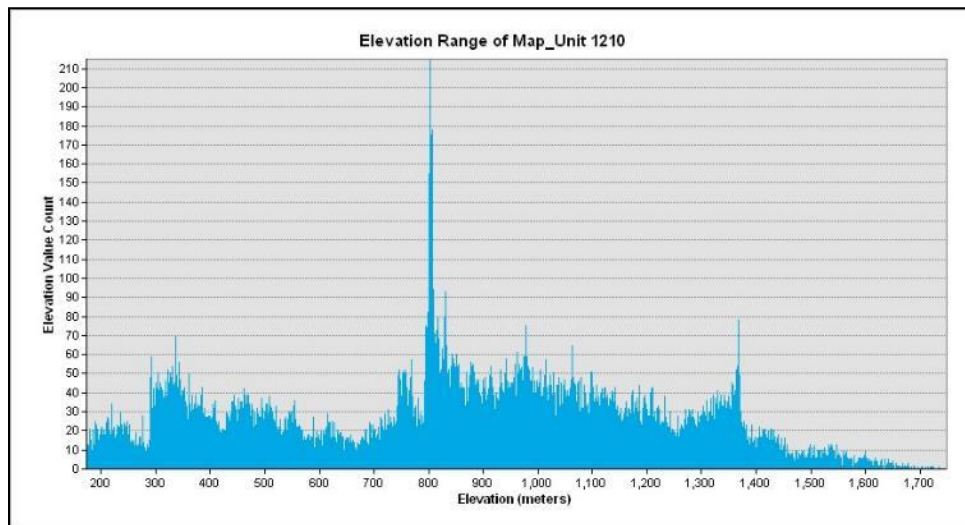
- *Quercus wislizeni* – *Quercus parvula* (tree) Alliance (1111) – Typically signatures are distinguishable between the *P. sabiniana* conifer and the *Q. wislizeni* evergreen hardwood. However, photo interpreters can at times underestimate the oak component in dense stands of *Pinus sabiniana*, especially when oaks are hidden in the sub-canopy. In these situations, photo interpreters may classify the stand as *Pinus sabiniana* where ground-based assessments may classify the stand as an oak type.

Pinus sabiniana Alliance (1210)



DISTRIBUTION: *Pinus sabiniana* stands are ubiquitous at lower to mid elevations throughout the northern portion of the Southern Sierra Nevada Foothills Proper subarea, and in the Lake Isabella area. It occurs through the northern part of the Horsethief Mountain subarea. One site is mapped at the southern end of the Tehachapi Mountains in the San Emigdio Range subarea, northwest of Quail Lake.

***Pinus sabiniana* Alliance (1210)**



Platanus racemosa – *Quercus agrifolia* Alliance (3310)
California sycamore woodlands Alliance



Aerial view of a dense riparian drainage with dominant *Platanus racemosa* mixing with other riparian trees.



Ground view of a dense *Platanus racemosa* stand of rather short stature along a riparian corridor, with an edge of live oak.

***Platanus racemosa* – *Quercus agrifolia* Alliance (3310)**

DESCRIPTION: *Platanus racemosa* has greater than 5% absolute cover in the overstory. Other species may intermix in the overstory, including *Quercus wislizeni*, *Q. lobata*, *Aesculus californica*, *Umbellularia californica*, *Alnus rhombifolia*, and/or *Fraxinus latifolia*. If *Alnus rhombifolia* is present then *Platanus* is dominant or co-dominant and *A. rhombifolia* has less than 3 times the cover of *P. racemosa*. If *Populus fremontii* is co-dominant with *Platanus* then the stand is considered as the *Platanus racemosa* – *Quercus agrifolia* Alliance. Note that in the Northern Sierra Nevada Foothills vegetation database, where *Populus fremontii* and *Platanus racemosa* co-dominate, the stand is mapped to the *Populus fremontii* Alliance.

Platanus racemosa is the most frequently mapped riparian tree alliance in the Southern Sierra Nevada Foothills Proper subarea, except north of Millerton Reservoir. In the Horsethief Mountain subarea, it is limited to several small stands in the western foothills of the Tehachapi Mountains along seasonally flooded drainages in Cedar and Sycamore Canyons, and in Comanche and Chanac Creeks. No sites are mapped in the San Emigdio Range subarea.

PHOTO INTERPRETATION SIGNATURE: On leaf-off imagery, *Platanus* is often tall, with an irregularly shaped open crown with several white main trunks or branches, and a dirty brown undertone or haze of dead leaf litter directly under the crown. Natural color signature could yield a light to medium green crown. *Platanus* is found along the stream margin or in dry infrequently flooded margins of the floodplain where understory annuals grasses can form dense cover.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

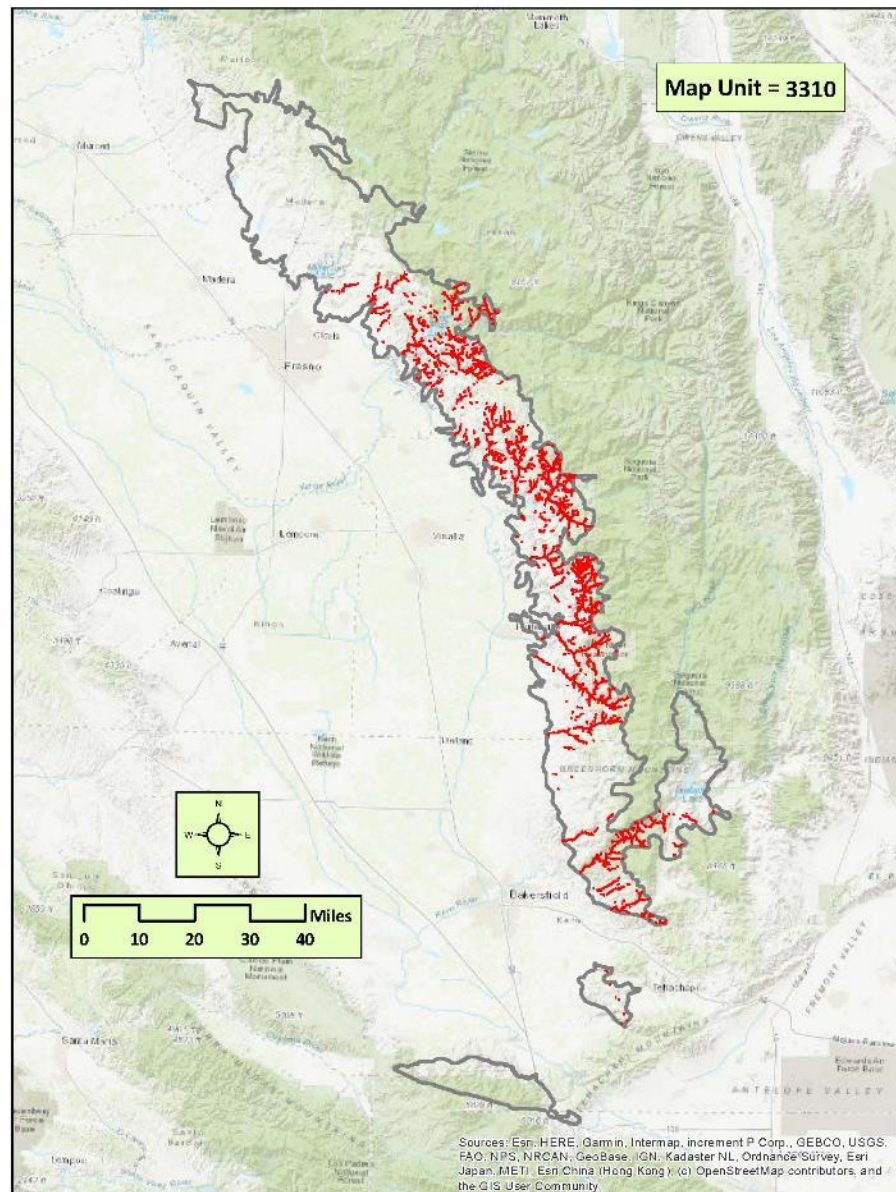
- *Populus fremontii* – *Fraxinus velutina* – *Salix gooddingii* Alliance (3110) – *Platanus racemosa* yields a signature similar to that of *Populus fremontii* and can be difficult to separate out where the two species co-occur. *Platanus racemosa* tends to have a smaller less rounded and lighter green crown and is found either in wetter settings along the stream margin or in dry infrequently flooded margins of the floodplain where understory annuals grasses can form dense cover. On leaf-off imagery, one may notice a brownish haze in the understory directly below the canopy indicating *Platanus* dead leaf litter. Also on this imagery, *Platanus* tends to have a more open, irregular crown. *Populus fremontii* tends to have larger more rounded crowns and overall has a duller green color. Both species can occur together in a stand in larger riparian woodlands, in these circumstances, photo interpreters classify to the *Platanus racemosa* – *Quercus agrifolia* Alliance.
- *Quercus lobata* Riparian Alliance (3314) – *Quercus lobata* is a common associate to riparian corridors, typically occurring along the slightly drier fringe of the floodplain, whereas *P. racemosa* typically occurs directly adjacent to the main channel. Typically, signatures are distinguishable between the *P. racemosa* deciduous and the *Q. lobata* evergreen hardwoods. On leaf-off imagery, *Platanus* is often taller, with an irregularly shaped open crown with whiter branches, and a dirty brown undertone of dead leaf litter. *Q. lobata* will have a more rounded

***Platanus racemosa* – *Quercus agrifolia* Alliance (3310)**

crown with a darker green color. However, in drainages with incised or narrowly confined channels, portions of the *P. racemosa* crowns may be obscured by larger *Quercus lobata* individuals, which make it difficult to quantify relative abundance.

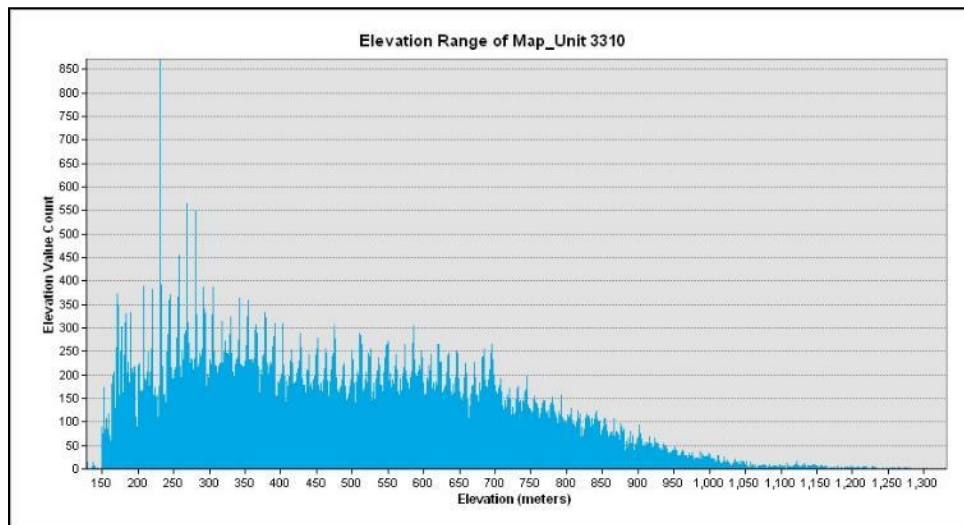
- *Quercus wislizeni* – *Quercus parvula* (tree) Alliance (1111) – *Quercus wislizeni* frequently mixes in the riparian zone along the drier margins of the floodplain. Typically, signatures are distinguishable between the *P. racemosa* deciduous and the *Q. wislizeni* evergreen hardwoods on leaf-off imagery. However, in minor drainages with less developed or inconsistent riparian distribution, *P. racemosa* crowns may be obscured by dense *Quercus wislizeni*, making it difficult to quantify relative abundance.
- *Salix gooddingii* – *Salix laevigata* Alliance (3114) – *Salix gooddingii* and *Salix laevigata* frequently occur with *P. racemosa*, with both species having very similar bright green color on the NAIP natural color imagery. The crowns of *S. laevigata* and *S. gooddingii* have a fuzzier, more rounded texture than the irregularly shaped *P. racemosa*.

***Platanus racemosa* – *Quercus agrifolia* Alliance (3310)**



DISTRIBUTION: *Platanus racemosa* is very ubiquitous throughout most of the Southern Sierra Nevada Foothills Proper subarea, being fairly absent to minimal at the northern end of the subarea and north of Lake Isabella. It occurs infrequently in the Horsethief Mountain subarea, and is not mapped in the San Emigdio Range subarea.

***Platanus racemosa* – *Quercus agrifolia* Alliance (3310)**



Populus fremontii – Fraxinus velutina – Salix gooddingii Alliance (3110)
Fremont cottonwood forest and woodland Alliance



Aerial view of riparian corridor with *Populus fremontii* dominant.



Ground view of a stand of *Populus fremontii* along a riparian drainage.

***Populus fremontii* – *Fraxinus velutina* – *Salix gooddingii* Alliance (3110)**

DESCRIPTION: *Populus fremontii* has equal or greater than 5% absolute cover in the overstory, usually as a dominant or co-dominant in the overstory with willows or other riparian tree species (*Salix laevigata*, *Salix gooddingii*, *Alnus rhombifolia*, *Fraxinus latifolia*, *Quercus lobata*, *Quercus wislizeni*). If *Populus fremontii* is co-dominant with *Platanus racemosa*, then the stand is considered as the *Platanus racemosa* – *Quercus agrifolia* Riparian Woodland Alliance. Note that in the Northern Sierra Nevada Foothills vegetation database, where *Populus fremontii* and *Platanus racemosa* co-dominate, the stand is mapped to the *Populus fremontii* Alliance.

Populus fremontii is commonly mapped throughout the Southern Sierra Nevada Foothills Proper subarea. In the San Emigdio Range subarea, *Populus fremontii* is limited primarily to the lower foothill areas in the northern portions of the San Emigdio Mountains. Small stands are mapped in Black Bob, Emigdio, and Doc Williams Canyons and along portions of Pleito Creek. A couple of stands are also mapped in the Tejon Hills along Chanac and Sycamore Canyons of the Horsethief Mountain subarea.

PHOTO INTERPRETATION SIGNATURE: Mature stands of *Populus fremontii* can be separated out fairly reliably from other riparian species by its large and open crown and dull green color. *Populus* tends to have light gray to white branching and can be identified from other riparian species fairly easily using early season leaf-off imagery.

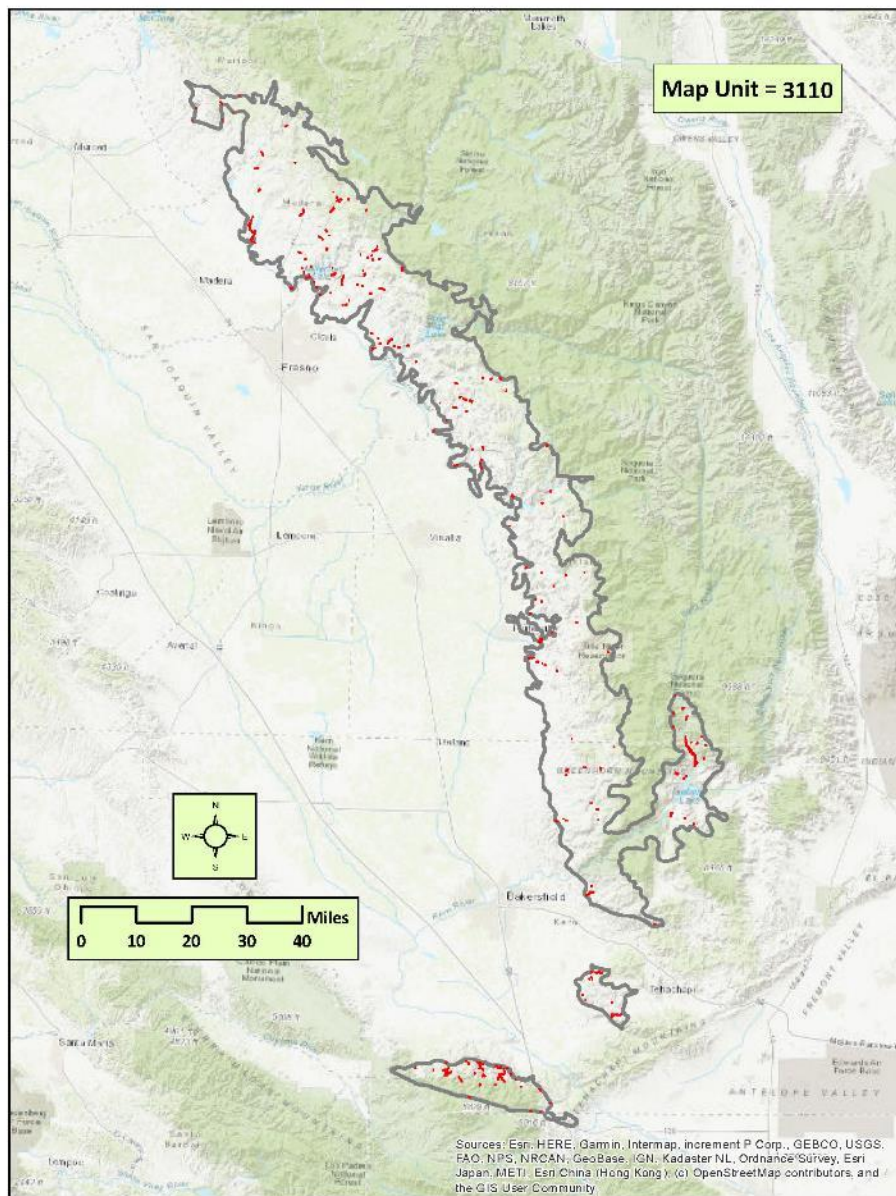
TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

- *Alnus rhombifolia* Alliance (3210) – *Alnus rhombifolia* has a much smaller crown, usually occurs in dense narrow stands, and is often much closer to the edge of the active stream channel. *Alnus rhombifolia* also occurs as smaller narrow linear stands and canopy tends to be more uniform throughout.
- *Platanus racemosa* – *Quercus agrifolia* Alliance (3310) – *Platanus racemosa* has a large crown but is generally not as rounded as a mature cottonwood, lacking distinct crown margins. Leaf-off imagery can show a brown shade in the understory of *Platanus* indicating its leaf litter. Stands of *Platanus* tend to occur in slightly less flooded environments or in drier narrow canyons upslope from *Populus*.
- *Quercus lobata* Riparian Alliance (3314) – *Quercus lobata* has a similar-sized crown and is also fairly open. Colors tend to be darker green with a broader spreading crown with irregular margins. *Quercus lobata* also prefers less well-drained very deep soils and will therefore often have a dense herbaceous understory composed often of weedy annuals. *Rubus armeniacus* is also a common understory associate to *Quercus lobata*.
- *Quercus wislizeni* – *Quercus parvula* (tree) Alliance (1111) – *Quercus wislizeni* frequently mixes in the riparian zone along the drier margins of the floodplain. Typically, signatures are distinguishable between the *P. fremontii* deciduous and the *Q. wislizeni* evergreen hardwoods on leaf-off imagery. However, in confined minor drainages with less developed or inconsistent riparian distribution, *P. fremontii* crowns may be obscured by dense *Quercus wislizeni*, making it difficult to quantify relative abundance.

***Populus fremontii* – *Fraxinus velutina* – *Salix gooddingii* Alliance (3110)**

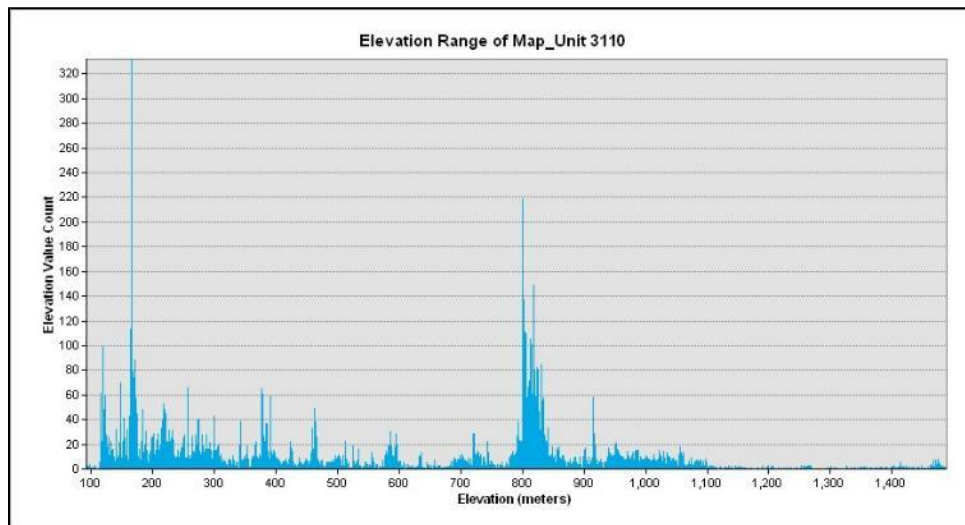
- *Salix gooddingii* – *Salix laevigata* Alliance (3114) – *Salix laevigata* has a smaller crown and can display multiple crowning in larger individuals. This species also yields a brighter and lighter green color and the crowns are less diffuse than the *Populus*. However, it is extremely difficult for photo interpreters to ascertain relative abundance of the two species in a stand, and therefore at times to make a determination between the two alliances.

***Populus fremontii* – *Fraxinus velutina* – *Salix gooddingii* Alliance (3110)**



DISTRIBUTION: *Populus fremontii* is common as small stands, and is mapped throughout the entire study area in all subareas from lower to the highest elevations.

***Populus fremontii* – *Fraxinus velutina* – *Salix gooddingii* Alliance (3110)**



Pseudotsuga macrocarpa Alliance (2216)

Big cone Douglas fir forest Alliance



Aerial view of a large open stand of *Pseudotsuga macrocarpa* on a very steep southerly slope in the San Emigdio Mountains.



Ground view of an open stand of *Pseudotsuga macrocarpa* on a very steep slope, with a very sparse understory.

***Pseudotsuga macrocarpa* Alliance (2216)**

DESCRIPTION: *Pseudotsuga macrocarpa* occurs as a dominant or co-dominant conifer in the overstory as a canopy tree, usually with at least 20% relative cover, and there may be an abundant (co-dominant or dominant) sub-canopy of *Quercus* spp. Stands were not surveyed in the project area but have been observed.

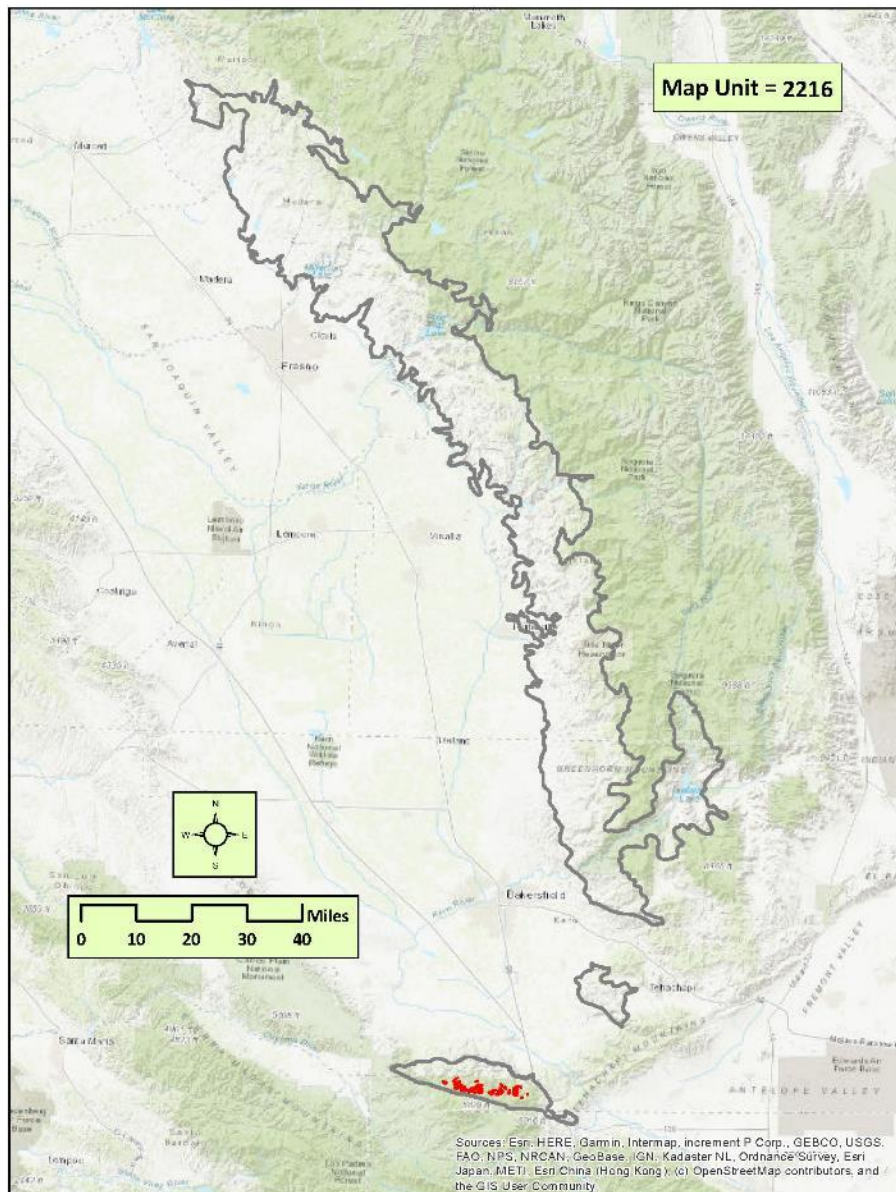
Stands of *Pseudotsuga macrocarpa* are mapped exclusively in very steep canyon bottoms and side slopes on northerly trending aspects of the San Emigdio Range subarea, from Doc Williams and Cloudburst Canyon east to Deadman Creek. In these very steep gorges, *Pseudotsuga macrocarpa* usually co-dominates the stand as a medium-sized emergent conifer over denser stands of *Quercus chrysolepis*. However, over portions of several stands, *Pseudotsuga macrocarpa* is mapped as a sub-dominant with a higher cover of oak, but is always a consistently occurring emergent conifer throughout. This mixed conifer hardwood woodland is intermediate in elevation between the lower elevation pinyon woodlands to the north and high elevation Jeffrey pine forests to the south which follow the main east-west-trending ridgeline. No sites are mapped in the Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas.

PHOTO INTERPRETATION SIGNATURE: Individual trees are difficult to see due to their very steep, north-trending aspects which are often hidden in shadows. Where visible, crowns are rather narrow but have branches whose ends extend downward, which are evident in larger individuals. Crowns are narrow, somewhat conical, but not as symmetrical as generally seen in *Abies concolor*. Signature color is a dark green, however, stands often have a significant component of dieback or stress. In stands where *P. macrocarpa* is an emergent to *Quercus chrysolepis*, visible shadowing is accentuated by the steep terrain.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

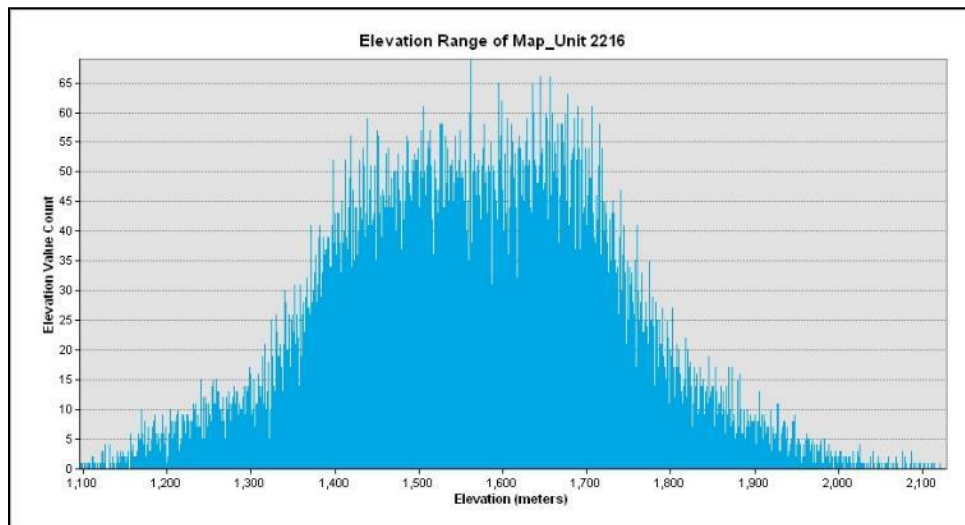
- *Abies concolor* Alliance (2214) – Most of the *Abies* noted in the study area occur as a co-dominant species in *Pinus jeffreyi* woodlands. True firs (*Abies*) generally have a more conical crown than Douglas-firs (*Pseudotsuga*) where lateral branching around the trunk of the fir is more symmetrical.
- *Pinus jeffreyi* Alliance (2215) – Where *Pinus jeffreyi* dominate stands they transition abruptly to *Pseudotsuga macrocarpa* as steepness increases northward off the main east-west-trending ridgeline of the San Emigdio Range. It is in these zones that the two conifers may come in close contact with one another. Mature Jeffrey pines have a much larger, rounded crown with broad lateral branching extending well into the middle sections of the tree.

Pseudotsuga macrocarpa Alliance (2216)



DISTRIBUTION: *Pseudotsuga macrocarpa* occurs exclusively in the San Emigdio Range subarea on very steep north-trending slopes. No sites are mapped in the Southern Sierra Nevada Foothills Proper and the Horsethief Mountain subareas.

***Pseudotsuga macrocarpa* Alliance (2216)**



Quercus chrysolepis Alliance (1410)
Canyon live oak forest and woodland Alliance



Aerial view of a very dense stand of *Quercus chrysolepis* in a wide-bottom canyon.



Ground view of a very dense stand of *Quercus chrysolepis* in a rocky/bouldery setting, with *Aesculus californica*.

***Quercus chrysolepis* Alliance (1410)**

DESCRIPTION: *Quercus chrysolepis* is usually the dominant species in the tree canopy. Conifers may be emergent and occasionally co-dominant. *Pinus sabiniana* and/or *Pinus ponderosa* may co-dominate. Other broad-leaf trees such *Aesculus californica*, *Umbellularia californica*, and other oaks (other than *Q. kelloggii* and *Q. lobata*) can be co-dominant and even higher covers than *Q. chrysolepis*. If *Q. kelloggii* is present, it is sub-dominant or found in the understory of *Q. chrysolepis*. If *Pinus monophylla* or *Pseudotsuga menziesii* are co-dominant then the stand is considered as those alliances, respectively. Note that in the Northern Sierra Nevada Foothills vegetation database, where *Quercus chrysolepis* and *Quercus kelloggii* co-dominate, the stand is mapped to the *Quercus chrysolepis* Alliance.

Quercus chrysolepis occurs throughout the Southern Sierra Nevada Foothills Proper subarea, beginning to appear as low as 2200 feet in elevation in well protected canyon bottoms and coves mixing with *Quercus wislizeni*. Stands increase in size and frequency above 4000 feet in elevation, where higher elevation conifers such as *P. ponderosa* and *Calocedrus decurrens* begin to mix into stands.

Stands in the San Emigdio Range subareas are mapped in middle to higher elevations of the San Emigdio Mountains, especially north of the main ridgeline. Small amounts of this alliance are found on the higher canyons of the western edges of the Tehachapi Range in upper coves and draws of the Horsethief Mountain subarea, adjacent to areas dominated by annual grasses. It is mapped in dense woodland settings, where *Quercus chrysolepis* is strongly dominant, or where it co-dominates with *Pinus monophylla* or *Pseudotsuga macrocarpa*. Stands strongly dominated by *Q. chrysolepis* in high cover settings are the most common expression in this region. At lower elevations, on mid and lower side slopes, it can occur with *Pinus monophylla*, and in these settings it is mapped to the *P. monophylla* – (*Juniperus osteosperma*) Alliance. In higher elevations on steep topography, it mixes with *Pseudotsuga macrocarpa* where it is assigned to that conifer alliance. In *Pinus jeffreyi* woodlands, *Q. chrysolepis* is found on steep canyon bottoms adjacent to the pine. In these settings, *Q. chrysolepis* stands are quite narrow in extent, but extend further up the side slopes as elevation drops.

PHOTO INTERPRETATION SIGNATURE: *Quercus chrysolepis* tends to have a brighter green signature than the often adjacently-occurring *Q. wislizeni*. This is most likely due to early growing season (late spring) NAIP imagery yielding leaf flush conditions in *Q. chrysolepis* that are usually not as prevalent in *Q. wislizeni* at the time. Spring imagery makes it possible to separate out *Quercus kelloggii* from *Q. chrysolepis* with the former yielding a blue-green signature. Leaf-off imagery will also differentiate the leaf-off *Q. kelloggii* from the evergreen *Q. chrysolepis*. Modeling the two species on topographical setting is also a fairly reliable tool; *Q. chrysolepis* occupies the steeper mid slopes and canyon bottoms while *Q. kelloggii* favors adjacent gentle upper slopes and spurs.

***Quercus chrysolepis* Alliance (1410)**

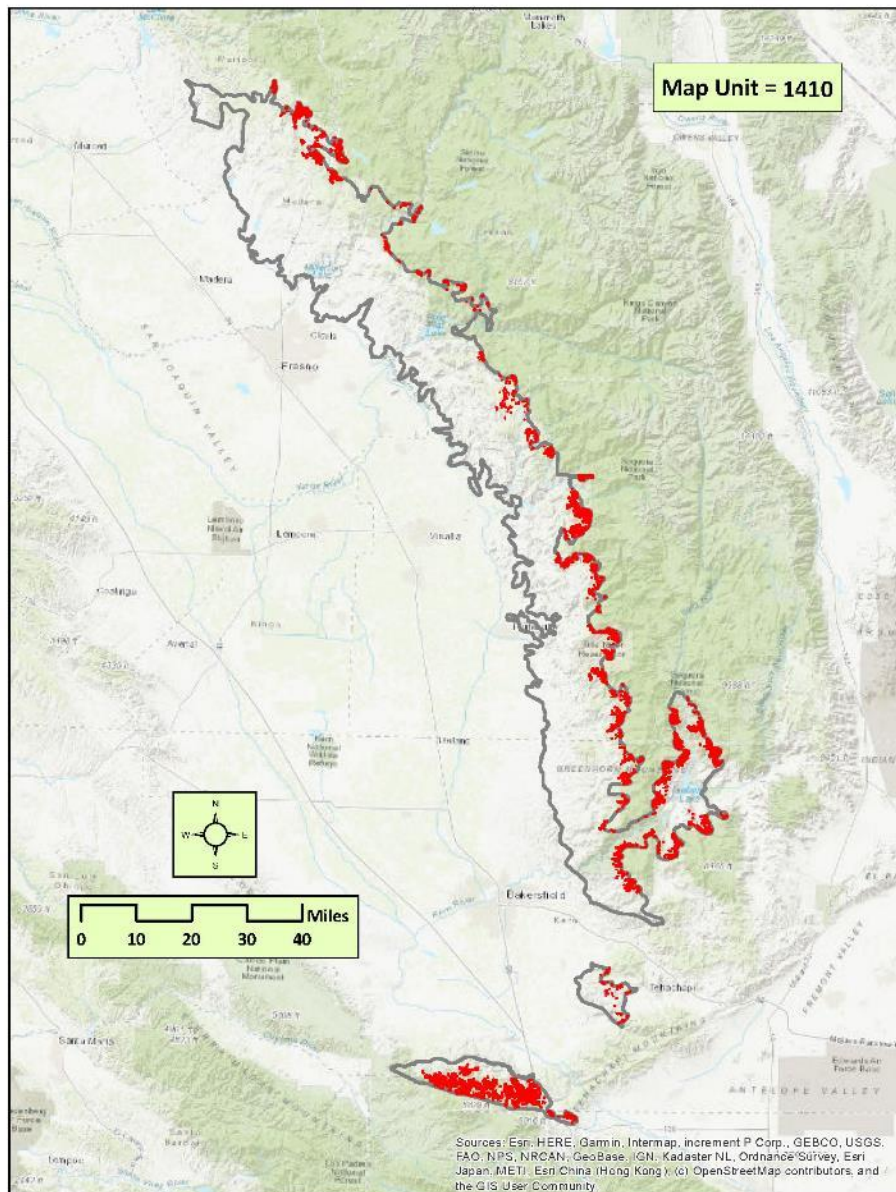
TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

- *Pinus monophylla* – (*Juniperus osteosperma*) Alliance (2310) – *P. monophylla* stands are limited to the higher elevations (above 4000 feet) along the drier eastern fringe of the Lake Isabella portion of the study area. *Quercus chrysolepis* occurs in the vicinity of these stands, but usually mixing of these species is limited. Typically, signatures are distinguishable between the *P. monophylla* conifer and the *Q. chrysolepis* evergreen hardwood. However, difficulties in assessing relative abundance occur when the pines exhibit decadence in lower cover stands,
- *Pinus ponderosa* – *Calocedrus decurrens* – *Pseudotsuga menziesii* Alliance (2212) – Typically, signatures are distinguishable between the *P. ponderosa* conifer and the *Q. chrysolepis* evergreen hardwood. However, difficulties arise when denser pine stands obscure the amount of *Q. chrysolepis* or understory shrub cover present. In addition, where there is significant dieback of conifers, quantifying relative abundance of the living versus dead at the time of the base imagery is also difficult.
- *Quercus kelloggii* Alliance (1312) – *Quercus kelloggii* has a more diffuse crown and the overall appearance of the stand is more open. *Q. kelloggii* is generally found upslope of *Quercus chrysolepis* when the two species are nearby. *Q. kelloggii*, being deciduous, can be noted in leaf-off imagery, as compared to evergreen *Quercus chrysolepis*.
- *Quercus lobata* Alliance (1313) – *Quercus chrysolepis* tends to occur on lower canyon bottoms and steeper side slopes in high elevation settings. In elevations above 4000 feet, *Q. lobata* may follow a ridgeline along the upper margins of an adjacent north-trending cove where *Q. chrysolepis* dominates. *Q. chrysolepis* tends to form a denser woodland with cover often over 60%. Individual crowns are denser and form distinct margins along the crown edge. Overall color of the *Q. chrysolepis* crown is greener, typical of a live oak signature.
- *Quercus lobata* Riparian Alliance (3314) – *Quercus lobata* and *Q. chrysolepis* usually occur in close proximity to one another, with *Q. lobata* establishing on deeper soil substrates or floodplain terraces, while *Q. chrysolepis* appears on steeper, rockier toe slopes. However, in drainages with incised or narrowly confined channels where *Q. lobata* lines the edge of the limited terrace, overhanging portions of the *Q. chrysolepis* crowns along the toe slopes can obscure and/or blend into the other, making species differentiation and stand boundaries more difficult to assess.
- *Quercus wislizeni* – *Quercus parvula* (tree) Alliance (1111) – *Quercus wislizeni* yields a darker green signature, and when adjacent to *Q. chrysolepis* is found in more xeric topographical settings. *Q. kelloggii*, being deciduous, can be noted in leaf-off imagery, as compared to evergreen *Q. wislizeni*. Presence of *Pinus ponderosa* is more likely with *Q. chrysolepis*, whereas *Q. wislizeni* is normally at too low an elevation for *P. ponderosa*.

***Quercus chrysolepis* Alliance (1410)**

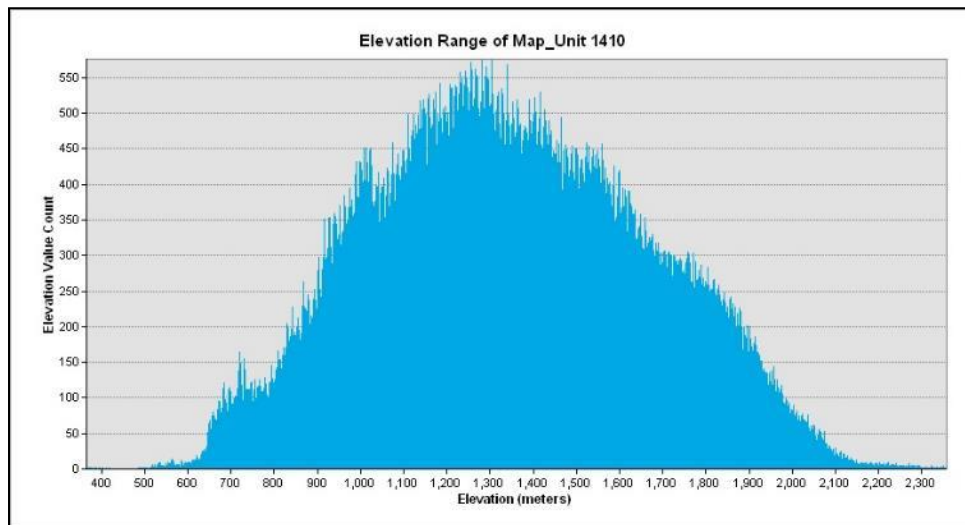
- Standing Dead Trees High Cover Mapping Unit (9600) – *P. ponderosa* and *C. decurrens* stands in this study area have been severely impacted by prolonged drought and western pine beetle infestations, resulting in significant dieback of these pine stands. Determining the stage of dieback and succession in these stands proves difficult, especially due to temporal issues, such as continuing conifer dieback, ongoing dead tree removal, emerging seedling development, and/or seral shrub recruitment in the understory. Difficulties arise when denser pine stands exhibit significant dieback in the canopy, where standing dead snags may obscure the amount of *Q. chrysolepis* and/or *Q. kelloggii* or understory shrub cover present.
- *Umbellularia californica* Alliance (1110) – *Umbellularia californica* has a very similar bright green color with a rounded crown that can be very difficult to discern from *Quercus chrysolepis*. *U. californica* has a flatter bumpy crown texture, as opposed to the domed, billowy crown of *Q. chrysolepis*. The overlap zone of occurrence is narrow, between 2200-4000 feet in elevation.

Quercus chrysolepis Alliance (1410)



DISTRIBUTION: Very common along the highest elevations of the Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas, and throughout the San Emigdio Range subarea.

Quercus chrysolepis Alliance (1410)



Quercus douglasii Alliance (1311)

Blue oak woodland and forest Alliance



Aerial view of typical stand of *Quercus douglasii*. They are open stands with distinct individuals of variable to homogenous size in a grassland setting, usually on flat to rolling terrain, or neutral slopes.



Ground view of an open stand of fairly equally spaced *Quercus douglasii* over grassland on gently rolling terrain.

***Quercus douglasii* Alliance (1311)**

DESCRIPTION: *Quercus douglasii* (or occasionally *Quercus x alvordiana*, which is defined operationally by tree size and morphology, but with some leaf characteristics of *Q. john-tuckeri*) is the dominant oak species in the overstory. Other trees, such *Pinus sabiniana*, *Juniperus californica*, *Aesculus californica*, and *Quercus lobata* may be present or co-dominant. If *Quercus wislizeni* or *Q. chrysolepis* is co-dominant, *Q. douglasii* must have at least twice as much cover as those oaks. Stands are typically open with an understory of dense grasses and forbs, or open shrubs with herbaceous understory. A denser shrub understory may also be encountered in mid to higher elevation zones of the study area where total vegetation cover is more abundant. Hybrid form (*Quercus douglasii* x *Quercus john-tuckeri* or *Quercus x alvordiana*) is mapped as *Quercus douglasii* Alliance if has a tree-like stature, and mapped as *Quercus john-tuckeri* if has a shrub-like stature. Adjacent patches or small stands of *Cercis occidentalis* may be subsumed into *Quercus douglasii* Alliance. Where *Q. douglasii* and *Q. kelloggii* co-occur, the alliance of the stand is considered as the dominant oak, but erring toward *Q. kelloggii*.

The *Quercus douglasii* Alliance is the most widely mapped type in the entire study area. In the Southern Sierra Nevada Foothills Proper subarea, it ranges from Cathey's Valley in the north, down to Tollhouse Canyon and Lake Isabella in the south. In the San Emigdio Range subarea, *Quercus douglasii* is mapped extensively, primarily in lower elevation settings. Stands occur in the northern foothills along the entire length of the San Emigdio Range subarea from Bitter Creek east to the Grapevine Canyon. Stands are also widespread to the north along the western slopes of the Tehachapi Range down to the Tejon Hills to the west in the Horsethief Mountain subarea. Stands are mapped where *Q. douglasii* strongly dominates the canopy in open savannah-like settings to at times moderately dense cover with a dense understory of annual grasses.

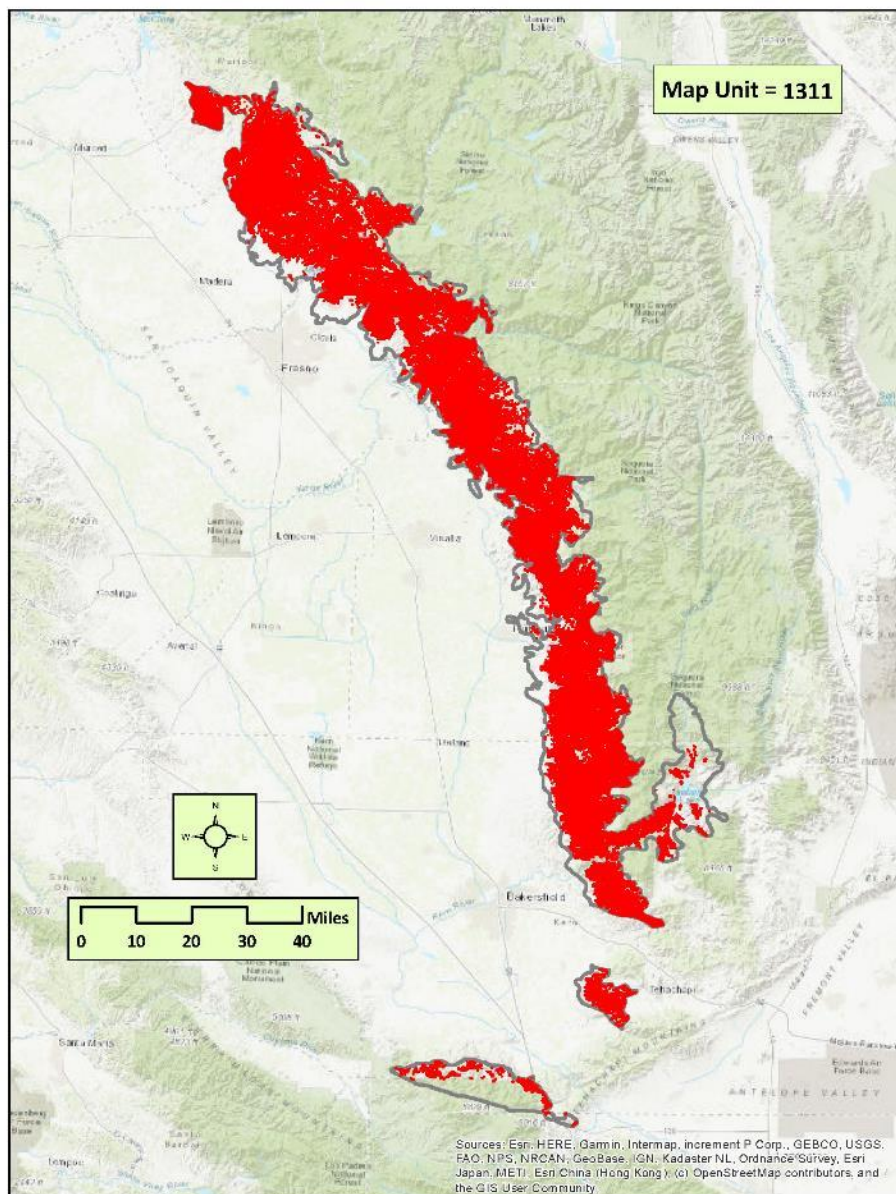
PHOTO INTERPRETATION SIGNATURE: *Quercus douglasii* has a characteristic blue-gray signature with a diffuse, irregularly shaped crown varying considerably in size. Stands in more xeric environments trend more to the blue-gray color while stands in mesic settings have a more blue-green signature. *Quercus douglasii* shows leaf stress conditions in late summer and imagery flown early in the season yields less of the characteristic blue signature noted on summer and early fall imagery. A number of stands have undergone considerable dieback, effects due to consecutive years of drought.

***Quercus douglasii* Alliance (1311)**

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

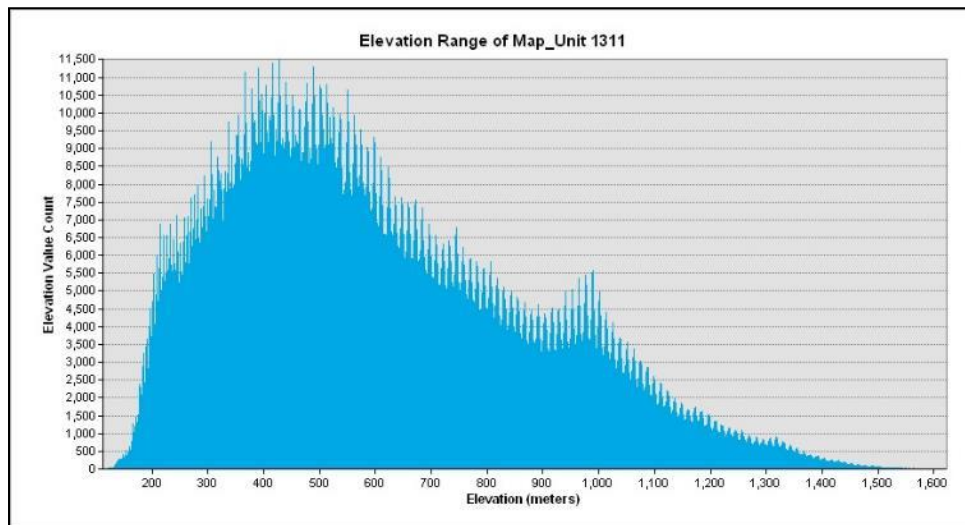
- *Pinus sabiniana* Alliance (1210) – *Pinus sabiniana* has a similar color but the crown shape is more irregular and typically exhibits a taller stature. Overall growth characteristics of *Pinus sabiniana* yield a significantly different appearance than that of *Q. douglasii* despite similar color and environment. Where the two species co-occur, *Pinus sabiniana* is often an emergent to the oak canopy.
- *Quercus* × *alvordiana* – This is a hybrid between *Quercus douglasii* and *Quercus john-tuckeri* and can vary in form from tree-like to shrub-like, and can be somewhat deciduous to evergreen. It can be very difficult to tell from *Q. douglasii* or *Q. john-tuckeri* through photo interpretation. Stands that are tree-like in form are mapped as *Quercus douglasii* Alliance, while those of shrub form are mapped as *Quercus john-tuckeri* Alliance.
- *Quercus lobata* Alliance (1313) – *Quercus douglasii* occurs in a slightly lower range of elevations than upland *Q. lobata*, however elevation overlap is substantial. *Q. douglasii* are found in drier settings, generally on steeper mid-slope topography. Crowns of *Q. douglasii* are more open and rarely cover more than 30% of the ground. Crown size is significantly smaller than *Q. lobata* and overall color contains lesser green hues, trending more towards the blue-gray. Upland *Q. lobata* most likely develop in areas of higher rainfall since there are no mechanisms of easily attaining moisture from the ground on upper slopes. Stands of *Q. lobata* on these upper slopes are unlikely in areas receiving less rainfall, especially along desert margins where *Q. douglasii* and *Q. john-tuckeri* dominate.
- *Quercus lobata* Riparian Alliance (3314) – *Quercus lobata* and *Q. douglasii* both exhibit irregular crown shapes and occur in similar settings; on floodplain terraces and flats with deep, well-developed soils and a layer of dense annual grasses. On average, *Q. lobata* will display a larger, darker green crown, sometimes seen as darker red on NAIP color infrared imagery. *Q. lobata* is usually found nearer to floodplain terraces and minor drainages.
- *Quercus wislizeni* – *Quercus parvula* (tree) Alliance (1111) – *Quercus wislizeni* in xeric settings where it mixes with *Q. douglasii* is still noticeably greener with a denser crown.

***Quercus douglasii* Alliance (1311)**



DISTRIBUTION: *Quercus douglasii* stands are highly ubiquitous and very extensive at lower to mid elevations throughout Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas. In the San Emigdio Range subarea, it occurs along the northern lower elevation margins.

Quercus douglasii Alliance (1311)



Quercus kelloggii Alliance (1312)
California black oak forest and woodland Alliance



Aerial view of a dense stand of *Quercus kelloggii* with large rounded irregularly shaped crowns, with grass in the understory openings.



Ground view of an intermittently open stand of fairly young *Quercus kelloggii* on a moderately steep slope with a grassy understory.

***Quercus kelloggii* Alliance (1312)**

DESCRIPTION: *Quercus kelloggii* is dominant in the tree layer, or is co-dominant with *Pinus ponderosa*, *Pinus sabiniana*, and/or *Pseudotsuga menziesii*. *Calocedrus decurrens* may be absent or very low in cover. Understory shrubs may include *Toxicodendron diversilobum*, *Arctostaphylos viscida*, *Heteromeles arbutifolia*, and/or *Ceanothus integerrimus*. In upland settings where *Quercus lobata* may co-dominate the stand is considered as the *Quercus lobata* Alliance. Where *Quercus wislizeni* co-dominates, the stand is considered as the *Quercus wislizeni* - *Quercus parvula* (tree) Alliance. Where *Q. chrysolepis* co-dominates, the stand is considered as the *Quercus kelloggii* Alliance. Where *Q. douglasii* and *Q. kelloggii* co-occur, the alliance of the stand is considered as the dominant oak, but erring toward *Q. kelloggii*. Where *Pseudotsuga menziesii* and *Umbellularia californica* co-dominate with *Q. kelloggii*, the stand is considered as the *Quercus kelloggii* Alliance. Note that in the Northern Sierra Nevada Foothills vegetation database, where *Quercus chrysolepis* and *Quercus kelloggii* co-dominate, the stand is mapped to the *Quercus chrysolepis* Alliance.

Stands of *Quercus kelloggii* are primarily mapped at higher elevations along the eastern edge of the Southern Sierra Nevada Foothills Proper subarea. There are few sites mapped in the Horsethief Mountain subarea, and no stands mapped in the San Emigdio Range subarea.

PHOTO INTERPRETATION SIGNATURE: *Quercus kelloggii* generally yields a brighter green signature than other species of oaks; when mixing in the stand with *Quercus wislizeni*, it is usually somewhat taller with a more diffuse irregularly shaped crown. Higher elevation stands often contain a strong emergent canopy of *Pinus ponderosa* significantly altering the typical hardwood signature. Early spring (April) imagery yields a unique leaf flush condition that is typically a bright blue-green color, much brighter than that of *Q. douglasii*. Leaf-off imagery differentiates between deciduous *Quercus kelloggii* and live oaks. This imagery may also show a reddish-brown highlight on the *Q. kelloggii*.

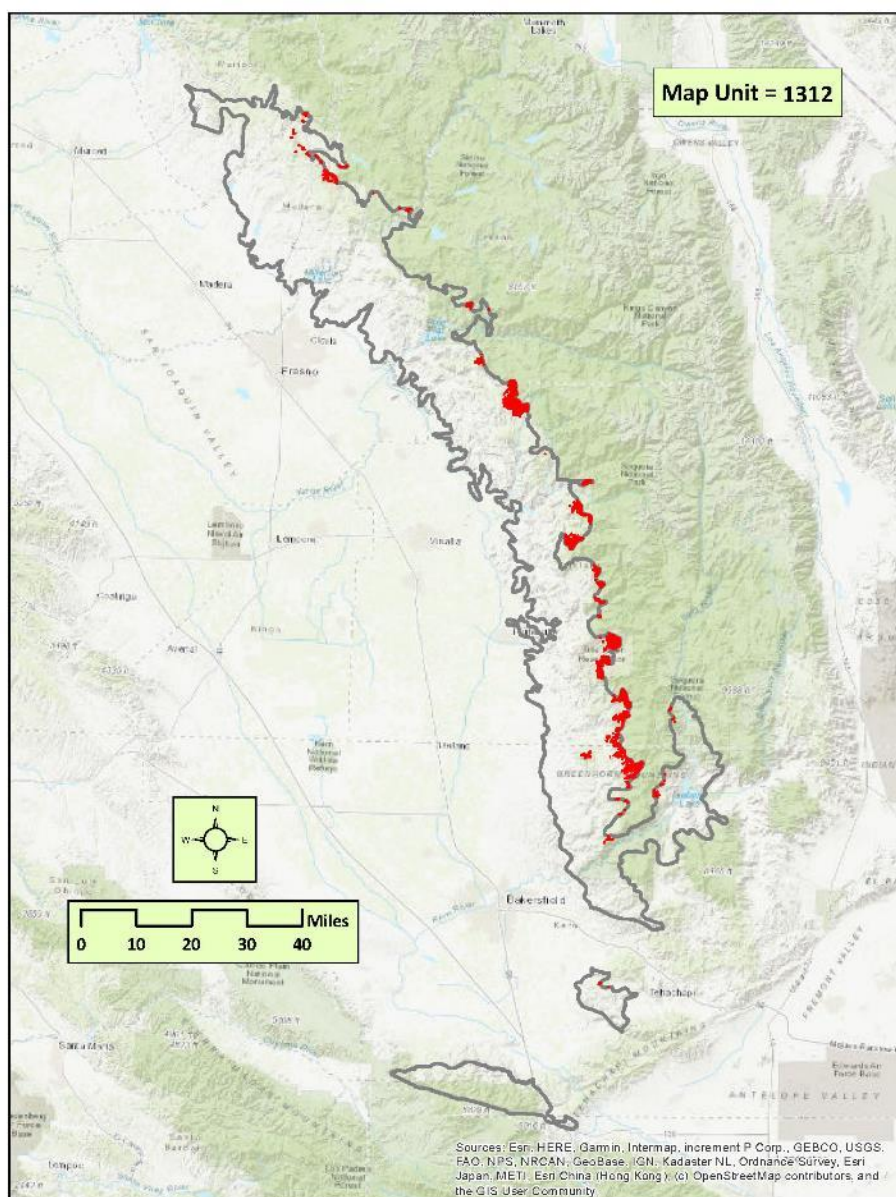
TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

- *Pinus ponderosa* – *Calocedrus decurrens* – *Pseudotsuga menziesii* Alliance (2212) – Where conifers strongly dominate the stand, photo interpreters look for diversity in the conifer component with minimal amounts of *Quercus kelloggii*. In these situations, photo interpreters will map to the mixed conifer type.
- *Quercus chrysolepis* Alliance (1410) – *Quercus chrysolepis* overlaps in color but has a denser more well-defined crown margin even in dense cover. Leaf-off imagery will indicate deciduous *Quercus kelloggii* vs. evergreen *Q. chrysolepis*.
- *Quercus douglasii* Alliance (1311) – In lower elevation stands, *Q. kelloggii*, *Q. wislizeni*, and *Q. douglasii* often occur in close proximity to one another. In these settings, *Q. kelloggii* will often occupy gentle upper north-trending slopes, *Q. wislizeni* will be found on the steeper side slopes, and *Q. douglasii* on gentle to moderately steep south-trending slopes.

***Quercus kelloggii* Alliance (1312)**

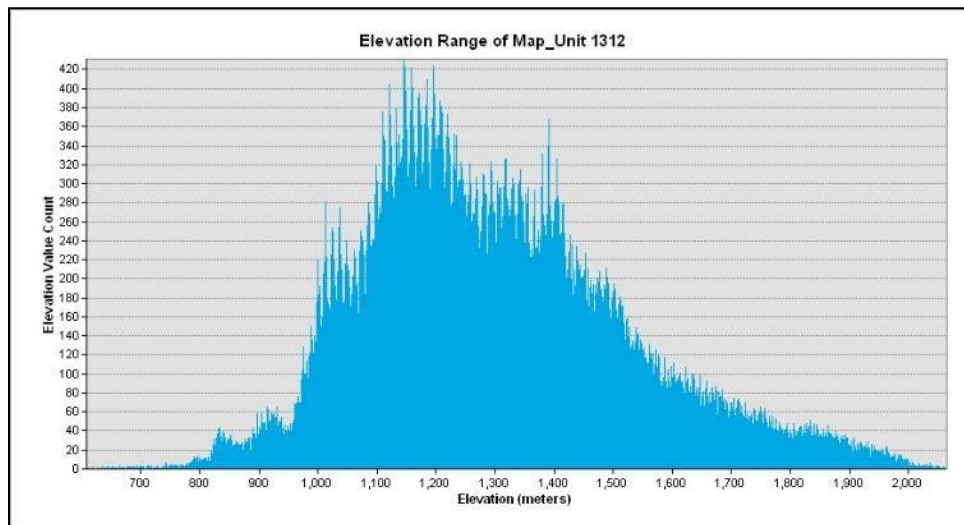
- *Quercus lobata* Riparian Alliance (3314) – *Quercus kelloggii* can have a similar color and both species have openings in the crown structure; however, *Q. kelloggii* crowns are usually smaller and less rounded. Stands of *Q. kelloggii* tend to occur just upslope from *Q. lobata* on north-trending slopes. Co-occurrence of the two species tends to overlap in very narrow zones often below the MMU.
- *Quercus wislizeni* – *Quercus parvula* (tree) Alliance (1111) – *Quercus wislizeni* has a more rounded denser crown and is generally darker green. When the two species co-occur, photo interpreters usually mapped to the *Q. wislizeni* Alliance. In lower elevation stands, *Q. kelloggii*, *Q. wislizeni*, and *Q. douglasii* often occur in close proximity to one another. In these settings, *Q. kelloggii* will often occupy gentle upper north-trending slopes, *Q. wislizeni* will be found on the steeper side slopes, and *Q. douglasii* on gentle to moderately steep south-trending slopes. Leaf-off imagery will indicate deciduous *Quercus kelloggii* vs. evergreen *Q. wislizeni*.

Quercus kelloggii Alliance (1312)



DISTRIBUTION: Stands of *Quercus kelloggii* are primarily mapped at higher elevations along the eastern edge of the Southern Sierra Nevada Foothills Proper subarea. There are few sites mapped in the Horsethief Mountain subarea. No sites are mapped in the San Emigdio Range subarea.

Quercus kelloggii Alliance (1312)



Quercus lobata Alliance (1313) (Upland)
Valley oak woodland and forest Alliance



Aerial view of an open upland stand of evenly spaced *Quercus lobata* with a grassland understory.



Ground view of a stand of large *Quercus lobata* individuals over a grassland understory.

***Quercus lobata* Alliance (1313) (Upland)**

DESCRIPTION: *Quercus lobata* is the dominant large tree in upland (non-riparian) settings. *Quercus kelloggii* or *Quercus douglasii* may be co-dominant. Stands are found on slopes or in broad valleys with no riparian influence. This alliance is mapped in open woodland settings on undulating topography with little or no riparian influence. Cover density increases with steepness and closer proximity to mid and lower slopes where intermittent streams may occur.

In the Horsethief Mountain subarea, the *Quercus lobata* Alliance (upland) is mapped in fairly high elevations (approximately 4200-4500 feet) in Oak Flat along the western edge of the Tehachapi Range. In this area they occur in deep soil on lower slopes, usually adjacent to stands dominated by *Quercus douglasii*. Extensive stands have also been mapped on gently undulating topography southeast of Sycamore Canyon at slightly lower elevations. In this same general region, stands are mapped at high elevations up to 4600 feet on undulating to moderately steep topography south of the Cummings Valley. It is also mapped in several locations on upper canyons west of Castac Valley in the San Emigdio Range subarea. This upland expression of *Quercus lobata* is not mapped in the Southern Sierra Nevada Foothills Proper subarea.

PHOTO INTERPRETATION SIGNATURE: The signature is similar to *Quercus lobata* stands found in riparian settings except cover tends to be lower and further away in proximity to riparian species such as *Salix* spp., *Fraxinus latifolia*, or *Populus fremontii*. In more open settings on nearly level topography, individual trees can have crowns approaching 25 meters in diameter. On these larger trees, individual sub-crowning can be observed on most imagery. In upland settings, signature tree color tends to lean more toward the blue-grays with less of a green hue. Crown openings are often visible, exposing the grassland understory beneath portions of the trees. In some circumstances, *Q. lobata* can follow the broad, deep-soiled ridgelines while on adjacent lower side slopes with a less developed soil layer, *Q. douglasii* may dominate. These shallower soiled side slopes may again be replaced by *Q. lobata* on the lower slopes where soil profiles are again deeper.

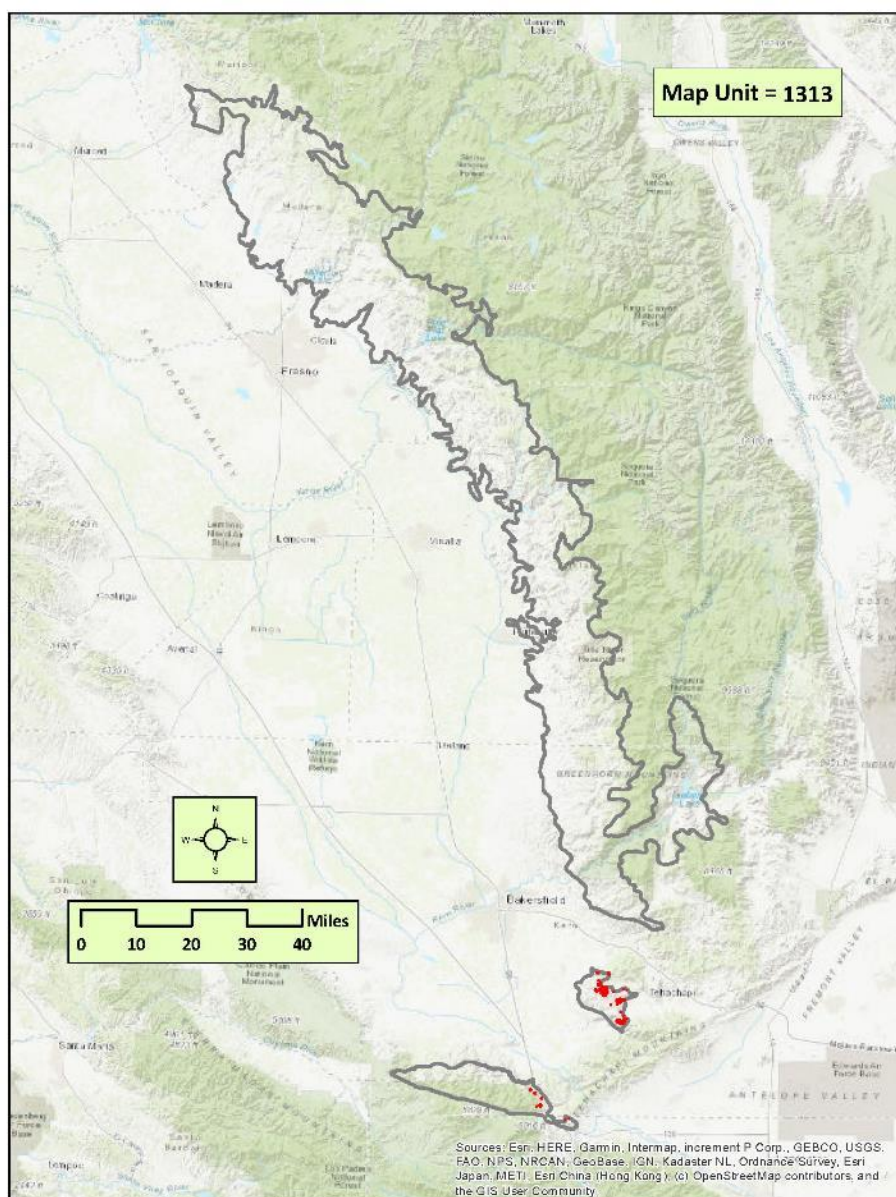
TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

- *Quercus chrysolepis* Alliance (1410) – *Quercus chrysolepis* tends to occur on lower canyon bottoms and steeper side slopes in high elevation settings. In elevations above 4000 feet, *Q. lobata* may follow a ridgeline along the upper margins of an adjacent north-trending cove where *Q. chrysolepis* dominates. *Q. chrysolepis* tend to form a denser woodland cover, often over 60%. Individual crowns are denser and form distinct margins along the crown edge. Overall color of the *Q. chrysolepis* crown is greener; typical of a live oak signature.
- *Quercus douglasii* Alliance (1311) – *Quercus douglasii* occurs in a slightly lower range of elevations than upland *Q. lobata*, however elevation overlap is substantial. *Q. douglasii* are found in drier settings, generally on steeper mid-slope topography. Crowns are significantly smaller and more open, and rarely cover more than 30% of the ground. Upland *Q. lobata* most likely develop

***Quercus lobata* Alliance (1313) (Upland)**

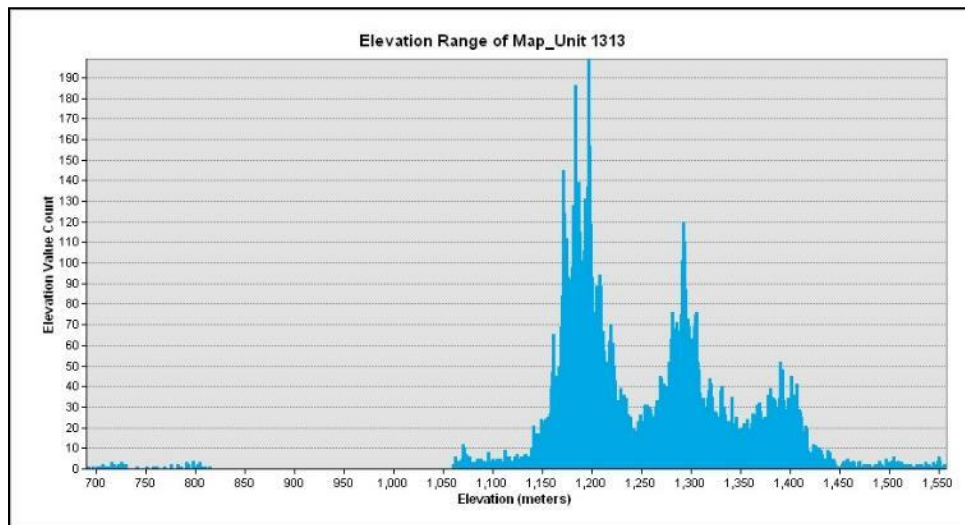
in areas of higher rainfall since there are no mechanisms of easily attaining moisture from the ground on upper slopes. Stands of *Q. lobata* on these upper slopes are unlikely in areas receiving less rainfall, especially along desert margins where *Q. douglasii* and *Q. john-tuckeri* dominate.

***Quercus lobata* Alliance (1313) (Upland)**



DISTRIBUTION: Upland *Q. lobata* stands are mapped exclusively in the Horsethief Mountain subarea and the eastern part of the San Emigdio Range subarea. No sites are mapped in the Southern Sierra Nevada Foothills subarea.

Quercus lobata Alliance (1313) (Upland)



Quercus lobata Riparian Alliance (3314)
Valley oak riparian woodland and forest Alliance



Aerial view of a dense stand of Riparian *Quercus lobata* near Lebec in the I-5 corridor.



Ground view of a dense closed-canopy stand of riparian *Quercus lobata* over grasses adjacent to a stream. Note the light filtering through the tree canopy.

***Quercus lobata* Riparian Alliance (3314)**

DESCRIPTION: *Quercus lobata* is the co-dominant to dominant tree in riparian settings. *Quercus wislizeni*, *Fraxinus latifolia*, *Q. chrysolepis*, *Salix laevigata*, and/or *Alnus rhombifolia* may co-dominate. Riparian influences may be minor including draws, drainages, ditches, or areas where water may collect. Other riparian species are typically present, however in areas that have been disturbed (i.e., grazing) other riparian species may be absent and the shrub layer is dominated by *Toxicodendron diversilobum*, *Rhus trilobata*, and/or *Rubus armeniacus*. *Salix lasiolepis* and/or *Salix laevigata* may be present or co-dominate in the understory. Where *Populus fremontii* or *Platanus racemosa* co-dominates, the stand is considered as those alliances, respectively. In larger riparian settings, photo interpreters were able to separate out higher less frequently flooded stands of *Q. lobata* from the true riparian species adjacent but closer to the stream channel. *Q. lobata* stands were noted where soils appeared deep, usually where annual grasses were denser and had a significant weedy component.

Riparian *Quercus lobata* stands are common and mapped primarily in the mid to higher elevations throughout the Southern Sierra Nevada Foothills Proper subarea, with the exception of the Lake Isabella region where it is not mapped. In the San Emigdio Mountains portion of the study area, the alliance is limited in extent to narrow canyons, best developed in the Grapevine Canyon near Lebec and O'Neil Canyon by Frazier Park. Stands are also mapped in deep soil riparian bands in the western foothills of the Tehachapi Range in the Horsethief Mountain subarea.

PHOTO INTERPRETATION SIGNATURE: *Quercus lobata* has a blue-green color and is easily recognizable on early (spring) season imagery in leaf flush conditions. Crowns are often very large and more diffuse than that of *Q. wislizeni*. Subtle differences in environmental settings aided photo interpreters in separating out small patches of *Q. lobata* where *Quercus douglasii* and *Q. wislizeni* occurred nearby. Photo interpreters noted soil depth as a more important indicator of *Q. lobata* presence than proximity to stream channel, especially in smaller watershed environments. *Q. lobata* is mapped in broad open woodlands more frequently at lower elevations and is more commonly found in riparian settings at higher elevations. Mid elevations tended to have the least amount of *Q. lobata*. Leaf-off image will differentiate between deciduous *Q. lobata* and live oaks *Q. wislizeni* and *Q. chrysolepis*.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

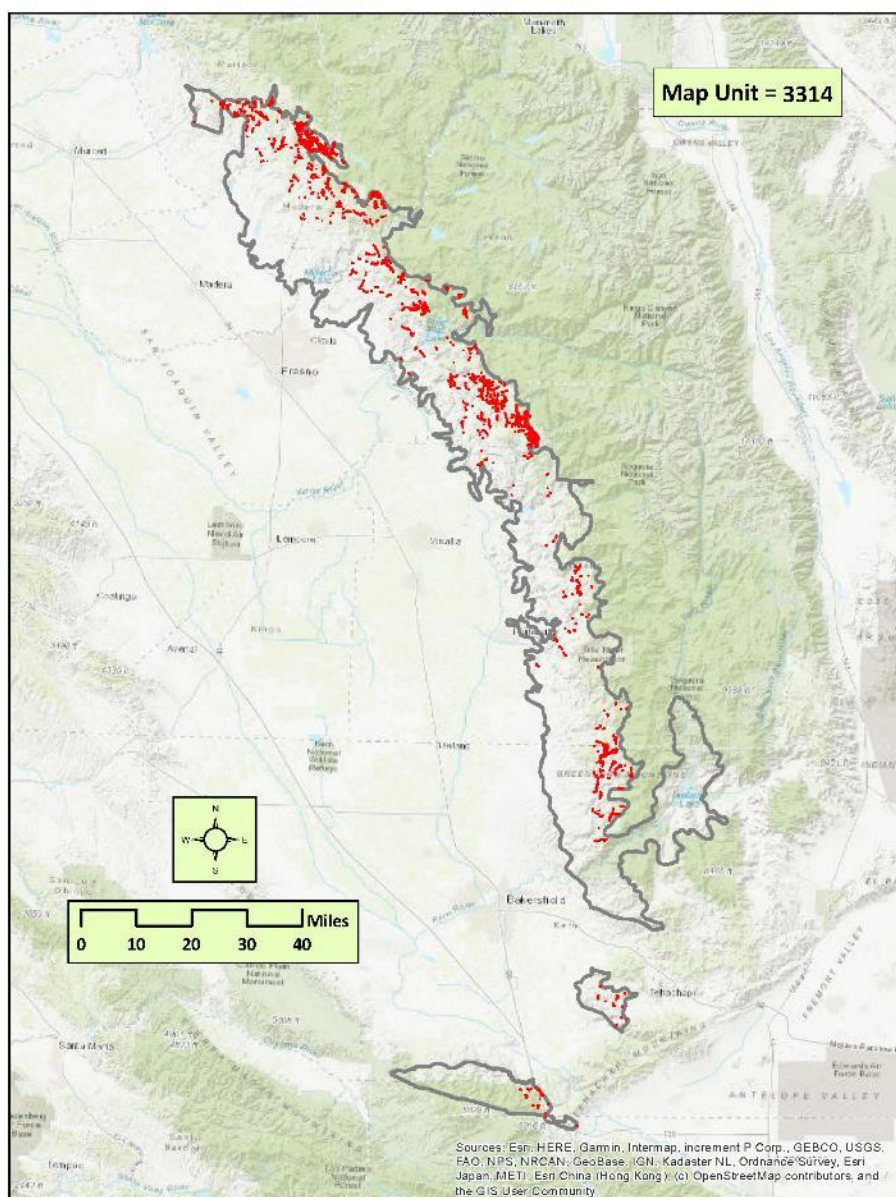
- *Platanus racemosa* – *Quercus agrifolia* Alliance (3310) – *Platanus* is a common associate to riparian corridors, typically occurring directly adjacent to the main channel, whereas *Q. lobata* occurs along the slightly drier fringe of the floodplain. Typically, signatures are distinguishable between the *P. racemosa* and the *Q. lobata* hardwoods, especially with leaf-off imagery where *Platanus* is often taller, with an irregularly shaped open crown with whiter branches, and a dirty brown undertone of dead leaf litter. *Q. lobata* on leaf-on imagery will have a more rounded crown with a darker green color. However, in drainages with incised or narrowly confined channels, portions of the *P. racemosa* crowns may be

***Quercus lobata* Riparian Alliance (3314)**

obscured by larger *Quercus lobata* individuals, which make it difficult to quantify relative abundance.

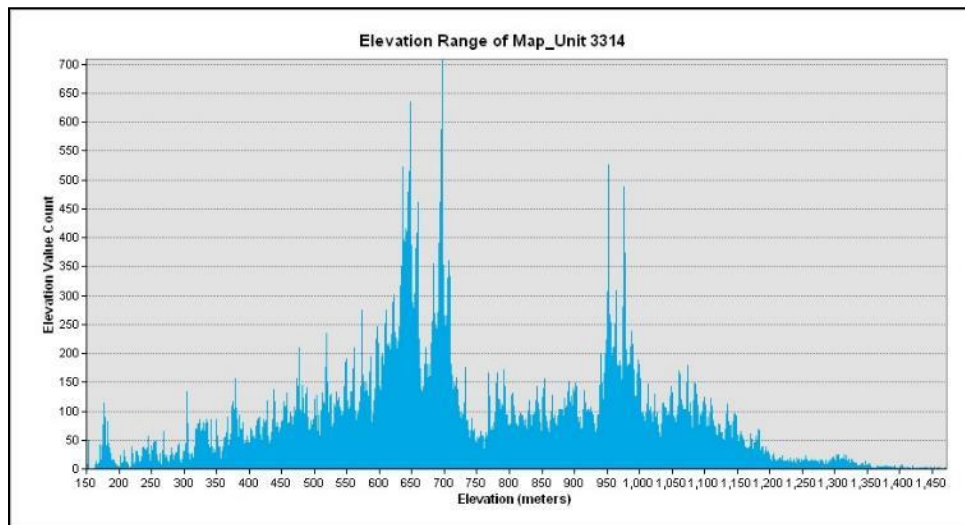
- *Populus fremontii* – *Fraxinus velutina* – *Salix gooddingii* Alliance (3114) – Mature stands of *Populus fremontii* can be separated out fairly reliably by its large and open crown and dull green color. *Populus* tends to have light gray to white branching and can be identified from other riparian species fairly easily using early season leaf-off imagery. *Quercus lobata* has a similar-sized crown and is also fairly open. Colors tend to be darker green with a broader spreading crown with irregular margins. *Quercus lobata* also prefers less well-drained very deep soils and will therefore usually have a dense herbaceous understory often composed of weedy annuals. *Rubus armeniacus* is also a common understory associate to *Quercus lobata*.
- *Quercus douglasii* Alliance (1311) – *Quercus douglasii* shares the diffuse nature of the *Q. lobata* crown but is usually much smaller. Subtle differences in environmental settings aided photo interpreters in separating out small patches of *Q. lobata* from *Q. douglasii* that occurred nearby. *Q. lobata* prefers deeper soils in the riparian and terrace zone, whereas *Q. douglasii* tends to favor toe slopes and steeper uplands. *Q. lobata* also has a darker green signature with larger shadows within the crown compared to blue-green of *Q. douglasii*. On leaf-off imagery *Q. lobata* displays prominent trunks of the upper crown. Photo interpreters rarely noted significant overlap between the two species other than broad valleys with rolling terrain where the two could intermix.
- *Quercus kelloggii* Alliance (1312) – *Quercus kelloggii* can have a similar color, and both species have openings in the crown structure; however, crowns are usually smaller and less rounded. Stands of *Q. kelloggii* tend to occur just upslope from *Q. lobata* on north-trending slopes. Co-occurrence of the two species tends to overlap in very narrow zones often below the MMU.
- *Quercus wislizeni* – *Quercus parvula* (tree) Alliance (1111) – *Quercus wislizeni* has a smaller, denser more rounded crown, even when occurring in similar deep soil environments where *Q. lobata* is expected. Leaf-off image will differentiate between deciduous *Q. lobata* and the live oak *Q. wislizeni*.

Quercus lobata Riparian Alliance (3314)



DISTRIBUTION: Riparian *Quercus lobata* stands are common and mapped primarily in the mid to higher elevations throughout the Southern Sierra Nevada Foothills Proper subarea, with the exception of the Lake Isabella region where it is not mapped. They are also mapped in the Horsethief Mountain subarea, and the eastern portion of the San Emigdio Range subarea.

Quercus lobata Riparian Alliance (3314)



Quercus wislizeni – *Quercus parvula* (tree) Alliance (1111)

Interior live oak woodland and forest Alliance



Aerial view of a dense to open stand of *Quercus wislizeni* following a drainage and adjacent lower slope.



Ground view of a stand of *Quercus wislizeni* over a mixed herbaceous and shrub understory.

***Quercus wislizeni* – *Quercus parvula* (tree) Alliance (1111)**

DESCRIPTION: *Quercus wislizeni* (occurring as a tree) is dominant or co-dominant at greater than 30% relative cover, with other tree species in the overstory. *Pinus ponderosa*, *Pinus sabiniana*, *Aesculus californica*, *Quercus kelloggii*, *Quercus douglasii*, *Juniperus californica*, and *Salix laevigata* may co-dominate. *Quercus berberidifolia* and *Quercus chrysolepis*, if present, occur at low cover. If *Q. wislizeni* is co-dominant with *Umbellularia californica*, then the stand is considered as the *Umbellularia californica* Alliance. Where *Pinus monophylla* co-dominates, then the stand is considered as the *Pinus monophylla* – (*Juniperus osteosperma*) Alliance. *Q. wislizeni* can occur on steep rocky or thin-soil north-facing slopes, along riparian or semi-riparian drainages, and swales. It occurs on rocky knobs at lower elevations among grasslands and *Q. douglasii* woodlands. Stands of short stature *Q. wislizeni* from effects of post-burn, post-disturbance (clearing then regeneration), or nutrient-poor soils are mapped as the *Quercus wislizeni* (Short Stature) Mapping Unit. Adjacent patches or small stands of *Cercis occidentalis* may be subsumed into *Quercus wislizeni* - *Quercus parvula* (tree) Alliance. Chaparral shrubs, such as *Heteromeles arbutifolia*, *Arctostaphylos viscida*, *Arctostaphylos manzanita*, and *Toxicodendron diversilobum*, may occur as dense cover in the understory.

Quercus wislizeni stands are very ubiquitous and extensive from mid to high elevations, throughout the Southern Sierra Nevada Foothills Proper subarea. Within the San Emigdio Range subarea, stands are almost exclusively mapped in the Tehachapi Range. Stands in the San Emigdio Mountains itself are rare. In the Horsethief Mountain subarea, the alliance is mapped in higher elevations of the western portions of the Tehachapi Range on steep, relatively protected mid and upper slopes between 3000 and 5000 feet.

PHOTO INTERPRETATION SIGNATURE: Stands range from dark to medium green depending on leaf age, associate species, and to a lesser degree image color variability. In open settings, crowns are large and rounded, generally larger than *Q. douglasii*. In dense woodland cover, crowns tend to narrow and vary considerably within the stand. In most circumstances, individual tree crowns are denser than either *Q. douglasii* or *Q. kelloggii*. Leaf-off image will differentiate between deciduous oaks *Q. lobata*, *Q. douglasii*, and *Q. kelloggii*, and the live oak *Q. wislizeni*.

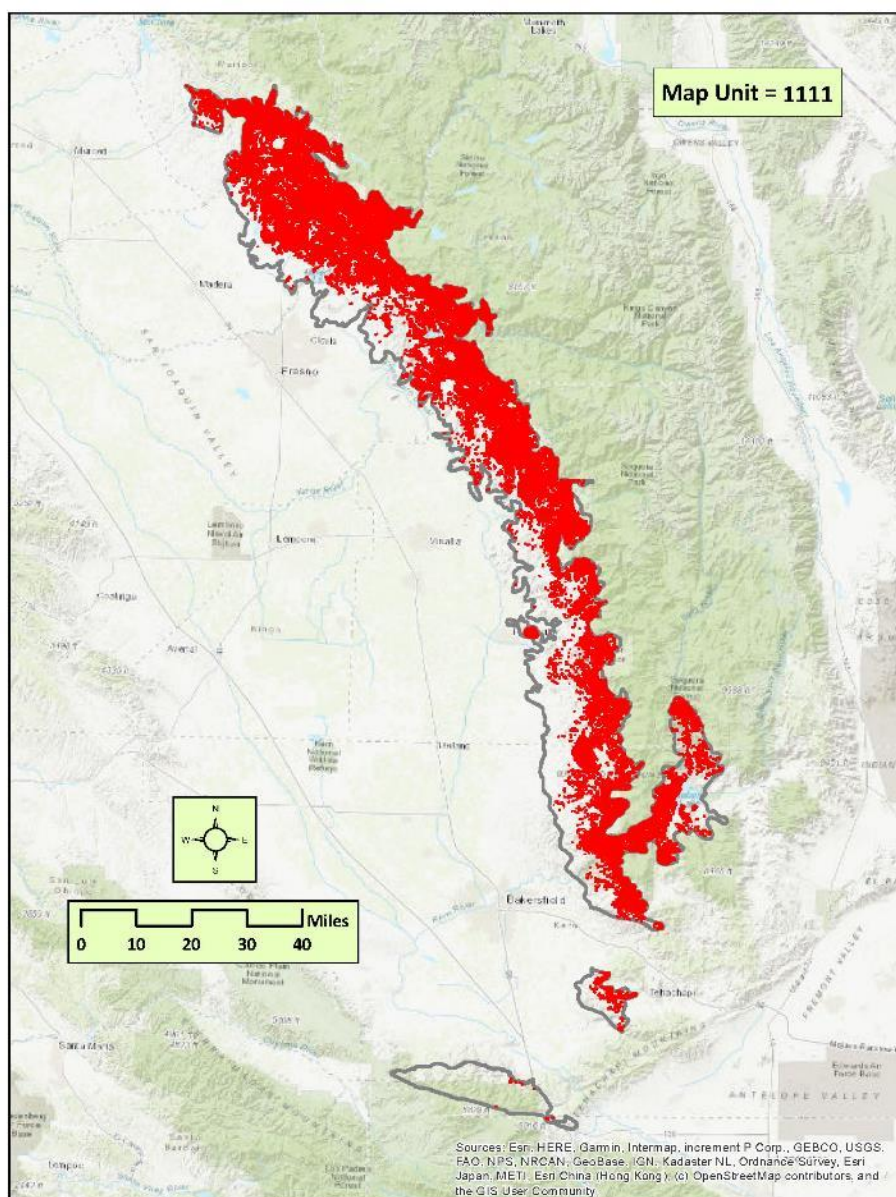
TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

- *Aesculus californica* Alliance (1310) – The *Aesculus* crown is brighter green in full leaf, yellow-brown when senescing, and white branching when leafless, whereas *Quercus wislizeni* has a distinct signature of a dark green evergreen canopy. The two species can occur together on the same north-facing rocky slope. In open settings it is difficult to quantify relative abundance. Generally, photo interpreters map to the *Aesculus californica* Alliance more often in a somewhat denser cover where it is easier to see overwhelming dominance of the *Aesculus*.

***Quercus wislizeni* – *Quercus parvula* (tree) Alliance (1111)**

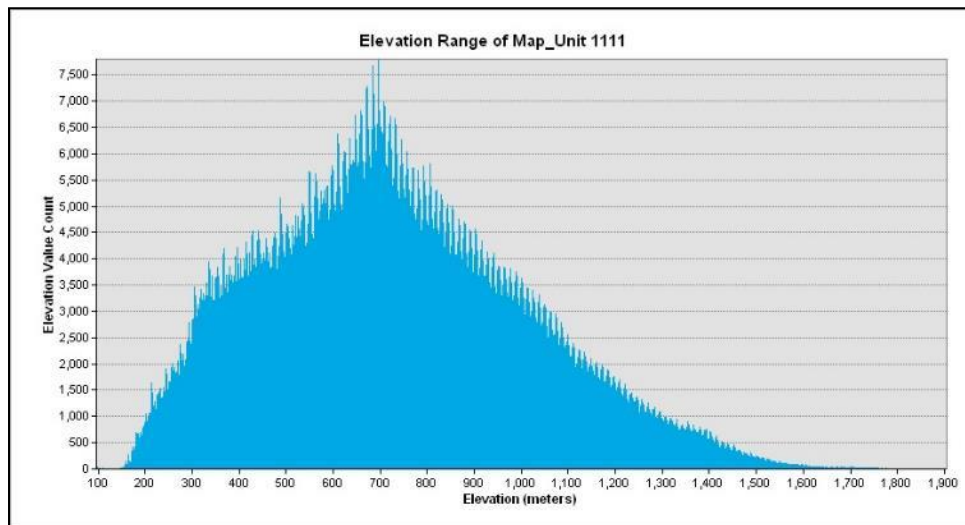
- *Juniperus californica* Alliance (1212) – *Juniperus californica* yields a medium green signature; crowns are consistently round with a well-defined crown margin. Crown density is high and transparency is minimal in all but the least healthy individuals. Stress to the stand dulls the signature color and tone making it sometimes difficult to discern individuals, especially in their characteristically open settings. *Quercus wislizeni* often forms denser cover, has a somewhat less rounded more irregular shape and larger crown, especially in open settings. *Q. wislizeni* generally is found in more mesic environments and rarely on ultramafic soils where *Juniperus* can occur.
- *Pinus sabiniana* Alliance (1210) – Typically signatures are distinguishable between the blue-gray of the tall *P. sabiniana* conifer and the dark to medium green of the shorter *Q. wislizeni* evergreen hardwood. However, photo interpreters can at times underestimate the oak component in dense stands of *Pinus sabiniana*, especially when oaks are hidden in the sub-canopy. In these situations, photo interpreters may classify the stand as *Pinus sabiniana* where ground-based assessments may classify the stand as an oak type.
- *Quercus chrysolepis* Alliance (1410) – *Quercus chrysolepis* has a brighter green color usually with a larger crown. When occurring near *Q. wislizeni* stands, *Q. chrysolepis* is found on steeper slopes closer to the canyon bottom in more protected settings, or adjacent on more northerly trending slopes.
- *Quercus douglasii* Alliance (1311) – Where *Q. douglasii* co-dominates the stand, one looks for presence of other tree species and overall cover densities. In denser stands with a diversity of species, photo interpreters generally mapped to the *Q. wislizeni* – *Quercus parvula* (tree) Alliance.
- *Quercus x alvordiana* – This is a hybrid between *Quercus douglasii* and *Quercus john-tuckeri* and can vary in form from tree-like to shrub-like, and can be somewhat deciduous to evergreen. It can be very difficult to tell from *Q. douglasii* or *Q. john-tuckeri* through photo interpretation. Stands that are tree-like in form are mapped as *Quercus douglasii* Alliance, while those of shrub form are mapped as *Quercus john-tuckeri* Alliance.
- *Quercus kelloggii* Alliance (1312) – *Quercus kelloggii* generally has a brighter green signature and overlaps along the higher elevation range of *Q. wislizeni*. Where stands co-dominate, photo interpreters generally mapped to the *Q. wislizeni* – *Quercus parvula* (tree) Alliance. Where the two stands co-occur, *Q. kelloggii* is found on gentler upper slopes trending northerly.
- *Umbellularia californica* Alliance (1110) – *Umbellularia californica* generally has a brighter green signature with narrower crowns and is nearly always found in a dense cover setting.

Quercus wislizeni – *Quercus parvula* (tree) Alliance (1111)



DISTRIBUTION: *Quercus wislizeni* stands are very ubiquitous and extensive from mid to high elevations, throughout the study area, with the exception of the San Emigdio Range subarea. There it is restricted to the north edge of the study area near Grapevine Canyon, in the east between Lebec and Gorman, and just below Tecuya Ridge.

***Quercus wislizeni* – *Quercus parvula* (tree) Alliance (1111)**



Salix gooddingii – *Salix laevigata* Alliance (3114)

Goodding's willow – Red willow riparian woodland and forest Alliance



Aerial view of a fairly dense stand of *Salix laevigata* along a riparian corridor.



Ground view of a stand of tree-stature *Salix laevigata* in a riparian setting over an herbaceous understory.

***Salix gooddingii* – *Salix laevigata* Alliance (3114)**

DESCRIPTION: *Salix gooddingii* or *Salix laevigata* are typically dominant in the canopy with at least 10% absolute cover. *S. laevigata* often occurs as a shrub and other willows may be co-dominant. *Juglans hindsii* may co-dominate. *Quercus wislizeni*, *Populus fremontii*, *Platanus racemosa*, and *Fraxinus latifolia* may be present at low cover, at less than 5% absolute cover. Where *Quercus lobata* or *Alnus rhombifolia* co-dominates with *Salix laevigata*, the stand is considered as those alliances, respectively.

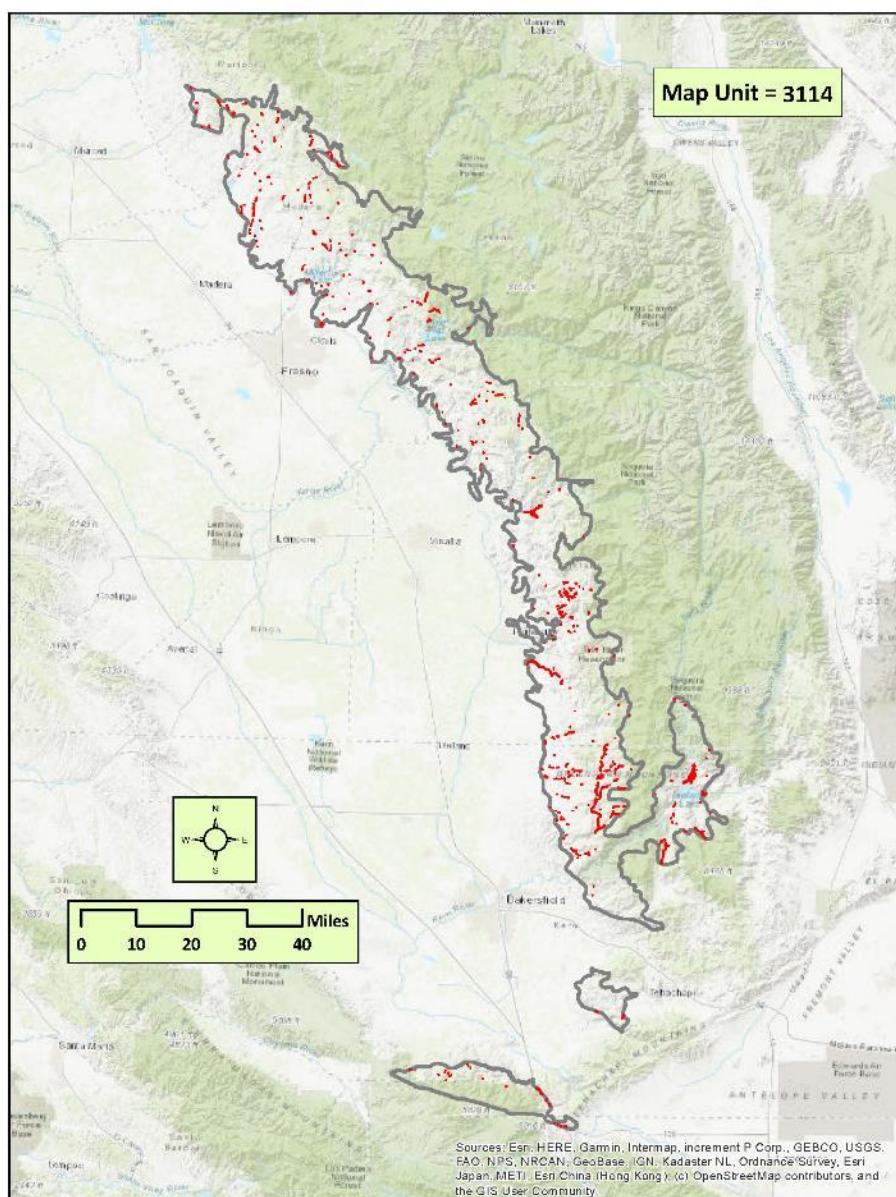
The *Salix gooddingii* – *Salix laevigata* Alliance is common as small stands throughout the Southern Sierra Nevada Foothills Proper subarea. In the Horsethief Mountain subarea it is limited to very small stands in the Tehachapi Range. It is sparsely distributed in the northern half of the San Emigdio Range subarea and along the lower elevation margins of the San Emigdio Mountains itself. Several better developed stands exist in Grapevine Canyon where there are small components of *Populus fremontii* and *Quercus lobata*.

PHOTO INTERPRETATION SIGNATURE: Mature *Salix laevigata* trees have a bright yellow-green color; younger thickets trend darker green. Where cover is dense, crowns tend to be small. Multiple crowning is also noted in individuals, especially in open stands. *S. laevigata* also prefers deep soil and an enhanced flowing water supply such as below stream confluences, springs, and seeps.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

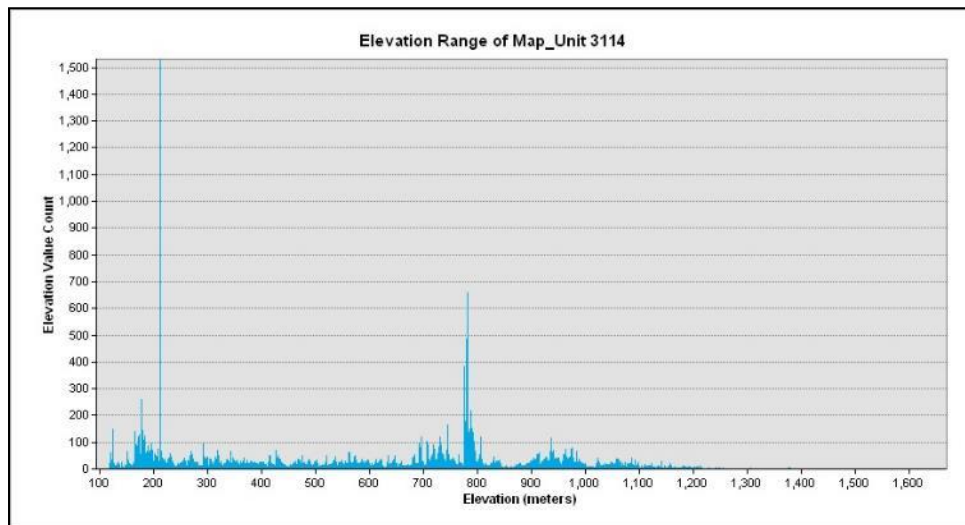
- *Populus fremontii* – *Fraxinus velutina* – *Salix gooddingii* Alliance (3110) – *Populus fremontii* tends to have larger more open crowns and overall has a duller green color. Both species often occur together in a stand, in these settings, photo interpreters mapped to the *Populus fremontii* – *Fraxinus velutina* – *Salix gooddingii* Alliance.
- *Salix lasiolepis* Alliance (6217) – *Salix lasiolepis* in most instances cannot be separated out from *S. laevigata*. *S. lasiolepis* generally does not grow to a large tree stature; *S. laevigata* stands can be quite tall, in these circumstances, photo interpreters can identify to the alliance level with greater confidence.
- *Fraxinus latifolia* Alliance (3211) – *F. latifolia* displays a similar color, generally shorter stature, and often mixes with *Salix laevigata*. *Salix laevigata* favors broader floodplains with soil, while *Fraxinus* prefers rocky streambeds with fast-moving streams.
- *Platanus racemosa* – *Quercus agrifolia* Alliance (3310) – *Platanus racemosa* tends to have a smaller less rounded and lighter green crown and is found either in wetter settings along the stream margin or in dry infrequently flooded margins of the floodplain where understory annual grasses can form dense cover. On leaf-off imagery, one may notice a brownish haze in the understory directly below the canopy indicating *Platanus* dead leaf litter. Also on this imagery, *Platanus* tends to have a more open, irregular crown.

Salix gooddingii – *Salix laevigata* Alliance (3114)



DISTRIBUTION: The *Salix gooddingii* – *Salix laevigata* Alliance is common as small stands throughout the Southern Sierra Nevada Foothills Proper subarea. It is restricted to 2 sites in the Horsethief Mountain subarea, and is sparsely distributed in the northern half of the San Emigdio Range subarea.

***Salix gooddingii* – *Salix laevigata* Alliance (3114)**



Southwestern North American riparian evergreen and deciduous woodland
Group (3100)



Aerial view of riparian tree and shrub post-burn regeneration after 2017 fire.

Ground photo is not available

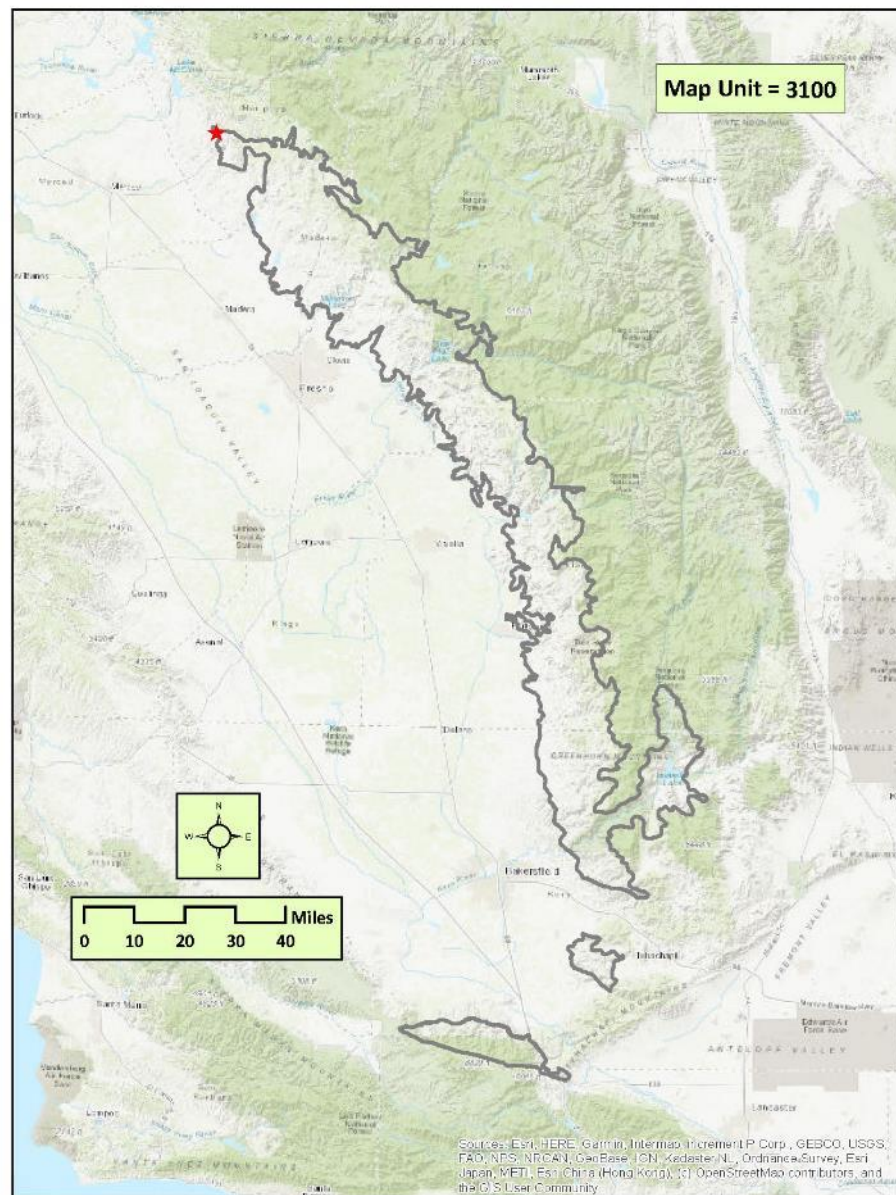
Southwestern North American riparian evergreen and deciduous woodland Group (3100)

DESCRIPTION: Stand dominated by riparian trees, such as *Salix laevigata*, *Salix gooddingii*, *Populus fremontii*, *Platanus racemosa*, *Quercus lobata*, and *Juglans hindsii*. Species and/or alliance identification with confidence is not possible due to disturbance factors, such as successional aspects of seral species and/or regeneration after a recent fire.

Stands of this Group are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project.

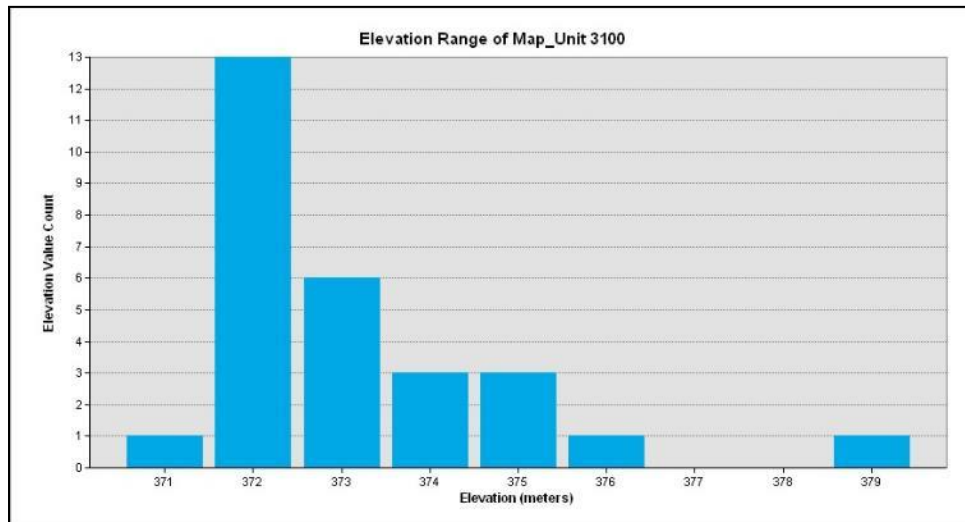
Only one polygon of this Group is mapped, located in a riparian corridor in the northernmost portion of the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Southwestern North American riparian evergreen and deciduous woodland Group (3100)



DISTRIBUTION: Only one polygon of this Group is mapped, located in a riparian corridor in the northernmost portion of the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Southwestern North American riparian evergreen and deciduous woodland Group (3100)



Umbellularia californica Alliance (1110)
California bay forest and woodland Alliance



Aerial view of a small stand of *Umbellularia californica* on a lower north-facing slope.



Ground view of a small stand of rather dense *Umbellularia californica* over young saplings, herbs, and dead branches and leaves.

***Umbellularia californica* Alliance (1110)**

DESCRIPTION: *Umbellularia californica* is strongly dominant, or co-dominant with *Quercus wislizeni* in the overstory as a tree or tall shrub. If *Umbellularia* is co-dominant with *Alnus rhombifolia*, *Arbutus menziesii*, or *Quercus chrysolepis*, then the stand is considered as those alliances respectively. Generally, occurs on steep north-facing slopes.

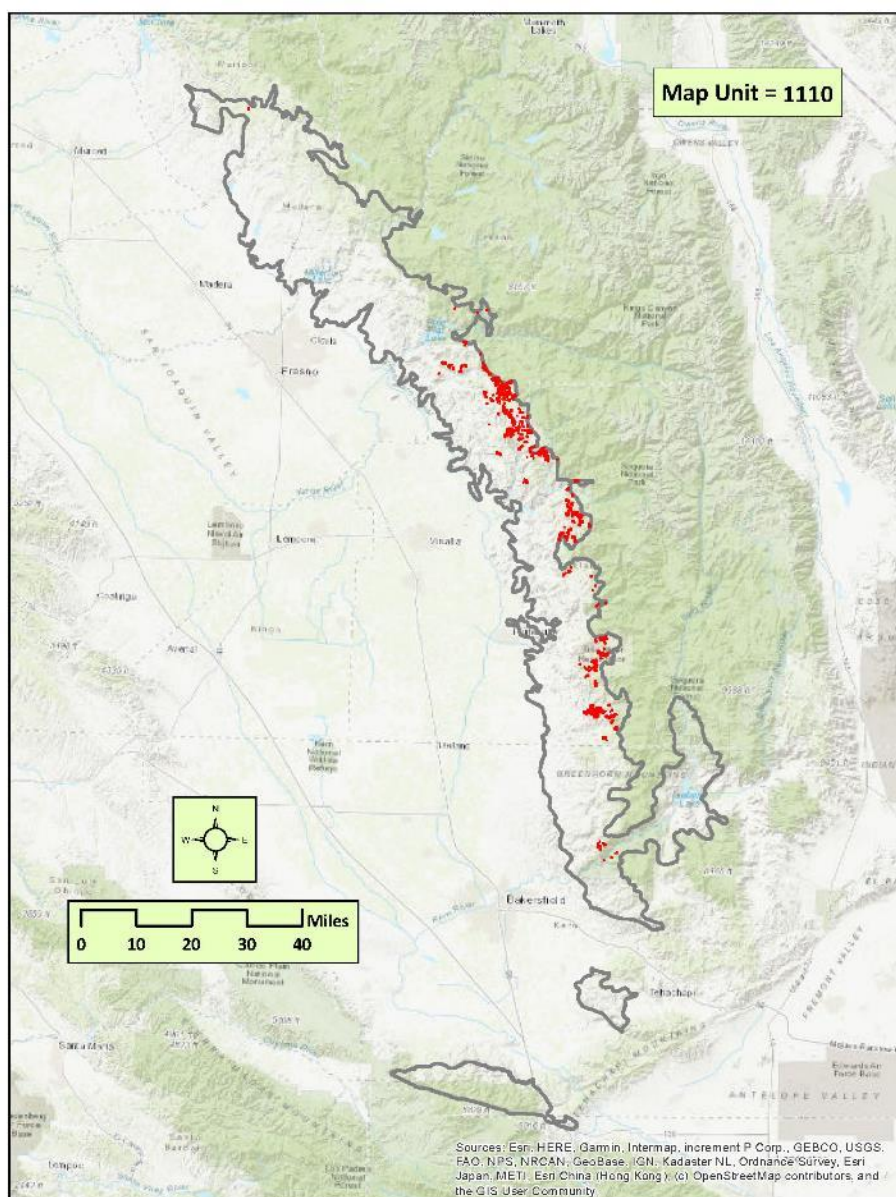
Umbellularia californica stands are mapped primarily in the higher elevations in the central portion of the Southern Sierra Nevada Foothills Proper subarea. They are not mapped in the northern portion, southernmost portion, or the Lake Isabella region of the subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: Narrow crowns generally consistent throughout the stand characterize this type; often with a bright green signature when adjacent to stands of dense *Quercus wislizeni*, which often retain their leaves during longer periods of time resulting in a darker green signature.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

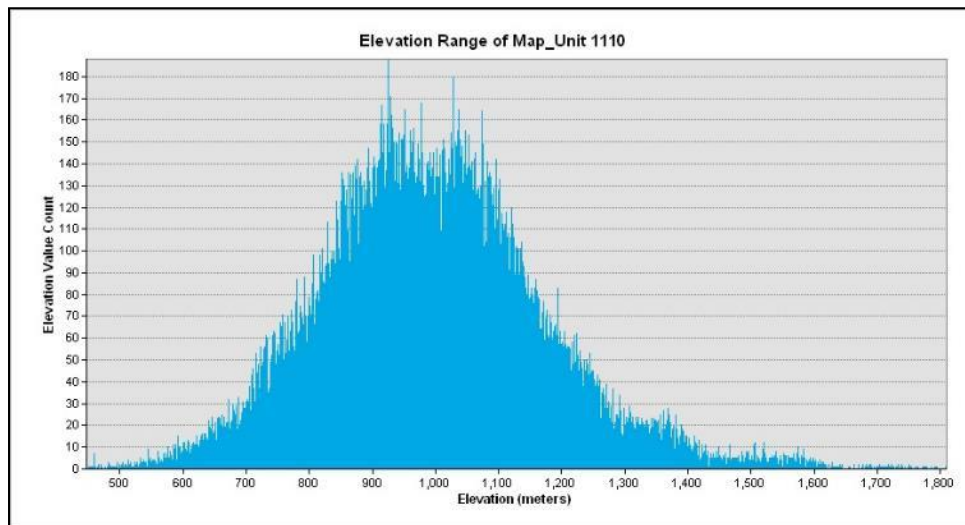
- *Quercus chrysolepis* Alliance (1410) – *Quercus chrysolepis* has a very similar bright green color with a rounded crown that can be very difficult to discern from *U. californica*. *Umbellularia* has a flatter bumpy crown texture, as opposed to the domed, billowy crown of *Q. chrysolepis*. The overlap zone of occurrence is narrow, between 2200-4000 feet in elevation.
- *Quercus wislizeni* – *Quercus parvula* (tree) Alliance (1111) – *Quercus wislizeni* generally has a darker green signature. *Umbellularia californica* generally has a brighter green signature with narrower crowns and is nearly always found in a dense cover setting.

Umbellularia californica Alliance (1110)



DISTRIBUTION: *Umbellularia californica* stands are mapped primarily in the higher elevations in the central portion of the Southern Sierra Nevada Foothills Proper subarea. They are not mapped in the northern portion, southernmost portion, or the Lake Isabella region of the subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Umbellularia californica Alliance (1110)



Yucca brevifolia Alliance (5423)

Joshua tree woodland Alliance



Aerial view of scattered short-statured *Yucca brevifolia* near Lake Isabella.



Ground view of single-stemmed short *Yucca brevifolia* scattered throughout a steep neutral slope in a shrubby matrix.

***Yucca brevifolia* Alliance (5423)**

DESCRIPTION: *Yucca brevifolia* is evenly distributed with at least 1% cover, *Juniperus californica* and/or *Pinus monophylla* are less than 1% absolute cover in the tree canopy. Although they usually only comprise between 1 and 5 percent cover, the highest cover of *Y. brevifolia* may reach 10% in clonal stands. This type is rare in the Foothills but may be found at the edge of the ecoregion in the Tehachapi Mountains and in the upper Kern River Watershed near Kelso Valley.

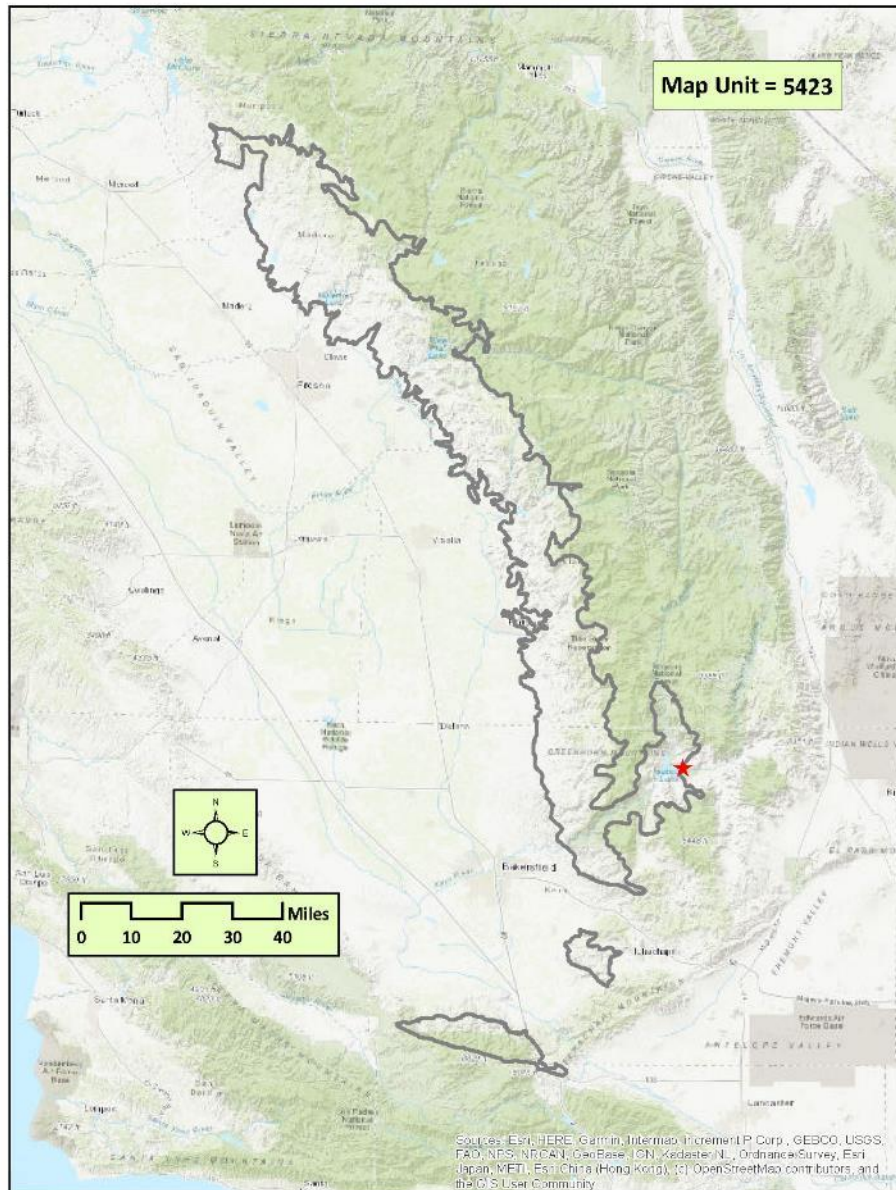
Only one stand is mapped, located at the edge of desert influence, at east side of Lake Isabella area in the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: Stands are typically sparse in cover and can be comprised of individuals with single or multiple crowns. Crown shape, size, and age may vary widely within a stand. The dull greenish gray individuals often produce shadowing that may appear linear from the base of the tree and is apparent on the image as a result of its single upright trunk and thick forking branches. Single-stem individuals below 3 meters tall are difficult to interpret even using high-resolution imagery.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

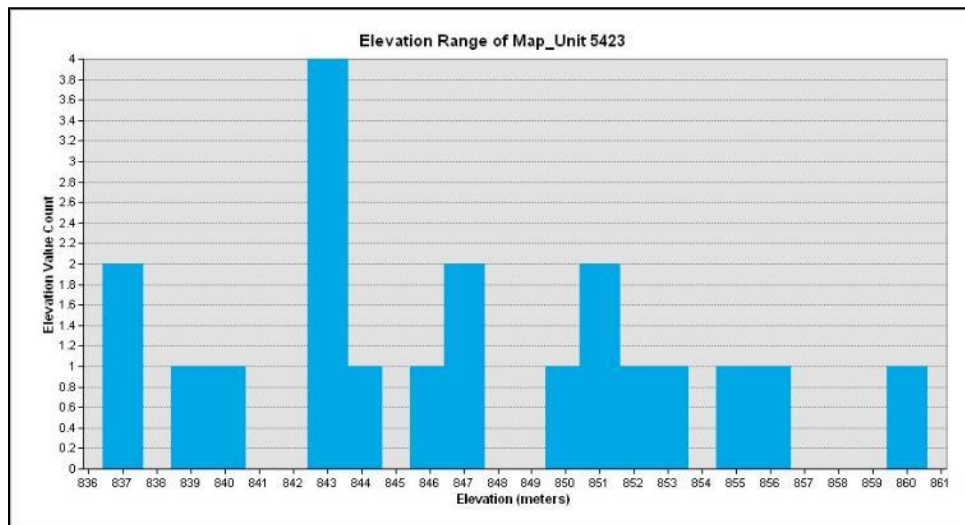
- None

Yucca brevifolia Alliance (5423)



DISTRIBUTION: Only one stand is mapped, located at the edge of desert influence, at east side of Lake Isabella area in the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Yucca brevifolia Alliance (5423)



Shrubs

Adenostoma fasciculatum Alliance (4111)
Arctostaphylos glauca Alliance (4118)
Arctostaphylos pungens – *Arctostaphylos pringlei* Alliance (4412)
Arctostaphylos viscida Alliance (4112)
Artemisia tridentata Alliance (5311)
Atriplex canescens (5111)
Atriplex polycarpa Alliance (5710)
Baccharis salicifolia Alliance (6210)
Ceanothus cuneatus Alliance (4113)
Ceanothus greggii – *Fremontodendron californicum* Alliance (6520)
Ceanothus integerrimus Alliance (6110)
Ceanothus leucodermis Alliance (4413)
Cephalanthus occidentalis – *Rosa californica* Alliance (6250)
 Calycanthus occidentalis Association (6216)
 Cephalanthus occidentalis Association (6214)
 Rosa californica Association (6401)
Cercocarpus montanus Alliance (4211)
Encelia (actonii, virginensis) – *Viguiera reticulata* Alliance (5211)
Ephedra californica – *Ephedra trifurca* Alliance (5620)
Ephedra viridis Alliance (5417)
Ericameria linearifolia – *Cleome isomeris* Alliance (4710)
Ericameria nauseosa Alliance (5212)
Eriogonum fasciculatum Alliance (4810)
Eriogonum fasciculatum – *Viguiera parishii* Alliance (5428)
Eriogonum wrightii – *Eriogonum heermannii* – *Buddleja utahensis* Alliance (4820)
Lepidospartum squamatum Alliance (5610)
Lotus scoparius – *Lupinus albifrons* – *Eriodictyon* spp. Alliance (4720)
Prunus fasciculata – *Salazaria mexicana* Alliance (5415)
Quercus berberidifolia Alliance (4210)
Quercus garryana (shrub) Alliance (6111)
Quercus john-tuckeri Alliance (6510)
Quercus wislizeni (Short Stature) Mapping Unit (4410)
Rhus trilobata – *Crataegus rivularis* – *Forestiera pubescens* Alliance (6230)
 Rhus trilobata Association (6231)
Ribes quercetorum – *Rhus trilobata* – *Frangula californica* Alliance (6440)
 Frangula californica ssp. *tomentella* Association (4501)
 Rhus trilobata Sierran Association (6218)
 Ribes quercetorum Association (6420)
 Sambucus nigra Association (6219)
Rubus armeniacus – *Sesbania punicea* – *Ficus carica* Semi-Natural Alliance (6213)
Salix exigua Alliance (6211)
Salix lasiolepis Alliance (6217)
Tamarix spp. Shrubland Semi-Natural Alliance (6212)
Toxicodendron diversilobum Alliance (6301)
Vitis arizonica – *Vitis girdiana* Alliance (6220)

Adenostoma fasciculatum Alliance (4111)

Chamise chaparral Alliance



Aerial view of an even-aged stand of *Adenostoma fasciculatum* on a moderately steep neutral east-facing slope with dirt roads and trails traversing through. View is north of Kernville.



Ground view of a dense stand of *Adenostoma fasciculatum* with some dead or distressed branching throughout. Emergent *Pinus sabiniana* is in the background.

***Adenostoma fasciculatum* Alliance (4111)**

DESCRIPTION: *Adenostoma fasciculatum* is dominant to co-dominant in the overstory with other chaparral species such as *Arctostaphylos manzanita*, *Heteromeles arbutifolia*, and disturbance related chaparral species such as *Eriodictyon californicum* and *Lotus scoparius*. If *Adenostoma* co-dominates with *Arctostaphylos viscida*, *Ceanothus* spp., or shrubby oak species, then the stand is considered as those alliances, respectively. Where *Adenostoma* characterizes an open to continuous shrub overstory with or without *Salvia sonomensis* in the understory, and *Arctostaphylos viscida* is co-to-sub-dominant, but sometimes merely present or absent, then the stand is considered the *Arctostaphylos viscida* Alliance (found primarily on gabbro).

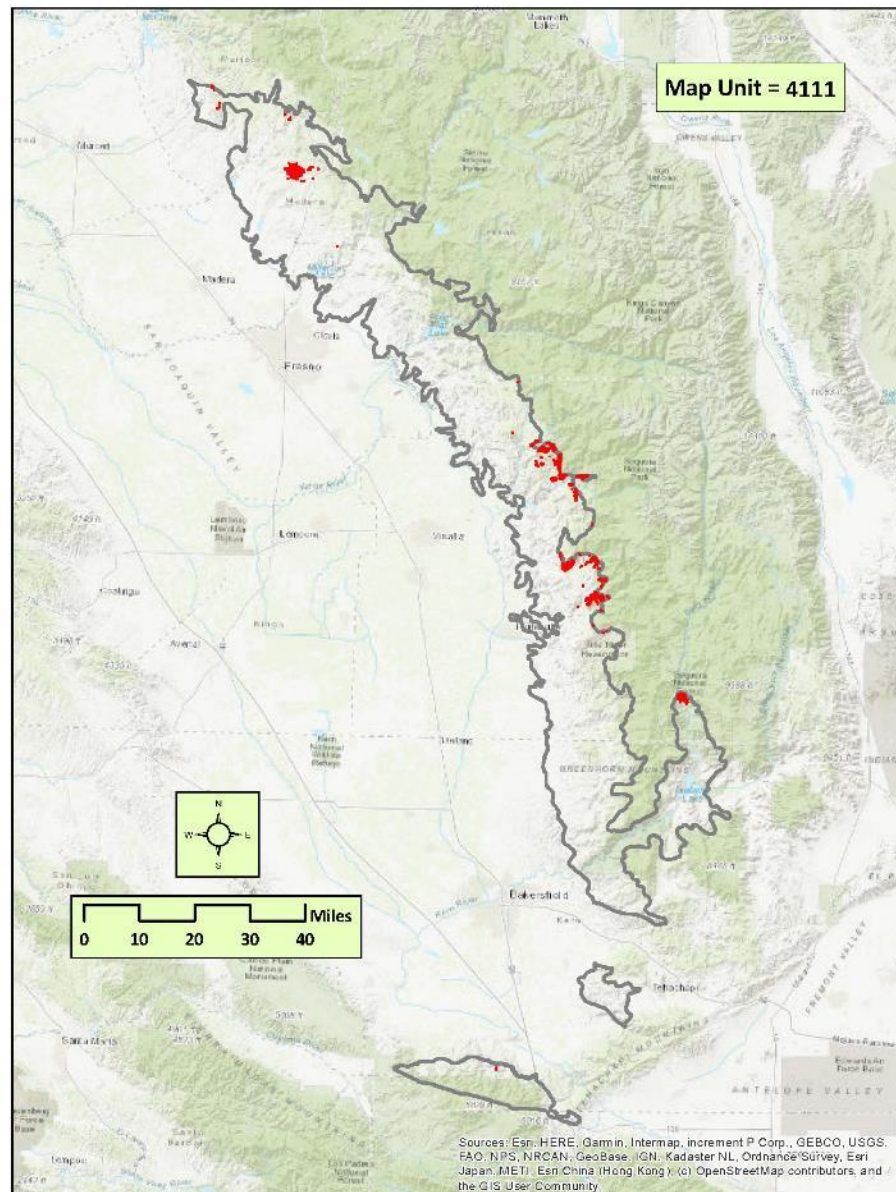
The *Adenostoma fasciculatum* Alliance is rare in San Emigdio Mountains, as only one stand is mapped near the Harris Ranch site in the foothills around 4000 feet. This type is uncommon in the Southern Sierra Nevada Foothills Proper subarea. Occurrences there are mapped as a few localized clusters in Springville, north of Lake Isabella in the Kernville area, and slopes above the Kaweah River between Shadequarter Mountain and Case Mountain. North of the Shadequarter area cluster, there is a noticeable 64-mile gap where *Adenostoma* is absent until another concentrated cluster occurs just north of the confluence of the Fresno River and Spangle Gold Creek. The Fresno River conglomeration occurs at an elevation of about 1300 feet, although most of the other occurrences are at higher elevations between 3000-4000 feet. There are no sites mapped in the Horsethief Mountain subarea.

PHOTO INTERPRETATION SIGNATURE: *Adenostoma fasciculatum* tends to form mostly homogenous stands where signature variability fluctuates minimally throughout the stand. Stand cover is the primary factor in affecting image signature in most settings. Chamise has a characteristic signature in most seasons; in early summer, signature color trends a dark brown with a slightly reddish hue due in part to the numerous dead inflorescence characteristic to the post-flower season.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

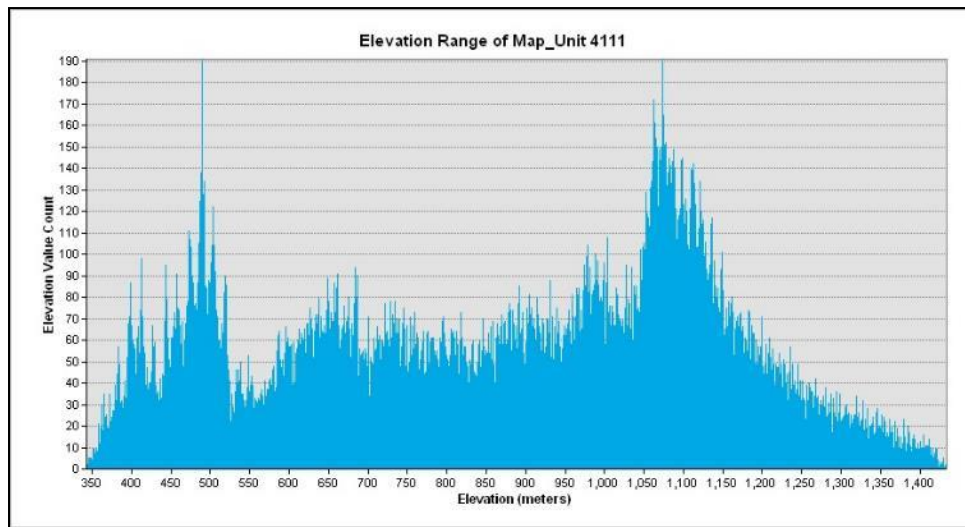
- *Arctostaphylos viscida* Alliance (4112) – *Arctostaphylos viscida* tends to have a slightly brighter signature with a darker gray, or more of a burgundy color overall. *Arctostaphylos* crown cover is generally less diffuse with well-defined crown margins. Color infrared imagery often yields a lighter pink, which may reflect how the *Arctostaphylos* leaf grows at perpendicular angles to the sun. This characteristic also makes it extremely difficult to discern manzanita, especially when it exhibits lower cover and *Adenostoma* is dense.

***Adenostoma fasciculatum* Alliance (4111)**



DISTRIBUTION: Occurs in selected clusters along the higher elevations of the Southern Sierra Nevada Foothills Proper subarea. One isolated cluster is mapped in the Lake Isabella area north of Kernville. Only one polygon is mapped in the northern foothills of the San Emigdio Range subarea. There are no sites mapped in the Horsethief Mountain subarea.

Adenostoma fasciculatum Alliance (4111)



Arctostaphylos glauca Alliance (4118)

Bigberry manzanita chaparral Alliance



Aerial view of intermittent to open stand of *Arctostaphylos glauca* on east and west flank of a ridge and adjacent spurs.



Ground view of *Arctostaphylos glauca* showing a dense crown and characteristic red bark, on an upper slope.

***Arctostaphylos glauca* Alliance (4118)**

DESCRIPTION: *Arctostaphylos glauca* is dominant in the shrub canopy, though other shrubs may be present with low cover. Shrub cover is open to intermittent and herb cover is sparse.

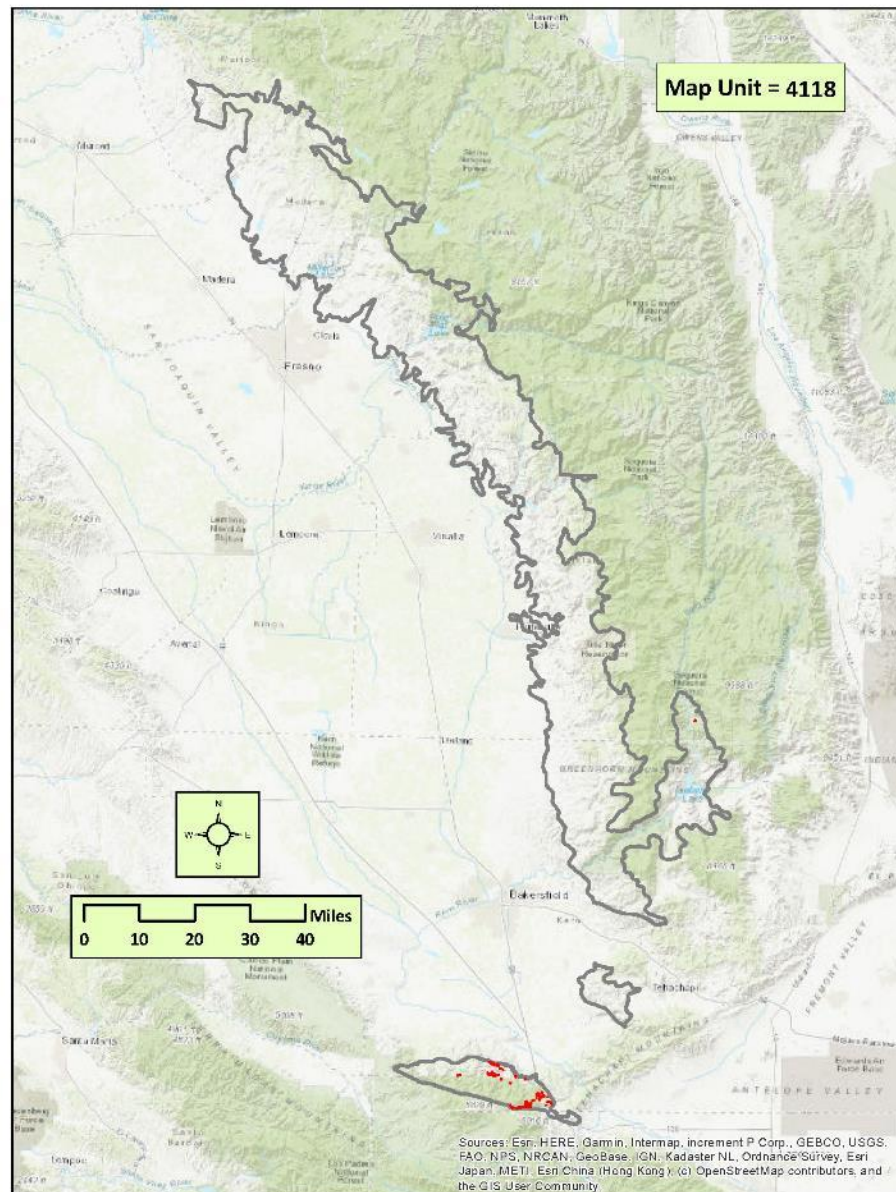
Only one stand is mapped in the Southern Sierra Nevada Foothills Proper subarea, in the Lake Isabella area north of Kernville, based on field data. *Arctostaphylos glauca* is mapped in lower elevations, generally on the southern slopes of the San Emigdio Range subarea near Grapevine Canyon and west to the Lake of the Woods development. Stands occur less frequently on similar settings on the north side of the San Emigdio Mountains also. Stands are moderately dense, however less so than most other chaparral types. Stands occur on thin gravelly soils with minimal herbaceous cover. *Eriogonum fasciculatum* is a frequent component to the shrub layer. As with other manzanita species, this alliance follows gentle to moderately sloping ridgelines and adjacent spurs forming narrow discontinuous bands of vegetation throughout its range. No sites are mapped in the Horsethief Mountain subarea.

PHOTO INTERPRETATION SIGNATURE: Crowns are somewhat rounded with a narrowly defined dark brown color. Individual shrubs have distinct edges that contrast vividly with the adjacent light-colored gravelly substrate.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

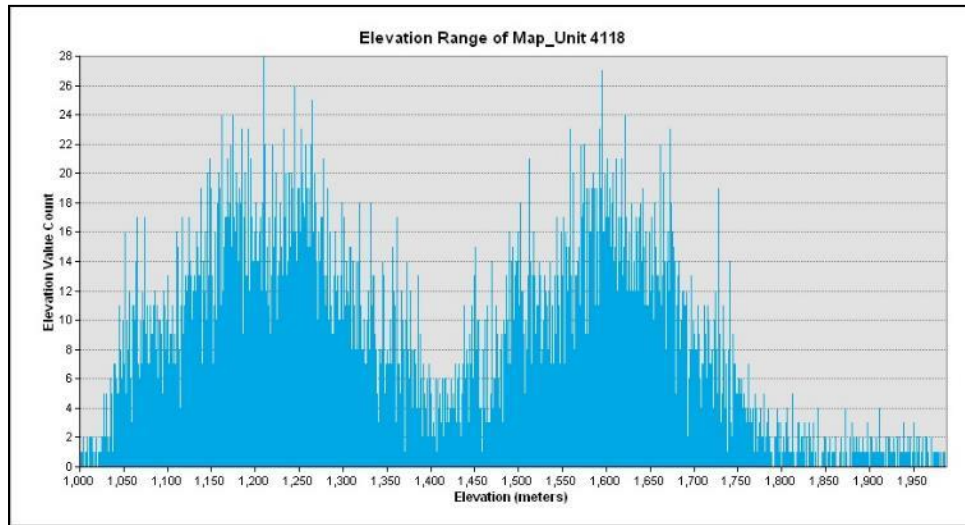
- *Arctostaphylos pungens* – *Arctostaphylos pringlei* Alliance (4412): Stands dominated by *Arctostaphylos parryana* occur at higher elevations, often adjacent to dense stands of *Pinus monophylla*. Overall cover tends to be significantly higher than *A. glauca*, often creating a dense fairly smooth textured mat that trends more toward a green color.
- *Arctostaphylos viscida* Alliance (4112) – *Arctostaphylos viscida* is the most commonly mapped manzanita in Southern Sierra Nevada Foothills Proper subarea, usually occurring in the mid to upper elevations of the study area. Signature differences between the three mapped manzanita species in this project are very similar and difficult to discern from one another. However, in San Emigdio Range subarea, there is only one stand of *A. viscida* mapped, along the northernmost portion of subarea. *A. pungens* – *A. pringlei* Alliance and *A. glauca* Alliance are more commonly mapped in the San Emigdio Range subarea. Regional modelling based on verified ground data was used to predict overall trends between manzanita species.
- *Quercus john-tuckeri* Alliance (6510): Stands adjacent to *A. glauca* can be difficult to distinguish. Shrubs dominated by this oak species are irregularly shaped while shrubs dominated by *A. glauca* are rounded. Oak shrubs are not as dark brown and tend to be less bright in a color. Stands dominated by *Q. john-tuckeri* are generally higher in cover.

Arctostaphylos glauca Alliance (4118)



DISTRIBUTION: Only one stand is mapped, based on field data, in the Southern Sierra Nevada Foothills Proper subarea in the Lake Isabella area north of Kernville. This alliance is fairly common in the eastern half of the San Emigdio Range subarea. There are no sites mapped in the Horsethief Mountain subarea.

***Arctostaphylos glauca* Alliance (4118)**



Arctostaphylos pungens – *Arctostaphylos pringlei* Alliance (4412)
Pointleaf manzanita – Pink-bract manzanita chaparral Alliance



Aerial view of low-growing *Arctostaphylos parryana* on a smooth rocky to thin-soiled flat in the San Emigdio Range.



Ground view of low-growing mounded individuals of *Arctostaphylos parryana* on thin gravelly soil.

***Arctostaphylos pungens* – *Arctostaphylos pringlei* Alliance (4412)**

DESCRIPTION: *Arctostaphylos parryana* is dominant in the shrub canopy, though other shrubs may be present with low to moderate cover. Found in the San Emigdio Mountains and occasionally in the Tehachapi Mountains.

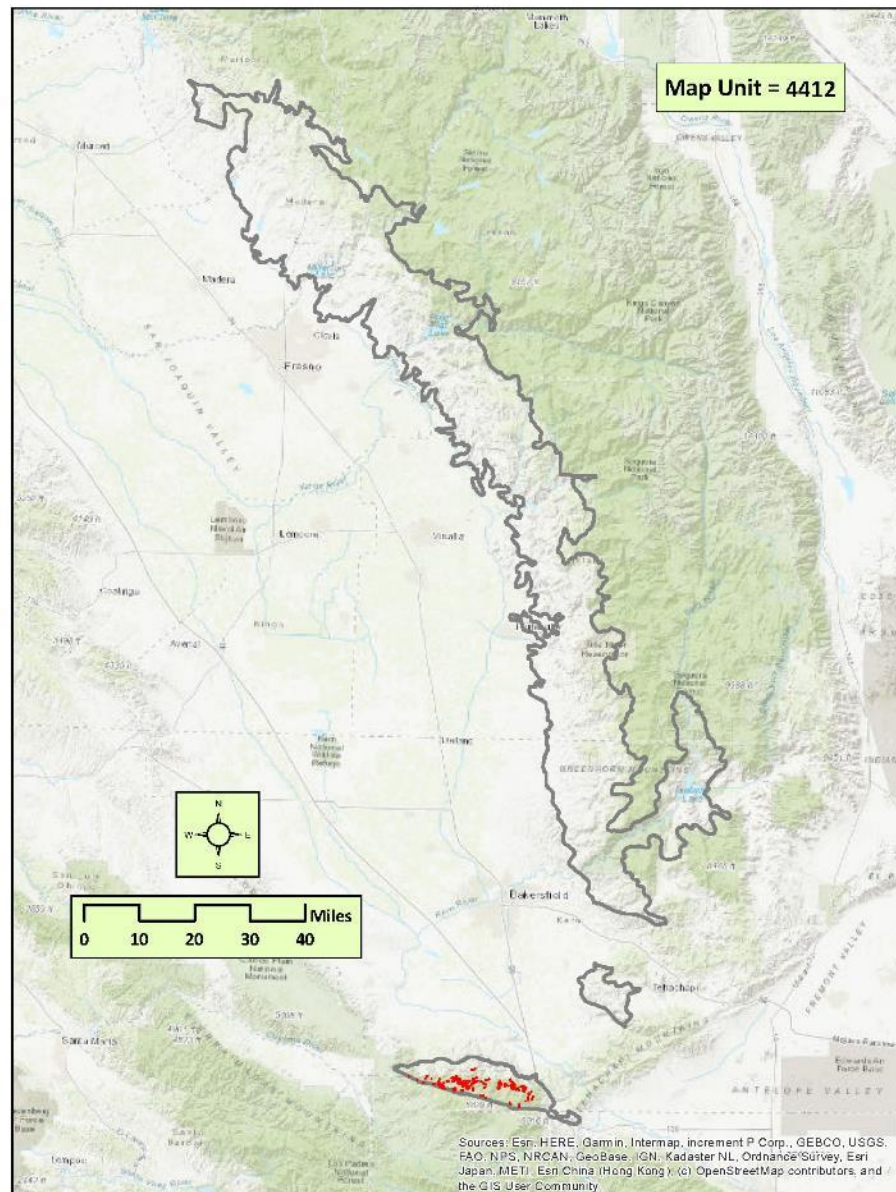
Stands are mapped at moderate elevations on the southern slopes of the San Emigdio Mountains and are represented in this alliance mostly with *Arctostaphylos parryana*. In the San Emigdio Range subarea, this species follows typical settings of other *Arctostaphylos* species and is most frequently seen on ridges and adjacent spur lines and upper slopes. Shrubs are found in discontinuous to closed cover, often with emergent *Pinus monophylla*. There were no occurrences of the *A. pungens* – *A. pringlei* Alliance in the Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas.

PHOTO INTERPRETATION SIGNATURE: Vegetation dominated with *Arctostaphylos parryana* often tend to occur in high cover, sometimes forming continuous mats over small areas. Individual shrubs range from dark brown to green (depending on leaf density) and tend to be brighter in color than other species in the stand. Crowns are rounded with definitive margins. Adjacent substrate supports a sparse herbaceous cover and is generally light gray to white. Overall signature is usually derived from the reddish-brown-colored stems branching rather than the leaf canopy due to the way this genus tends to hold leaves more perpendicular to the sun, showing less leaf area, but allowing a view to the stems.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

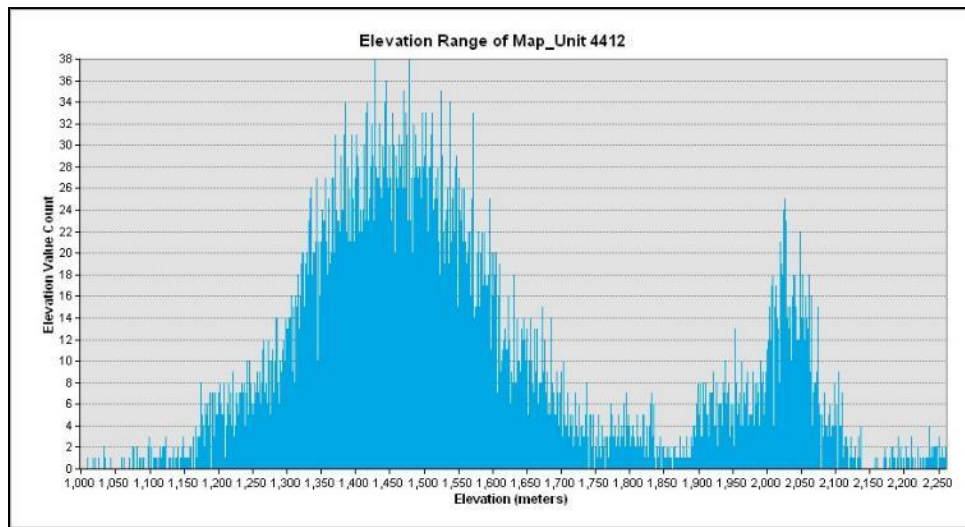
- *Arctostaphylos glauca* Alliance (4118): Occurs at lower elevations in similar locations often just downslope. Differentiating the two *Arctostaphylos* species without reliable models is not possible. Although signature color overlap is substantial, *A. glauca* has a darker brown crown, contrasts slightly more against the brightly colored white substrate, and often has a component of *Q. john-tuckeri*.

***Arctostaphylos pungens* – *Arctostaphylos pringlei* Alliance (4412)**



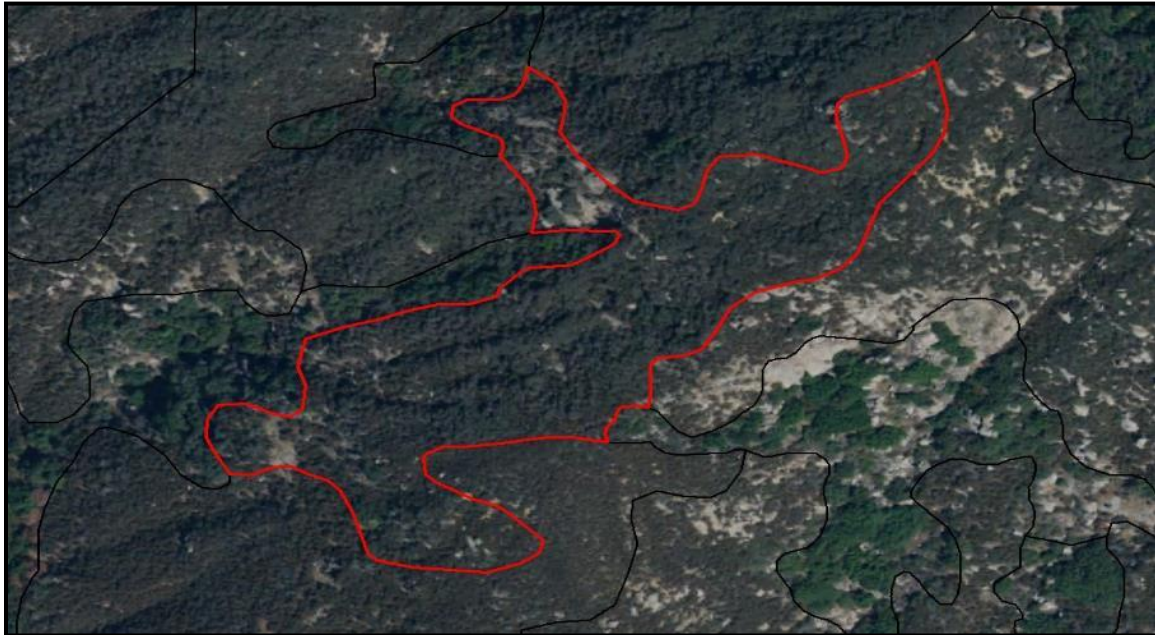
DISTRIBUTION: There are no mapped occurrences in the Southern Sierra Nevada Foothills Proper and the Horsethief Mountain subareas. This alliance is common in the San Emigdio Range subarea.

***Arctostaphylos pungens* – *Arctostaphylos pringlei* Alliance (4412)**



Arctostaphylos viscida Alliance (4112)

Whiteleaf manzanita chaparral Alliance



Aerial view of a fairly dense stand of *Arctostaphylos viscida* on upper slopes and ridges.



Ground view of a dense stand of *Arctostaphylos viscida* on an upper slope and ridgetop. Note the characteristic light gray foliage and red bark.

***Arctostaphylos viscida* Alliance (4112)**

DESCRIPTION: *Arctostaphylos viscida* intermixes with a variety of associated shrubs, including *Adenostoma fasciculatum*, *Heteromeles arbutifolia*, and *Ceanothus* spp., in the canopy. In some cases, particularly in older stands on ultramafic substrate, *A. viscida* ranges from co-dominant to sub-dominant with some stands dominated at least locally by *Adenostoma fasciculatum*. Where *Adenostoma* characterizes an open to continuous shrub overstory with or without *Salvia sonomensis* in the understory, and *Arctostaphylos viscida* is co-to-sub-dominant, but sometimes merely present or absent, then the stand is considered the *Arctostaphylos viscida* Alliance (found primarily on gabbro). Where *Cercocarpus montanus* co-dominates on mesic slopes, the stand is considered as *Cercocarpus montanus* Alliance.

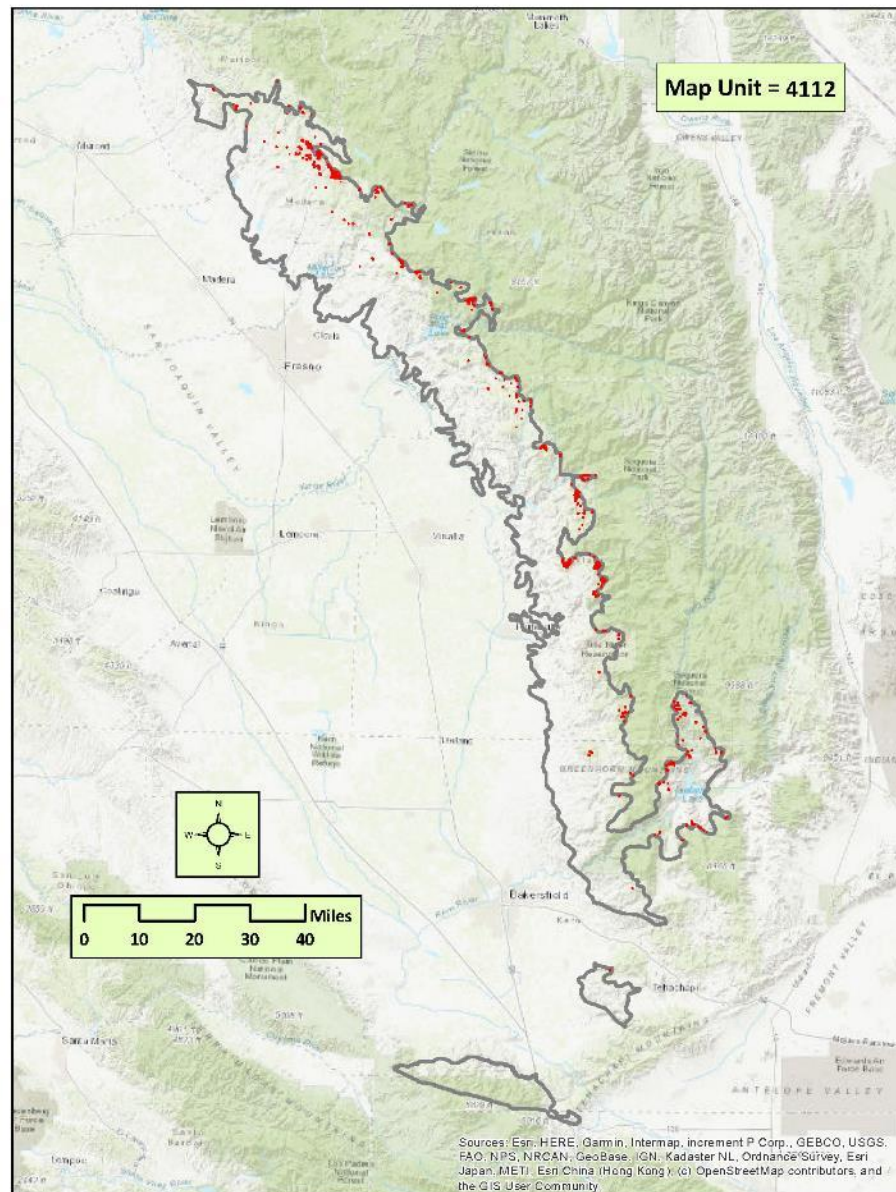
Arctostaphylos viscida Alliance is the most commonly mapped manzanita type in the Southern Sierra Nevada Foothills Proper subarea, usually occurring in the mid to upper elevations of the study area. Signature differences between the three mapped manzanita species in this project are very similar and difficult to discern from one another. However, in the Horsethief Mountain subarea there is only one mapped stand of the *A. viscida* along the northernmost portion of the subarea. *A. pungens* – *A. pringlei* Alliance and *A. glauca* Alliance are more commonly mapped there. Regional modelling based on verified ground data was used to predict overall trends between manzanita species. No sites are mapped in the San Emigdio Range subarea.

PHOTO INTERPRETATION SIGNATURE: *Arctostaphylos viscida* where it dominates the stand in dense cover has a characteristic steel blue-gray to a brown or burgundy color signature that can appear hummocky over the stand. Crown edges are well-defined in open settings. *Arctostaphylos* stems tend to play a significant role in image signature due to the nature of the leaf which is held somewhat perpendicular to the sun, showing less leaf area, but allowing a view to the stems.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

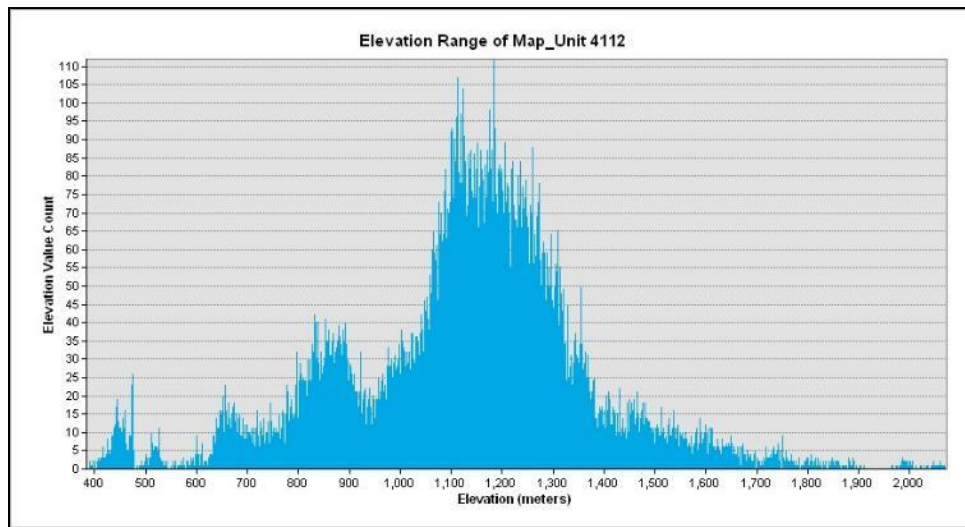
- *Adenostoma fasciculatum* Alliance (4111) – *Arctostaphylos viscida* tends to have a slightly brighter signature with a darker gray color overall. *Arctostaphylos* crown cover is generally less diffuse with well-defined crown margins. Color infrared imagery often yields a lighter pink which may reflect how the *Arctostaphylos* leaf grows at perpendicular angles to the sun. This characteristic also makes it extremely difficult to discern manzanita, especially when it exhibits lower cover and *Adenostoma* is dense.
- *Quercus garryana* (shrub) Alliance (6111) – *Quercus garryana* commonly occurs on protected north-facing facets above 3000 feet, and interface with *A. viscida* on gradually undulating hills along the transition from the upper third of the northerly slopes to the hilltop. *Q. garryana* coalesces into dense patches with a smooth dark green color, fairly distinctive from the *A. viscida* signature. Therefore, signature confusion arises when determining relative cover, due to below-MMU inclusions, and in diversely mixed chaparral settings.

Arctostaphylos viscida Alliance (4112)



DISTRIBUTION: Common at highest elevations throughout the Southern Sierra Nevada Foothills Proper subarea. There is only one mapped stand in the Horsethief Mountain subarea, along the northernmost portion of the subarea. No sites are mapped in the San Emigdio Range subarea.

***Arctostaphylos viscida* Alliance (4112)**



Artemisia tridentata Alliance (5311)

Big sagebrush Alliance



Aerial view of a stand of *Artemisia tridentata* with intermittent and evenly distributed cover on a flat, with an adjacent stand of *Juniperus californica* to the north.



Ground view of an *Artemisia tridentata* stand in the foreground with open to intermittent cover on a gentle slope, with an herbaceous understory. Note the silvery blue-gray color of the plants.

***Artemisia tridentata* Alliance (5311)**

DESCRIPTION: *Artemisia tridentata* is dominant in the shrub layer. *Ceanothus* spp., *Ericameria nauseosa*, *Eriogonum fasciculatum*, *Eriogonum wrightii*, or *Ribes quercetorum* may be co-dominant. Other shrubs are typically present at low cover. Trees such as *Juniperus californica*, *Quercus douglasii*, and *Pinus monophylla* may be emergent. Where *Atriplex polycarpa* has greater cover than *Artemisia* in co-dominance, then the stand is considered as *Atriplex polycarpa* Alliance. Where *Cercocarpus montanus* co-dominates, the stand is considered as *Cercocarpus montanus* Alliance.

In the Southern Sierra Nevada Foothills Proper subarea, *A. tridentata* stands are primarily mapped on hilltops and ridgelines along the Greenhorn Mountains, clustered on north-facing slopes along Erskine Creek southeast of Lake Isabella (3200-4800 feet), as well as another concentration west of the lake in a gently rolling shelf called Waggy Flat near French Gulch (4400 feet). There is also a sprinkling of stands on protected slopes north of the lake in the Kernville area.

In the San Emigdio Range subarea, *Artemisia tridentata* is mapped primarily on low to mid slopes and floodplain margins in the foothills of the mountains. It is also mapped on lower slopes in Cummings and Bear Valley in the Tehachapi Mountains of the Horsethief Mountain subarea. Stands prefer cold air basins and drainages, and are mapped on deep soil in moderately dense to dense cover. In warmer, drier desert margins it interfaces with *Atriplex polycarpa*. On warmer slopes above cold air drainages, it is often replaced by *Eriogonum fasciculatum*. It is frequently a shrub component to *Pinus monophylla* woodlands. In floodplains it is occasionally found adjacent to *Lepidospartum squamatum* on less cobbly substrate.

PHOTO INTERPRETATION SIGNATURE: Signature color varies depending on leaf age, phenology, and health, and ranges from gray to a medium dark blue. Most stands fall within the blue-gray range. Shrubs are medium-sized, for example, smaller than *Arctostaphylos* and larger than *Eriogonum*. In dense cover, stand texture is hummocky. Canopy cover across a typical stand is variable, but much less so than *Ericameria nauseosa*.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

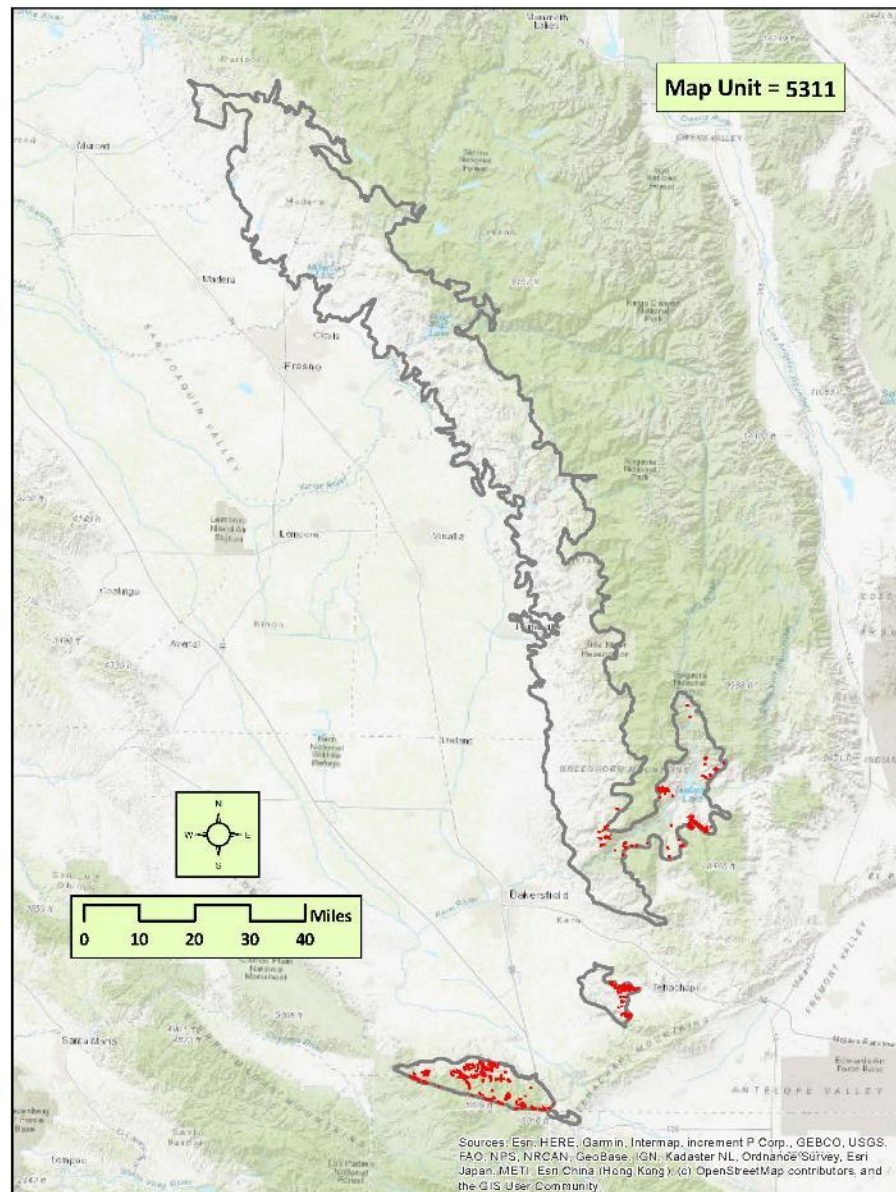
- *Arctostaphylos viscida* Alliance (4112) – *Arctostaphylos viscida* exhibits a broader crown than *A. tridentata*, and stands are more likely found on ridgelines and hilltops, whereas the latter interfaces on the lower to upper slope north faces.
- *Ceanothus cuneatus* Alliance (4113) – *Ceanothus cuneatus* has a broader round crown with a dull to dark gray color. *A. tridentata* will usually have a bluer cast and a smaller, more irregular crown margin. Diverse stands with both species present in dense stands are very difficult to discern individual species dominance.
- *Cercocarpus montanus* Alliance (4211) – *Cercocarpus montanus* occurs on significantly steeper slopes on mid and upper positions. *C. montanus* has an

***Artemisia tridentata* Alliance (5311)**

overall darker signature with no blue trending hues. Individual shrubs are taller and crown edges, when found in pure stands are more distinct.

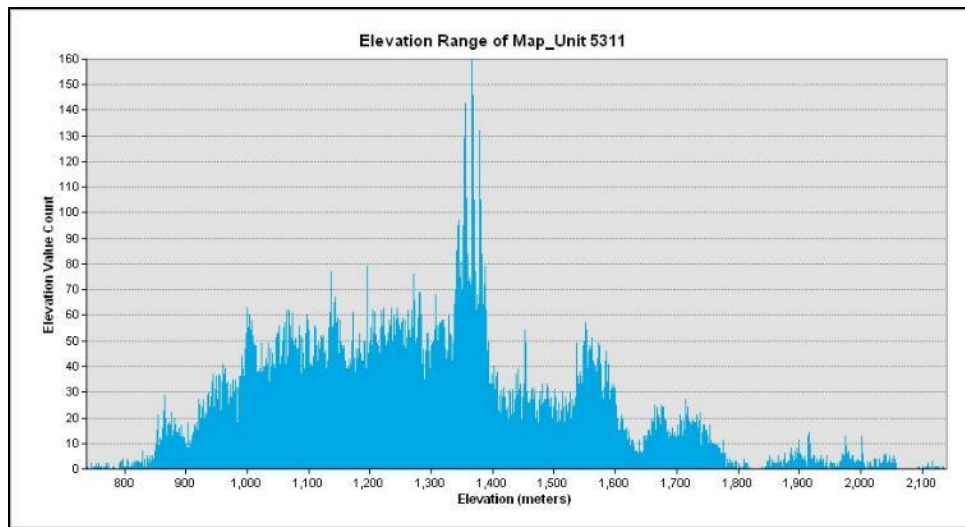
- *Ericameria nauseosa* Alliance (5212) – *Ericameria nauseosa* has a similar color signature but ranges broader both into the dark grays, and on the other end of the spectrum, more into the light blues. Healthy stands are a light blue to nearly white. Cover density across the stand is much more variable since it is often found in post-disturbance settings. Although this species does well in cold air basins, it can be found on mid and upper slopes in grassland settings also.
- *Lepidospartum squamatum* Alliance (5610) – *Lepidospartum squamatum* is found in well-drained cobbly, temporarily flooded streambeds and can be adjacent to *A. tridentata*. Signature color is generally dark brown to dark gray, never trending towards the blue range.
- *Ribes quercetorum* Association (6420) – Stands are generally strongly dominated with *Ribes quercetorum*, in cover that is very dense. Stands are usually patchy and often less than an acre in size. Distinctions can be made between the two alliances based on signature characteristics where *R. quercetorum* trends green to yellow-green and texture is more stipple-like.

Artemisia tridentata Alliance (5311)



DISTRIBUTION: In the Southern Sierra Nevada Foothills Proper subarea this alliance is common only in the hills surrounding Lake Isabella and along the Kern River. It is found on the eastern side of the Horsethief Mountain subarea, and occurs throughout the San Emidio Range subarea.

***Artemisia tridentata* Alliance (5311)**



Atriplex canescens Alliance (5111)

Fourwing saltbush scrub Alliance



Aerial view of an *Atriplex canescens* of intermittent cover along the flat bottom at the mouth of a canyon.



Ground view of *Atriplex canescens* in the foreground, with intermittent cover on flat sandy terrain, with some grasses in the understory.

***Atriplex canescens* Alliance (5111)**

DESCRIPTION: *Atriplex canescens* is dominant or co-dominant in the shrub layer along washes with other disturbance or wash indicator shrubs including *Ericameria nauseosa* and *Ambrosia salsola*.

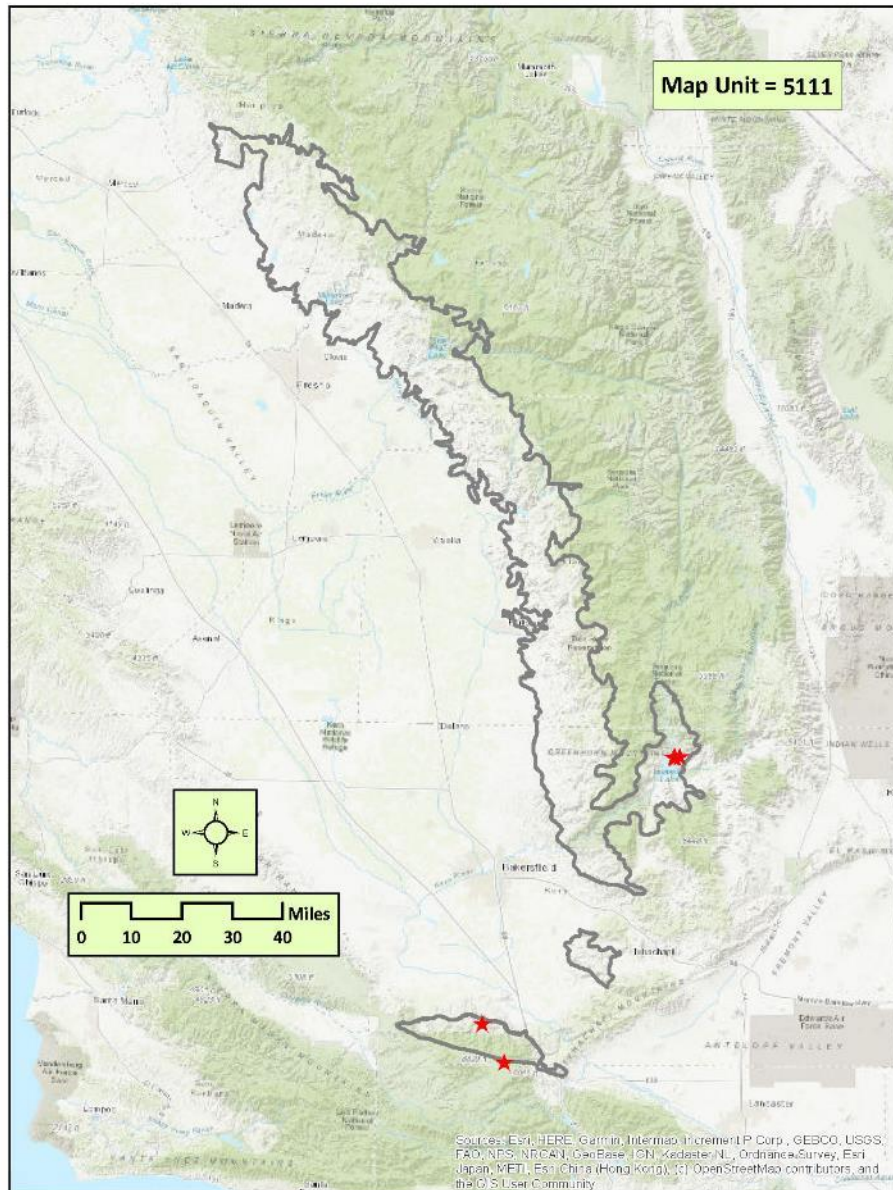
Only two *A. canescens* stands are mapped in the Southern Sierra Nevada Foothills Proper subarea on the disturbed grassy terrace margins east of Lake Isabella within the Cyrus Flat area. All stands are mixed with *Ericameria nauseosa*, which is more concentrated nearer to the active wash nearby. Two sites are mapped in the San Emigdio Range subarea. This alliance is not mapped in the Horsethief Mountain subarea. Most of these mapped polygons were derived from field verified ground data.

PHOTO INTERPRETATION SIGNATURE: *Atriplex canescens* individuals appear as rounded medium-sized shrubs with a gray to slightly green tinge when healthy, or a diffuse dull gray crown when decadent. Stands are much more confined to desert edge lower elevations and are usually limited in size. This species favors sandy soil and cover is patchy and variable.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

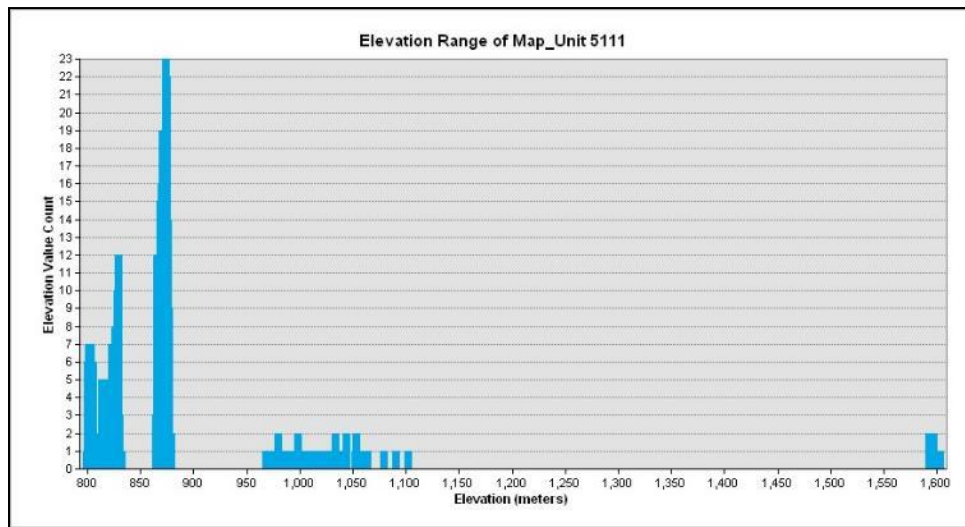
- *Atriplex polycarpa* Alliance (5710) – *A. polycarpa* has similar size, shape, and color ranges, but may have a slight bluer tinge to its crown. Both species can occur on disturbed flats or highly eroded floodplains and have similar distribution ranges. *A. polycarpa* tends to be positioned nearer to springs or surface water, whereas *A. canescens* is more likely to be perched on sandy substrates along the drier, grassier margin.
- *Ericameria nauseosa* Alliance (5212) – *Ericameria nauseosa* is also a medium-sized shrub and falls into a similar gray to blueish color range as *Atriplex canescens*. Both species can occur in the broader floodplain drainages and human disturbed flats. In more mature stands, *E. nauseosa* shrubs are generally less blue. Where both species mix, it can be quite difficult to differentiate based on signature alone.
- *Lepidospartum squamatum* Alliance (5610) – *Lepidospartum squamatum* is found in well-drained cobbly, temporarily flooded streambeds, and adjacent terraces. Typical signature characteristics are defined by medium-sized shrubs that are dull gray-brown in color and frequently tall enough to yield a shadow against the light-colored substrate. *A. canescens* can occur in disturbed areas on the edge and outside the floodplain.

***Atriplex canescens* Alliance (5111)**



DISTRIBUTION: Two polygons each were mapped in the Lake Isabella area of the Southern Sierra Nevada Foothills Proper subarea, and the San Emigdio Range subarea. No sites were mapped in the Horsethief Mountain subarea.

Atriplex canescens Alliance (5111)



***Atriplex polycarpa* Alliance (5710)**

Allscale scrub Alliance



Aerial view of an open stand of *Atriplex polycarpa* upslope of and paralleling a dry stream/terrace system. Grassland area is adjacent to the stand.



Ground view of a dense stand of *Atriplex polycarpa* in the foreground, on flat terrain. Note the blue-green color of the plants with a spikey texture of the crowns.

***Atriplex polycarpa* Alliance (5710)**

DESCRIPTION: *Atriplex polycarpa* is dominant in the open shrub layer with greater than 50% relative cover. Non-native annuals are dominant in the herbaceous layer ranging from sparse to open. Found at lower elevations in the southern Sierra Nevada Foothills in washes and ravines above the Central Valley, or uplands with alkaline substrate as in the foothills east of Bakersfield. Co-dominance with *Baccharis salicifolia* in a riparian setting would be considered as *Baccharis salicifolia* Alliance. Where *Artemisia tridentata* has greater cover than *Atriplex* in co-dominance, the stand is considered as *Artemisia tridentata* Alliance.

In the Southern Sierra Nevada Foothills Proper subarea, only three small stands of *Atriplex polycarpa* are mapped along the southernmost edge of the subarea, just north of the confluence with Caliente Creek and Walker Basin Creek. These stands are mapped on slopes nearer to springs upslope and in drier side draws above Walker Basin Creek. One two small stands are mapped in the western edge of the Horsethief Mountain subarea.

The *A. polycarpa* Alliance is also mapped in San Emigdio Range subarea. This species is found in California's only cismontane desert in the foothills north of the San Emigdio Range, generally below 3000 feet. Small- to medium-sized stands are mapped just above the floodplain and lower slopes of the San Emigdio Mountains, Pleito Hills, and Salt Creek, in areas dominated by annual grasses. Most stands are strongly dominated by *Atriplex polycarpa* in low to moderate cover. Cover can be quite low as the species ascends small, steep canyons. Floodplain cover is highly variable and patchy, and stands are of limited size.

PHOTO INTERPRETATION SIGNATURE: Of the three medium-sized, bluish-colored shrubs (*Atriplex polycarpa*, *Ericameria nauseosa*, and *Artemisia tridentata*), *A. polycarpa* can be quite difficult to differentiate based on signature characteristics alone. Stands are much more confined to desert edge lower elevations and are usually limited in size. Cover is patchy and variable. In more mature stands, shrubs are generally less blue and crowns are somewhat larger. Adjacent steep slopes are often grassy or can be dominated by a sparse cover of *Eriogonum fasciculatum*, *Lotus scoparius*, or *Cleome isomeris*. Substrate characteristics on stands mapped upslope from the floodplain in steep settings are eroded and often expose a discontinuous chalky white appearance across the landscape.

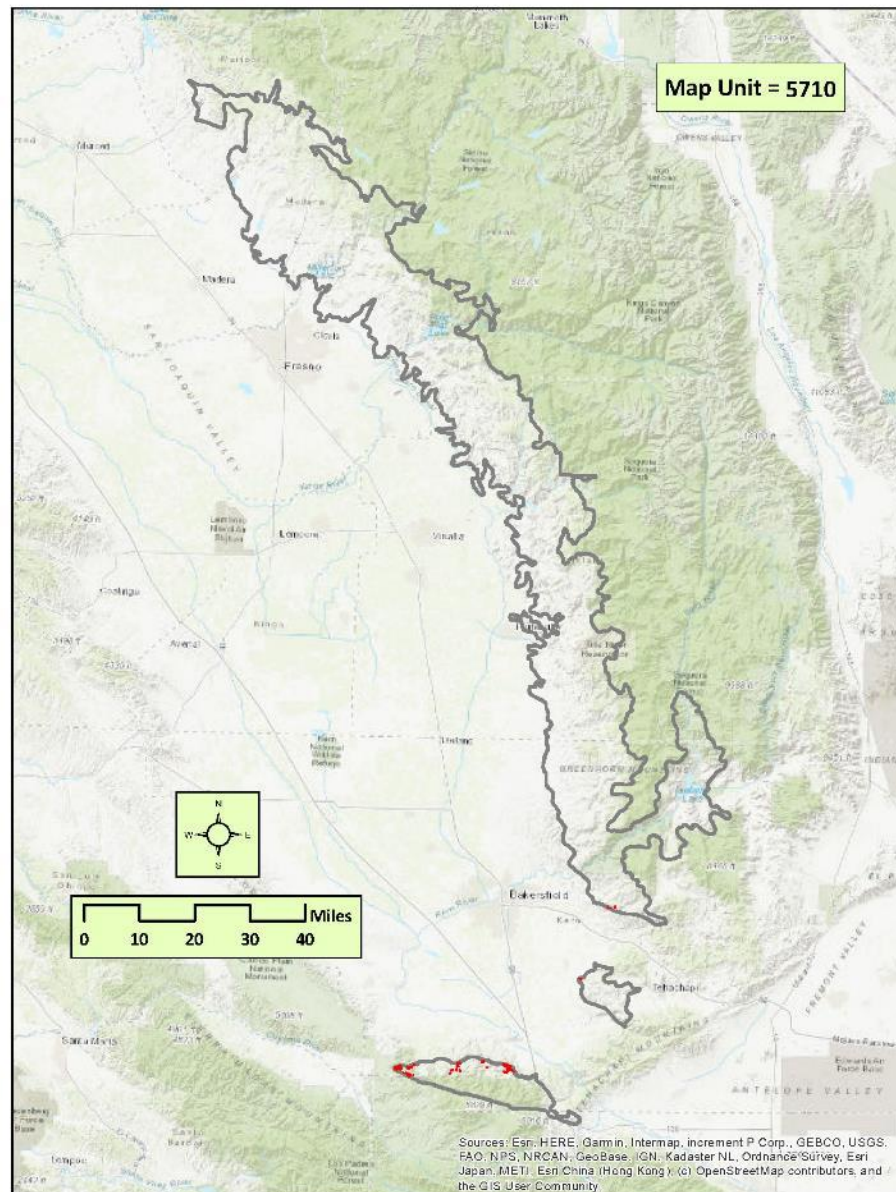
TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

- *Atriplex canescens* Alliance (5111) – *A. canescens* has similar size, shape and color ranges, but may have a slight green or brown tinge to its crown. Both species can occur on disturbed flats or highly eroded floodplains and have similar distribution ranges. *A. polycarpa* tends to be positioned nearer to springs or surface water, whereas *A. canescens* is more likely to be perched on sandy substrates along the drier, grassier margin.

***Atriplex polycarpa* Alliance (5710)**

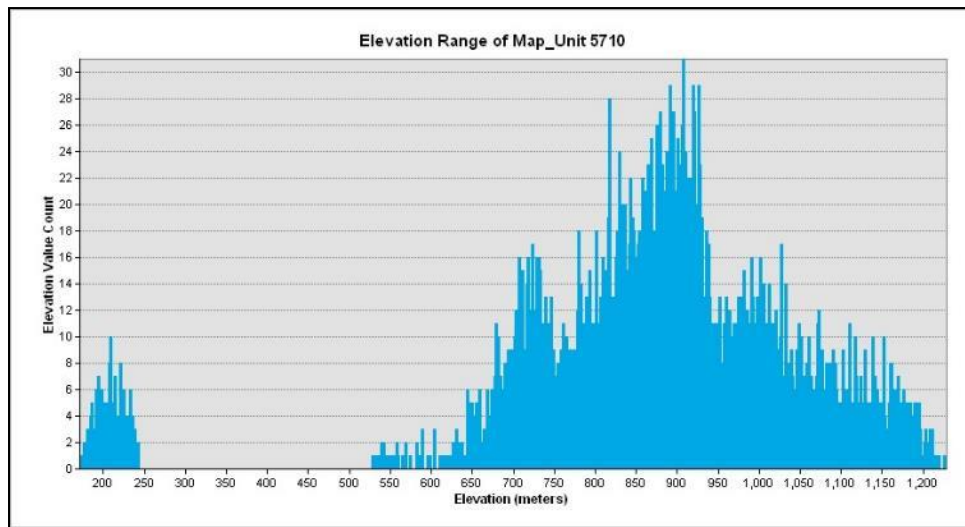
- *Ericameria nauseosa* Alliance (5212) – *Ericameria nauseosa* has similar color ranges, mature crowns are generally more rounded and somewhat smaller. Stands dominated with this shrub occur more frequently in settings adjacent to grassland and tend to be larger in size. Both species have similar ranges in slope positions, but it can be accurately assumed that large stands on mid and upper slopes in this region will be *E. nauseosa*.
- *Artemisia tridentata* Alliance (5311) – *Artemisia tridentata* interfaces with *Atriplex polycarpa* in mid to higher elevations locally in low slope settings. Overall cover for *A. tridentata* is significantly higher in most cases and color trends a bit more toward dark gray and medium to dark blue-gray. Stands may be comparable in size where settings are similar, but in these areas, *Atriplex polycarpa* tend to favor drier slopes and draws.

Atriplex polycarpa Alliance (5710)



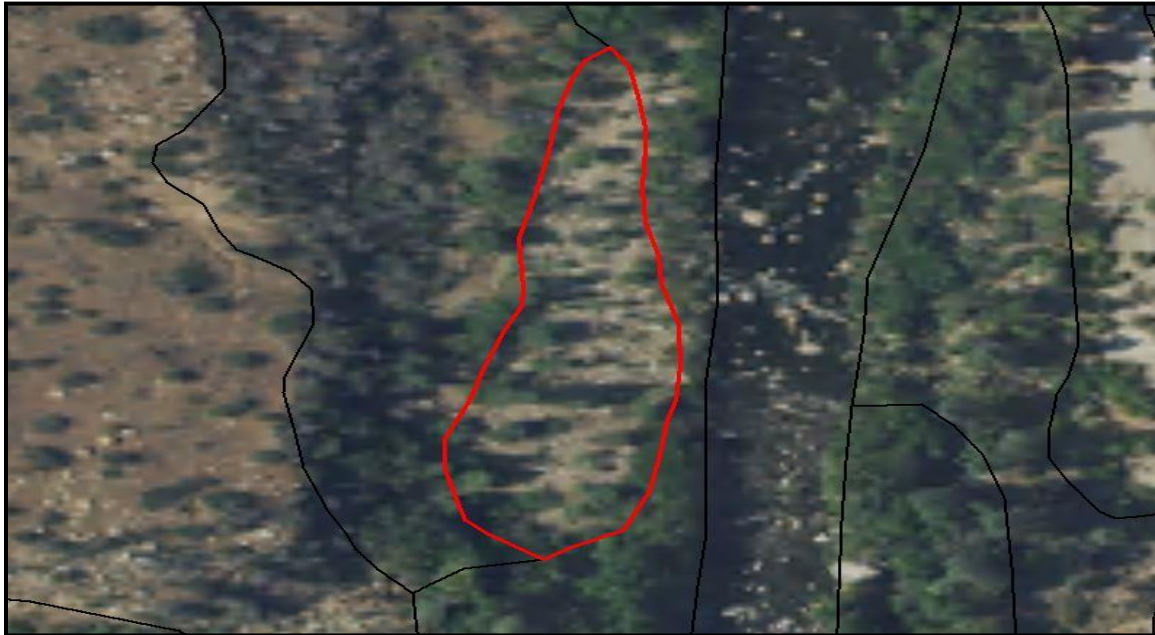
DISTRIBUTION: Only three small stands are mapped at the southern end of the Southern Sierra Nevada Foothills Proper subarea. Two small polygons are mapped at the western edge of the Horsethief Mountain subarea. Several clusters of this alliance are mapped at the western end and on the northern edge foothills of the San Emigdio Range subarea.

Atriplex polycarpa Alliance (5710)

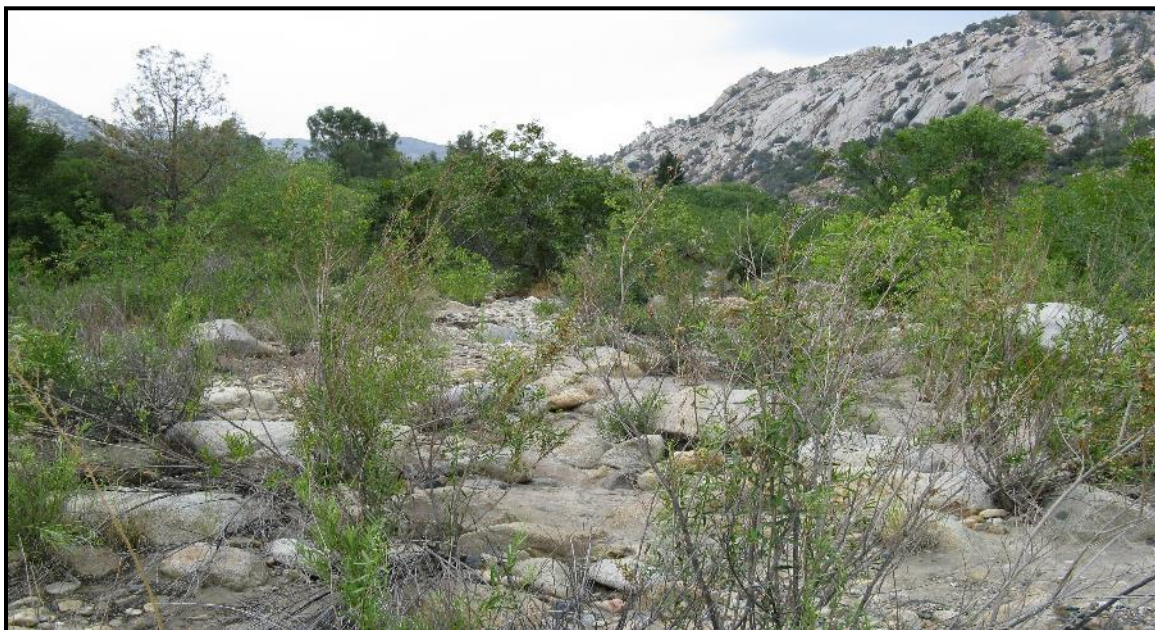


Baccharis salicifolia Alliance (6210)

Mulefat thickets Alliance



Aerial view of a small open stand of *Baccharis salicifolia* on the stream terrace floodplain adjacent to a river.



Ground view of an open cover stand of *Baccharis salicifolia* over rocky-cobbly substrate in a floodplain.

***Baccharis salicifolia* Alliance (6210)**

DESCRIPTION: *Baccharis salicifolia* is dominant in the shrub layer. Riparian trees may be emergent at low cover. Other shrubs if present are low cover, and annual herbs, including *Bromus diandrus*, *B. hordeaceus*, and *B. madritensis*, are usually present and may be abundant in the understory. Found in gravelly, sandy washes periodically disturbed by flooding. *Atriplex polycarpa* co-dominating with *Baccharis* in a riparian setting would be considered as *Baccharis salicifolia* Alliance. Where *Cephalanthus occidentalis* co-dominates, then the stand is considered as *Cephalanthus occidentalis* Alliance.

Stands of *Baccharis salicifolia* are sparsely dispersed throughout the Southern Sierra Nevada Foothills Proper subarea, but more commonly occur as an understory component to *Salix* spp., *Platanus racemosa*, and *Populus fremontii* types. *B. salicifolia* may be found with *Lepidospartum squamatum* in the active wash zone, with the *Baccharis* typically clustering along the edges nearest to the most active channel.

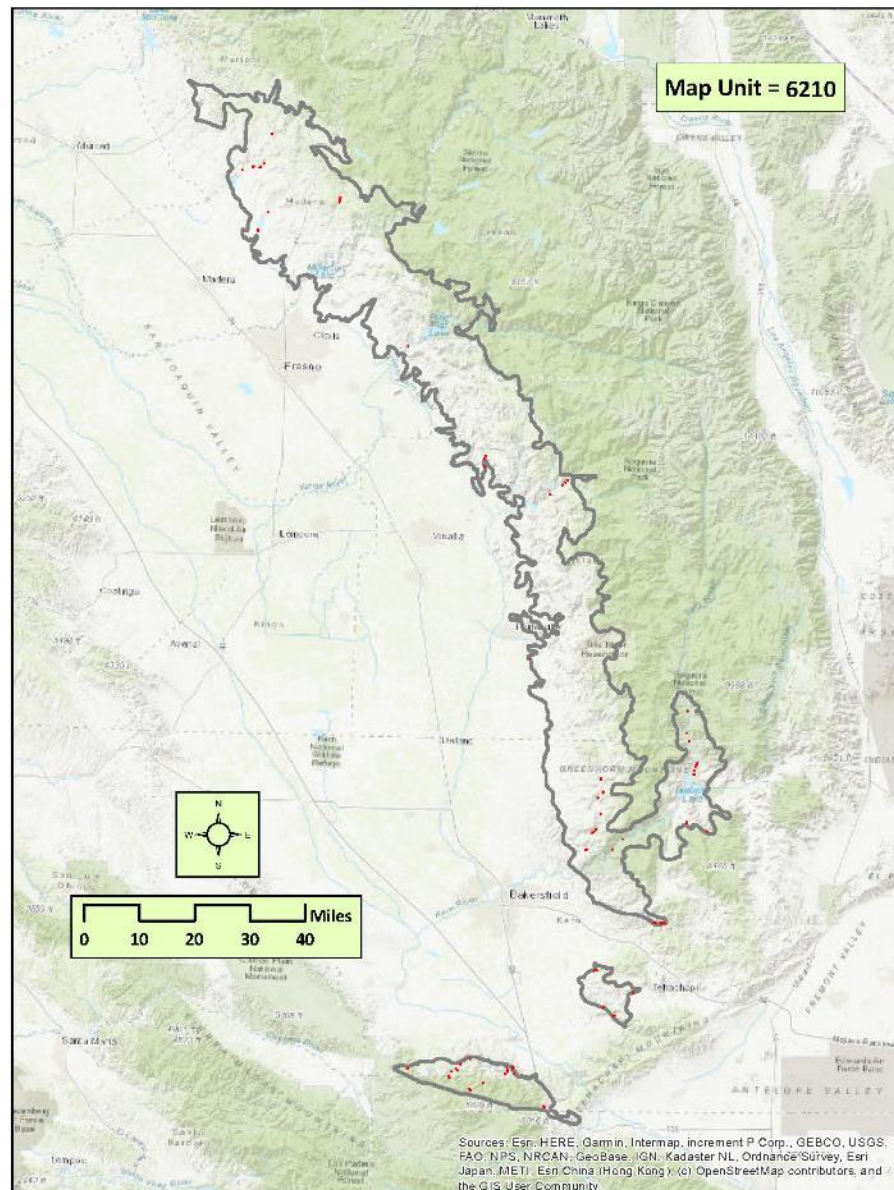
Several small stands are mapped adjacent to other riparian vegetation in the northern foothills of the San Emigdio Range subarea, and to the north, near the eastern end of the San Joaquin Valley in the Tejon Hills of the Horsethief Mountain subarea. Mapped stands usually have a minor component of *Salix* spp., and/or *Populus fremontii* under 5% cover.

PHOTO INTERPRETATION SIGNATURE: Well-developed stands tend to have a slightly stippled texture with a medium green to medium brown color signature. Stand configurations tend to be long and narrow.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

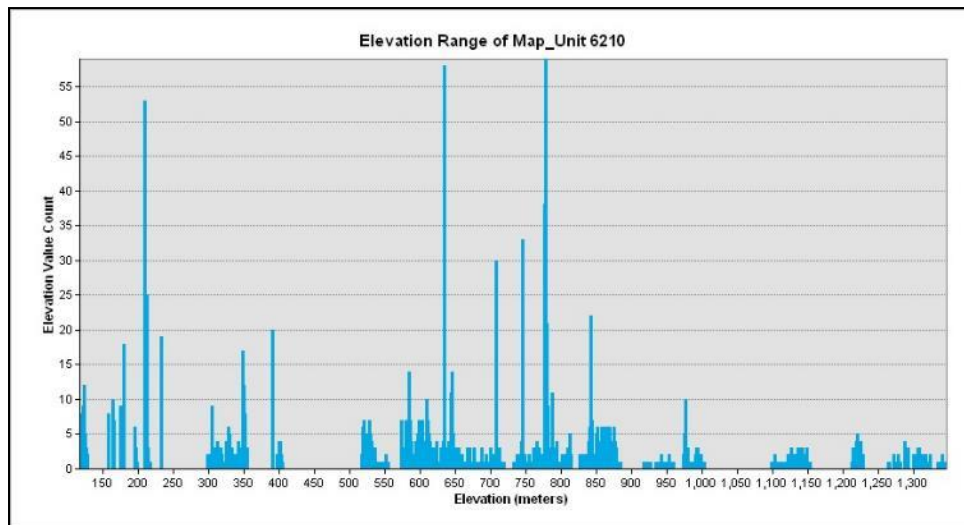
- *Cephalanthus occidentalis* Association (6214) – *Cephalanthus occidentalis* commonly occurs in rocky/bouldery fast moving stream settings. Stands are typically very low cover (less than 5%) with a small rounded dark green to black circle sparsely tucked into the rocks. Larger individuals may occur along the margins of the rocky streambed where flooding is not as frequent. The crown height is shorter and more well-defined than the wispy texture of the *B. salicifolia*.
- *Ericameria nauseosa* Alliance (5212) – *Ericameria nauseosa* appears grayer in color, is shorter in stature, and clusters next to the *B. salicifolia* on the drier margins of the active floodplain.
- *Lepidospartum squamatum* Alliance (5610) *Lepidospartum squamatum* generally has a much lower cover density and a shorter, well-defined crown.
- River and Lacustrine Flats & Streambeds Mapping Unit (9402) – These are sparsely vegetated mapping units and occur in areas where vegetation is under 10% cover. They are often adjacent to a low cover of *Baccharis salicifolia* in areas of shallow water yielding a dark signature color.

***Baccharis salicifolia* Alliance (6210)**



DISTRIBUTION: Uncommon widely scattered small stands dispersed throughout the Southern Sierra Nevada Foothills Proper, Horsethief Mountain, and San Emigdio Range subareas.

***Baccharis salicifolia* Alliance (6210)**



Ceanothus cuneatus Alliance (4113)

Wedgeleaf ceanothus chaparral Alliance



Aerial view of a very dense stand of *Ceanothus cuneatus*.



Ground view of a dense stand of *Ceanothus cuneatus*. Note the spikey white branches and the small ovate sclerophyllous leaves.

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

DESCRIPTION: *Ceanothus cuneatus* is typically dominant in the shrub layer or may be co-dominant with *Adenostoma fasciculatum* or *Eriodictyon californicum*. If it is co-dominant with *Cercocarpus montanus*, then the stand is considered as the *Cercocarpus montanus* Alliance. Trees such as *Pinus sabiniana* may be present in the overstory but have significantly less cover than the shrubs. Where *Ceanothus cuneatus* co-dominates with *Fremontodendron*, then the stand is considered as the *Ceanothus greggii* – *Fremontodendron californicum* Alliance.

Ceanothus cuneatus is a commonly mapped chaparral type found throughout the Southern Sierra Nevada Foothills Proper subarea. *C. cuneatus* begins to trickle into the *Quercus douglasii* woodlands at around 1000 feet, then increases in density and distribution as one climbs in elevation into the *Quercus wislizeni* zone, and further into the higher elevation oak and conifer zone. At lower elevations it appears on lower slopes in the *Quercus douglasii* understory. As one climbs higher in elevation, *C. cuneatus* is found on south faces and spills over the ridgetops and upper north faces.

In the Horsethief Mountain subarea, *Ceanothus cuneatus* for the most part is limited to a few small stands in the western slopes of the Tehachapi Mountains. In the San Emigdio Range subarea there is only a cluster of polygons in the eastern part of the subarea. In the San Emigdio Mountains, it is replaced with the semi-desert chaparral *C. greggii* where it is a component to other plants such as *Fremontodendron californicum*, *Cercocarpus montanus* and *Artemisia tridentata*.

PHOTO INTERPRETATION SIGNATURE: *Ceanothus cuneatus* yields a light to dark gray color both on and off ultramafic soils with a broad round medium-sized crown. In post-burn environments, it forms a dense low cover, which is highly variable depending on the presence of other seral shrubs including *Eriodictyon* & *Toxicodendron*. On ultramafic soils, the color is reliably light gray. When occurring with *Adenostoma fasciculatum*, it is extremely difficult to separate out, but can often be found forming small bands around denser chaparral downslope where it transitions into annual grasses

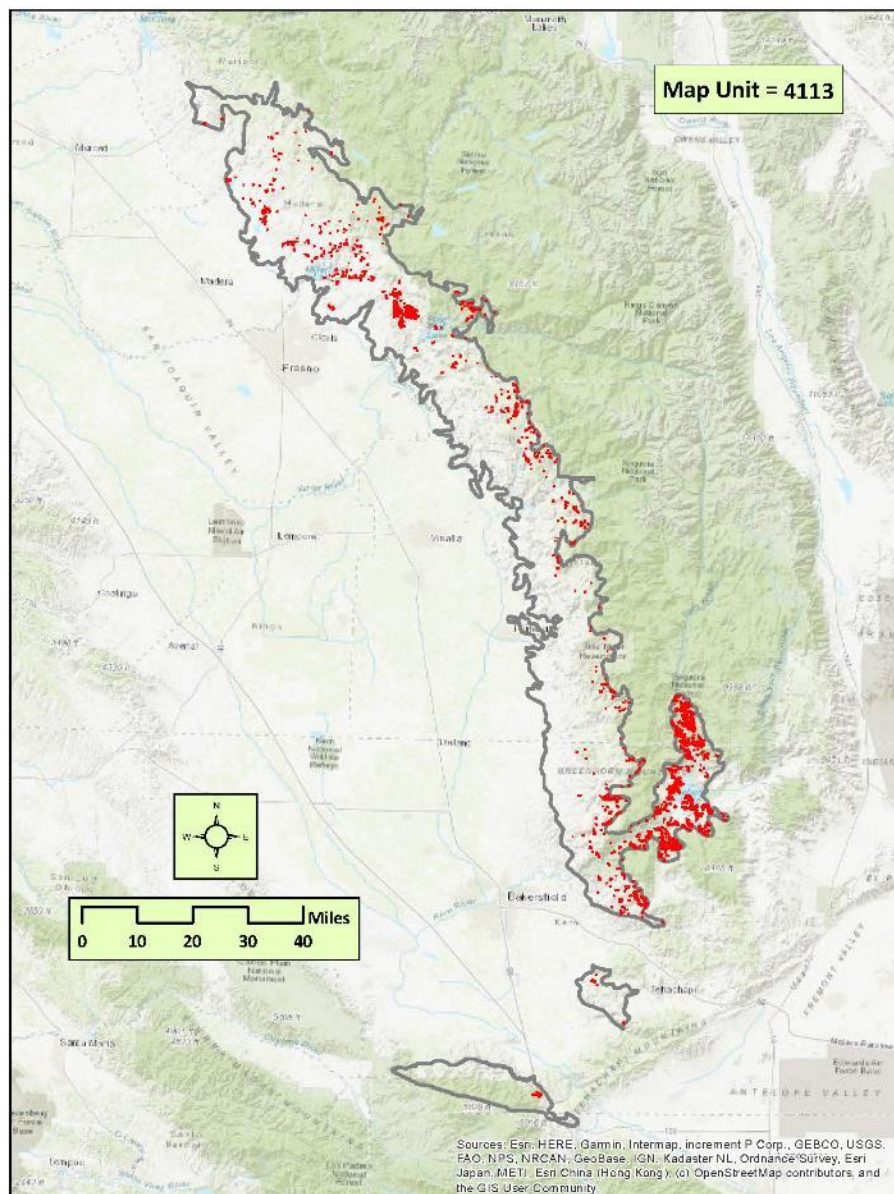
TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

- *Adenostoma fasciculatum* Alliance (4111) – *Adenostoma fasciculatum* in open settings is not as gray and usually has a less well-defined crown. In dense cover, it is almost impossible to distinguish except to note that a well-mixed stand will yield a somewhat more complex signature than pure stands of *Adenostoma*. In some areas, ancillary image sources were used to distinguish the browner/rusty color of *A. fasciculatum*, characteristic of its late summer phenology.
- *Arctostaphylos viscida* Alliance (4112) – *Arctostaphylos viscida* generally occurs on upper gentle slopes while *C. cuneatus* will be more likely on mid and lower slopes, also gently sloping. *A. viscida* usually yields a darker gray color and has denser crown & branching.

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

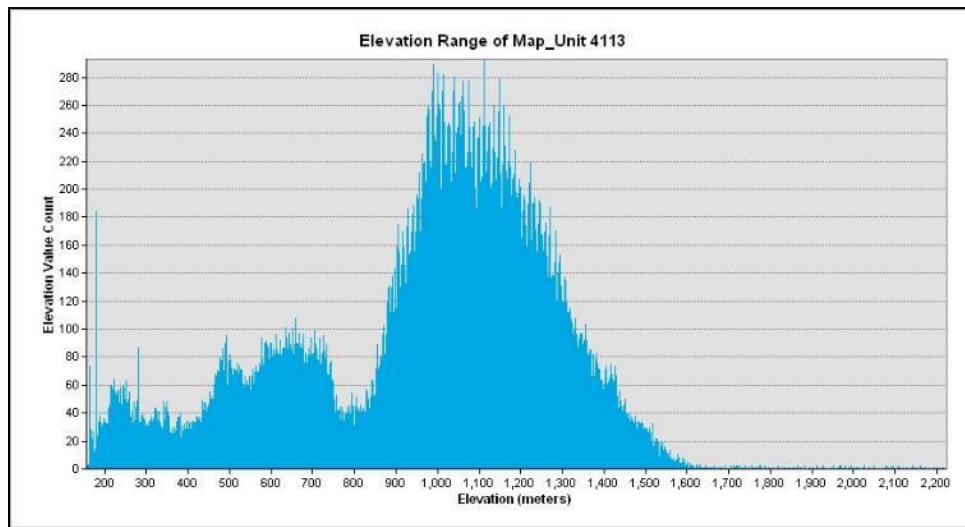
- *Artemisia tridentata* Alliance (5311) – *Artemisia tridentata* has a very similar color range, gray to blue-gray, but trends slightly bluer than *Ceanothus cuneatus*. *Artemisia* also has more of an irregular crown, and typically occurs on north-facing protected slopes.
- *Cercocarpus montanus* Alliance (4211) – *Cercocarpus montanus* has a taller stature with a wispier texture. Both species appear as a similar shade of gray. In dense chaparral stands with a diverse mix of species it is very difficult to discern stand dominance. *C. montanus* can be modeled on steep upper slope east faces in the dense chaparral zone.
- *Lotus scoparius* – *Lupinus albifrons* – *Eriodictyon* spp. Alliance (4720) – *Eriodictyon californicum* in post-burn settings often co-dominates with *C. cuneatus* with *Eriodictyon* yielding a greener color. In the years following a fire, there is a 3- to 5-year transition period where the early seral shrubs will wane and the *C. cuneatus* becomes the characteristic dominant. Signature recognition on imagery within the 3 years is very unreliable, thus requiring the mapper to use ancillary image sets, species fire characteristics, and/or additional field verification.

Ceanothus cuneatus Alliance (4113)



DISTRIBUTION: Very common throughout the Southern Sierra Nevada Foothills Proper subarea, especially in the northern half and in the Lake Isabella and Kern River corridor areas. A few stands are mapped scattered in the Horsethief Mountain subarea, and a small cluster of polygons is mapped in the eastern part of the San Emigdio Range subarea.

Ceanothus cuneatus Alliance (4113)



Ceanothus greggii – Fremontodendron californicum Alliance (6520)
Cup leaf ceanothus – California flannelbush chaparral Alliance



Aerial view of open stand of *Ceanothus greggii*-*Fremontodendron californicum* Alliance on a lower slope adjacent to an urban development.



Ground view of an open stand of *Ceanothus greggii*-*Fremontodendron californicum* Alliance in the foreground, on a gentle slope.

***Ceanothus greggii* – *Fremontodendron californicum* Alliance (6520)**

DESCRIPTION: *Fremontodendron californicum* and/or *Ceanothus greggii* are dominant or co-dominant in the shrub layer. *Cercocarpus montanus*, *Eriodictyon californica*, *Ephedra viridis*, or *Artemisia tridentata* may be present at low cover. Where *Fremontodendron* and/or *C. greggii* co-dominate with *Cercocarpus montanus* or *Artemisia tridentata*, then the stands are considered as those alliances, respectively. Where *Ceanothus cuneatus* co-dominates with *Fremontodendron*, then the stand is considered as the *Ceanothus greggii* – *Fremontodendron californicum* Alliance.

In the Southern Sierra Nevada Foothills Proper subarea, the alliance is restricted to steep slopes along the northern edge of the Piute Mountains just east of Lake Isabella. The stands were recovering from a 2016 burn and were dominated by *Fremontodendron californicum*. However, the *Ceanothus* species was not field verified for this area. Stands primarily occur on steep north faces above 3500 feet, as well as protected south faces along the desert margins.

The alliance is uncommon in the San Emigdio Range subarea, and limited to several broad floodplains above Frazier Park on cobbly well-drained substrate. To the north, in the Horsethief Mountain subarea, stands are found on north-trending slopes south of Bear Valley in the western portions of the Tehachapi Mountains. It should be noted that ground field samples in the Tehachapi stands indicated the presence of *Fremontodendron californicum* but the *Ceanothus* species was not positively identified.

PHOTO INTERPRETATION SIGNATURE: *Ceanothus greggii* – *Fremontodendron californicum* Alliance is differentiated from *C. cuneatus* Alliance based on associated plant species, elevation (to a lesser extent), and setting. The two *Ceanothus* species cannot be separated out based on the image signature alone. In the San Emigdio subarea stands of *Ceanothus greggii* – *Fremontodendron californicum* Alliance occur on the white, cobbly floodplain substrate that can be seen through openings in the shrub cover. To the north, in the Bear Valley stands, post-burn chaparral occurs on moderately sloping mid slopes and cover is dense across the stand. In these settings, overall shrub color is gray to slightly green and texture is mottled. Emergent oaks dot the landscape in cover below 1%. Additional image sources were used to correlate a yellow cast of flowering individuals of *Fremontodendron* to early spring/summer phenology.

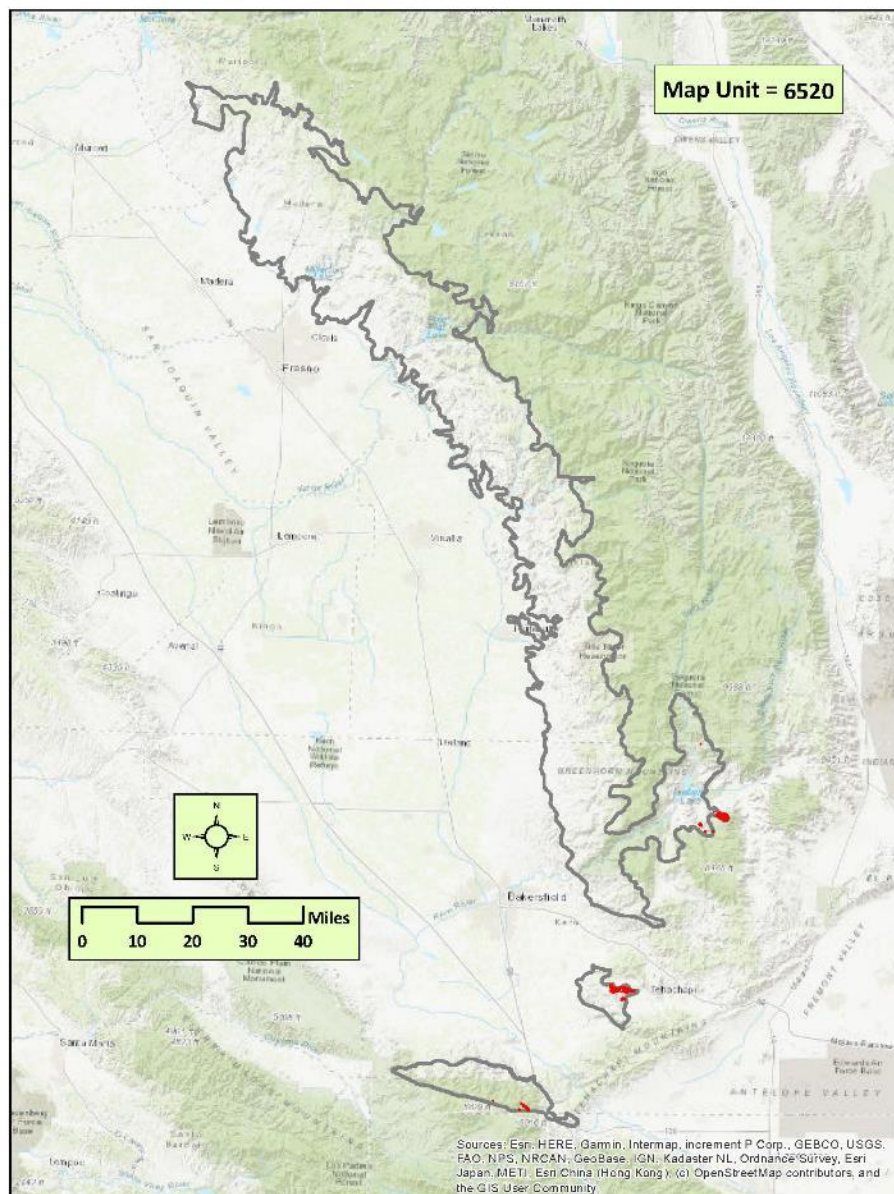
TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

- *Ceanothus cuneatus* Alliance (4113) – *Ceanothus cuneatus* cannot be reliably separated out from *C. greggii* on signature characteristics alone. Regional distribution, associated vegetation and local settings are key to determining this alliance. Stands assigned to this alliance often contain a dense shrub cover and frequently are associated with other chaparral species, such as *Adenostoma fasciculatum*.

***Ceanothus greggii* – *Fremontodendron californicum* Alliance (6520)**

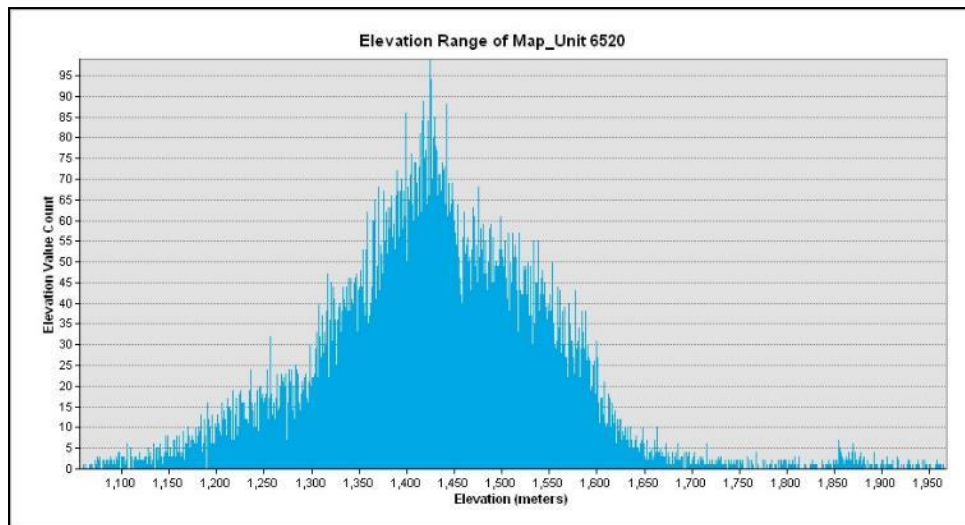
- *Cercocarpus montanus* Alliance (4211) – *Cercocarpus montanus* can be differentiated from *Ceanothus greggii* where it occurs on significantly steeper terrain and dominates the shrub cover. In stands dominated by *C. greggii*, this species is only a component to the vegetation. In its typical setting, *C. montanus* has a small rounded crown and appears dark gray to brown. In mixed stands where both *C. montanus* and *F. californicum* are more prevalent than the *Ceanothus* spp., signatures are too similar to discern. Therefore, proximity to the desert edge, associated species, and elevational gradients are used to model the vegetation.

***Ceanothus greggii* – *Fremontodendron californicum* Alliance (6520)**



DISTRIBUTION: The alliance is rare, and is mapped only in the eastern edge of the Lake Isabella portion of the Southern Sierra Nevada Foothills Proper subarea, the northeast edge of the Horsethief Mountain subarea, and in the southeastern edge of the San Emigdio Range subarea.

***Ceanothus greggii* – *Fremontodendron californicum* Alliance (6520)**



Ceanothus integerrimus Alliance (6110)
Deerbrush chaparral Alliance



Aerial view of a dense stand of *Ceanothus integerrimus*.

Ground photo is not available.

***Ceanothus integerrimus* Alliance (6110)**

DESCRIPTION: *Ceanothus integerrimus* is the dominant or co-dominant shrub in the overstory, and may be co-dominant with *Heteromeles arbutifolia* and *Arctostaphylos* spp. *Quercus garryana* is typically sub-dominant. *Cercis occidentalis* and *Fraxinus dipetala* are frequently present with low to moderate cover. If *Quercus garryana* co-dominates, then the stand is considered as the *Quercus garryana* (shrub) Alliance.

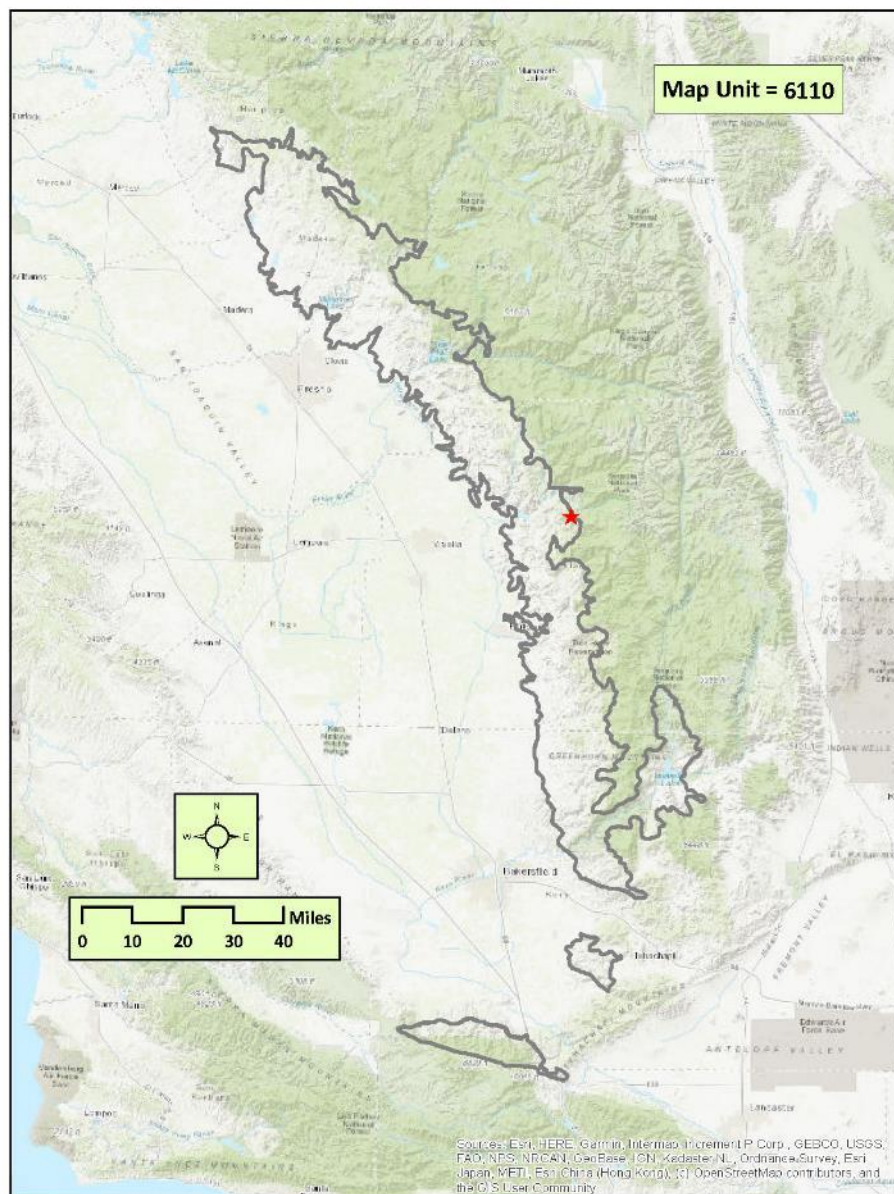
Only one stand is mapped in the Southern Sierra Nevada Foothills Proper subarea, along the ridgeline of Case Mountain at over 6000 feet in elevation. No other stands were mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: *Ceanothus integerrimus* stands appear as a bright to medium green shrub and often are mixed with an *Arctostaphylos* spp. in dense mature stands. *C. integerrimus* prefers well-drained soils along ridgelines.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

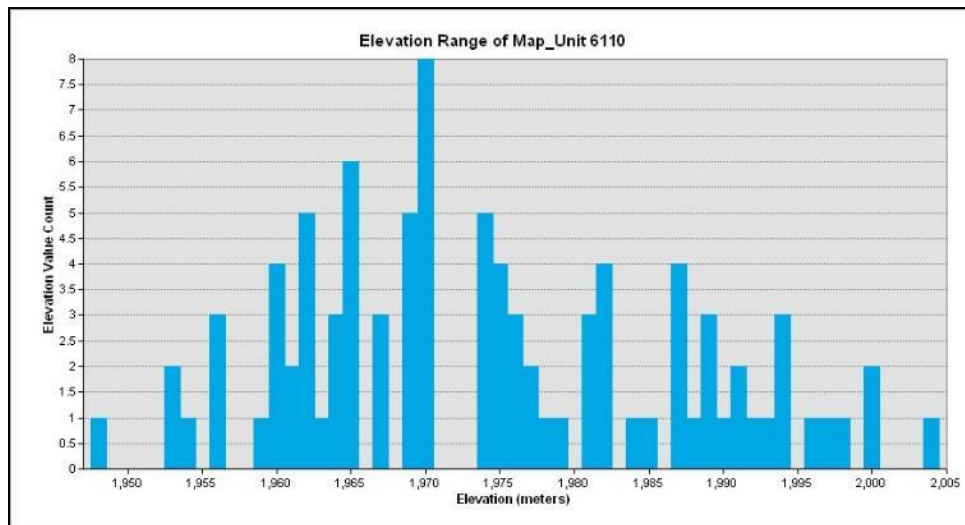
- None

Ceanothus integerrimus Alliance (6110)



DISTRIBUTION: Only one stand of *Ceanothus integerrimus* was mapped in the higher elevations of the Southern Sierra Nevada Foothills Proper subarea at Case Mountain. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Ceanothus integerrimus Alliance (6110)



Ceanothus leucodermis Alliance (4413)
Chaparral whitethorn chaparral Alliance



Aerial view of an open stand of *Ceanothus leucodermis*, of variable cover in a post-burn situation.



Ground view of a post-burn situation with open cover of *Ceanothus leucodermis* over a grassy understory on rolling terrain.

***Ceanothus leucodermis* Alliance (4413)**

DESCRIPTION: *Ceanothus leucodermis* is dominant to co-dominant with other chaparral shrubs in the shrub layer. Trees may be emergent and the herbaceous layer is typically sparse to open. Stands typically occur on relatively early post-fire sites in the southern Sierra Nevada Foothills.

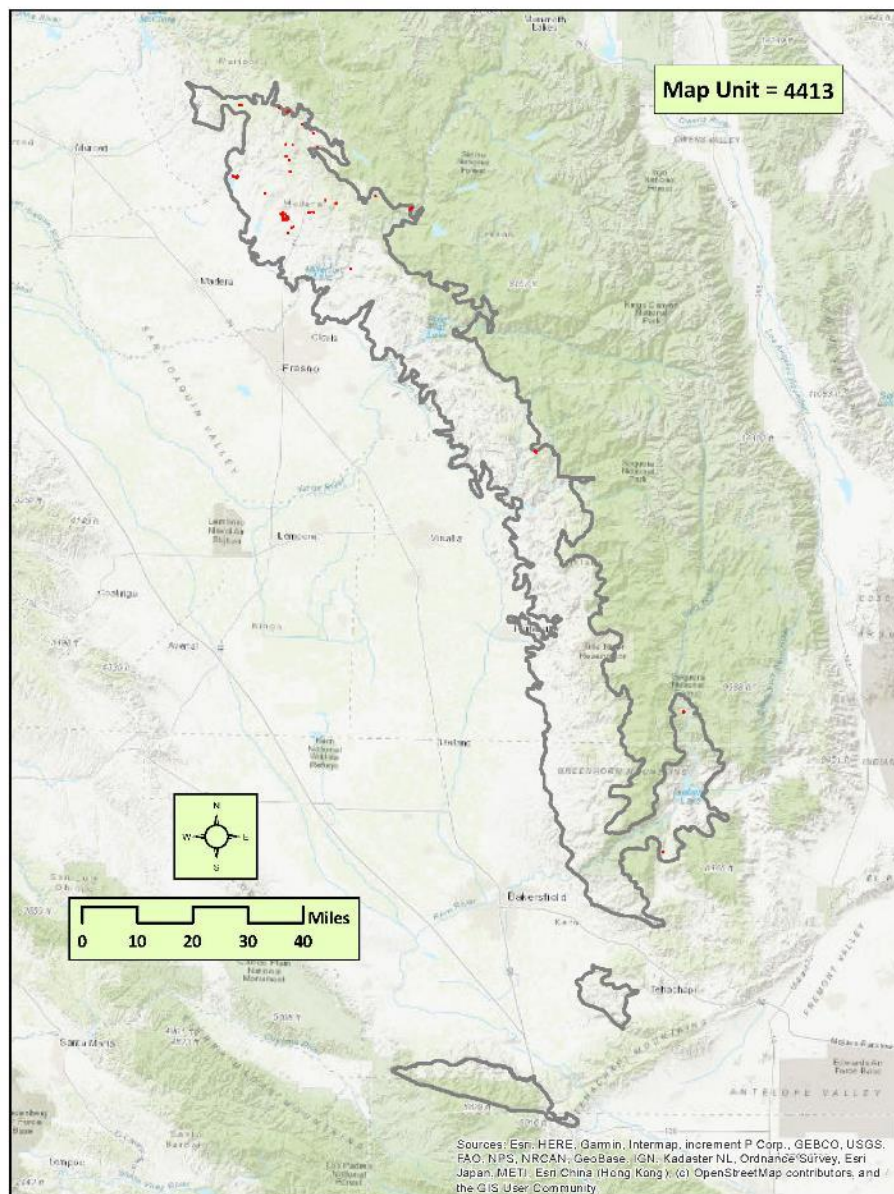
A majority of the mapped *Ceanothus leucodermis* stands occur in the northernmost part of the Southern Sierra Nevada Foothills Proper subarea, on gradually sloping hollows, protected hills, and north-facing toe slopes. Stands in this area are largely homogenous, small in size, and can be open to moderately dense in cover. The substrate is mostly grassy with small scattered rock outcroppings. Open stands of *Quercus wislizeni* also occur in the vicinity, which also absorb the moisture being brought to the surface from under the emerging boulders. A small number of isolated mapped stands are sprinkled in the southern portions of the subarea, mostly containing sparse cover and uneven distribution due to clearing and/or other human disturbances. More commonly *Ceanothus leucodermis* occurs as a component to dense *Q. wislizeni* stands or other more prevalent chaparral types. No stands are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: *Ceanothus leucodermis* is a medium-sized shrub that has a gray to lavender color tone, with mature stands exhibiting a clumpy and uneven crown shape. Disturbed stands vary more in color, stature, and distribution.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

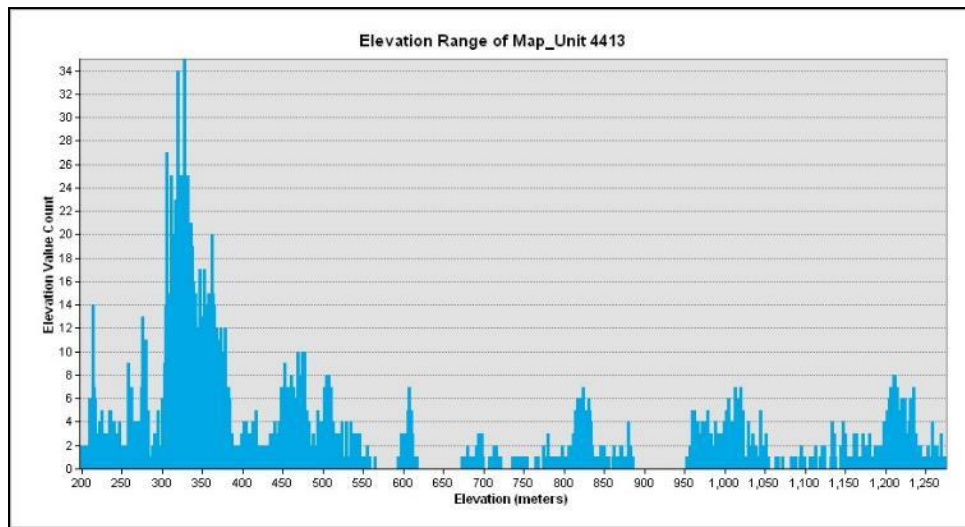
- *Ceanothus cuneatus* Alliance (4113) – *Ceanothus cuneatus* has a light to dark gray color, with individuals displaying a broad round, smooth-textured crown. Dense stands appear as thick clumps with a smooth to slightly bumpy texture.

Ceanothus leucodermis Alliance (4413)



DISTRIBUTION: Small stands mostly mapped at the northernmost part of the Southern Sierra Nevada Foothills Proper subarea, and with a few others at higher elevations in the central portion and in the Lake Isabella-Kern River area. No sites are mapped in the Horsethief Mountain or San Emigdio Range subareas.

Ceanothus leucodermis Alliance (4413)



***Cephalanthus occidentalis* – *Rosa californica* Alliance (6250)**

Button willow – California rose thickets Alliance

DESCRIPTION: *Calycanthus occidentalis*, *Cephalanthus occidentalis* and/or *Rosa californica* are the dominant shrubs forming an open to intermittent shrub canopy along rocky riparian settings. Riparian trees may be emergent or intermix in the canopy. Occasionally *Baccharis salicifolia* may be present or co-dominant.

This alliance is only mapped to the association level as the *Calycanthus occidentalis*, *Cephalanthus occidentalis*, and *Rosa californica* Associations. The association descriptions follow.

PHOTO INTERPRETATION SIGNATURE: Please refer to the association descriptions for photo interpretation signature discussion.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES: Please refer to the association descriptions for the discussion of similar types.

Calycanthus occidentalis Association (6216) of the Cephalanthus
occidentalis – Rosa californica Alliance
Spice bush thickets Association



Aerial view of a dense stand of *Calycanthus occidentalis* in a riparian drainage bottom.



Ground view of *Calycanthus occidentalis* in a narrow drainage bottom adjacent to a roadbed.

***Calycanthus occidentalis* Association (6216)**

DESCRIPTION: *Calycanthus occidentalis* dominates the shrub layer. *Quercus wislizeni* is often emergent in the overstory. Other riparian shrubs are present including *Salix* spp., *Sambucus nigra*, and *Vitis californica*. *Toxicodendron diversilobum* may be sub-dominant in the understory. Stands are small patches found in riparian settings.

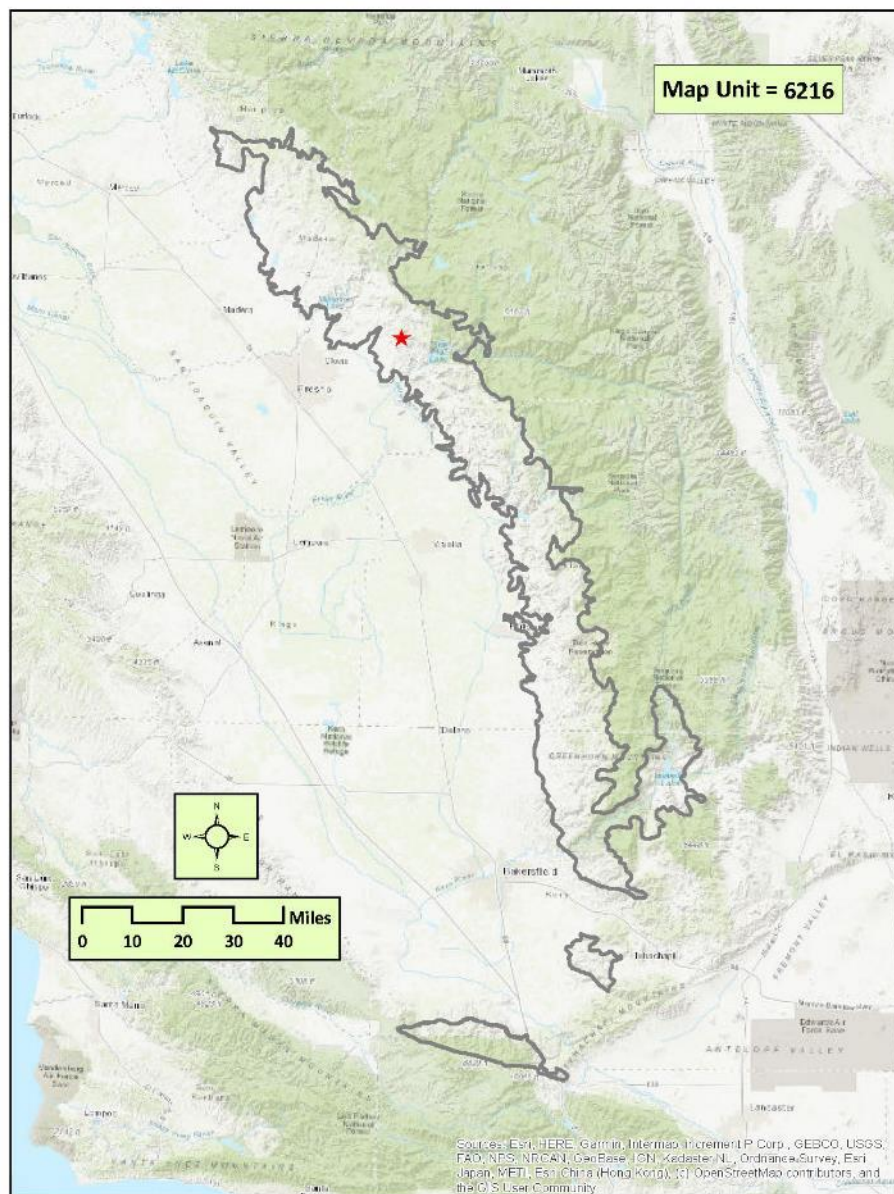
In the Southern Sierra Nevada Foothills Proper subarea, one small field-verified *Calycanthus occidentalis* stand was mapped on Fancher Creek, just southwest of Watts Valley. It occurs in a confined stream bottom next to a road berm. No sites are mapped in the Horsethief Mountain or San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: *Calycanthus occidentalis* appears as a lime green thicket with a smooth texture.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

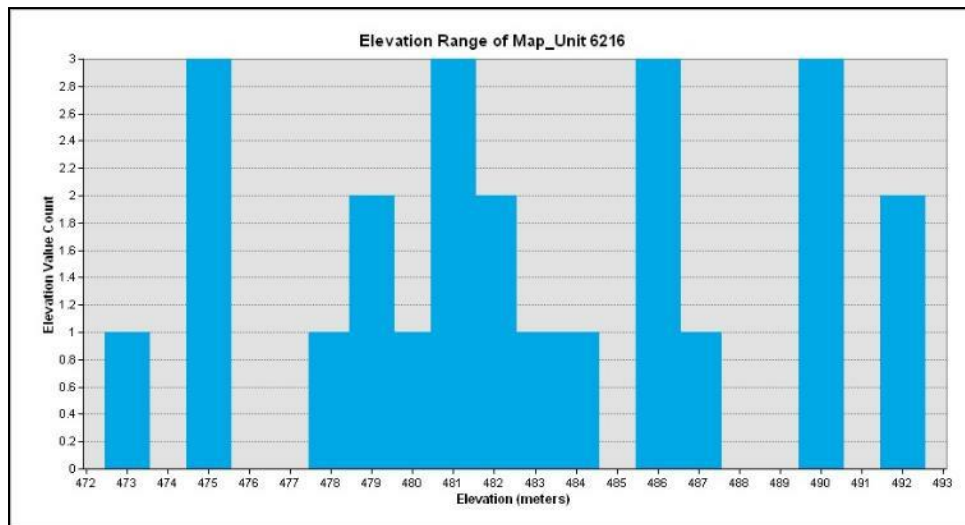
- *Rhus trilobata* Association (6231) – *Rhus trilobata* has a darker green signature than *Calycanthus occidentalis* and typically occurs on the drier margins of broader floodplains.
- *Rubus armeniacus* – *Sesbania punicea* – *Ficus carica* Semi-Natural Alliance (6213) – *Rubus armeniacus* can appear as a similar bright green, but it has a much shorter stature.
- *Salix lasiolepis* Alliance (6217) – *Salix lasiolepis* can also be found in a drainage setting, has a similar clumping pattern and medium size, but it is typically a medium to dark green color.

Calycanthus occidentalis Association (6216)



DISTRIBUTION: Only one stand was mapped, from field data, in the Southern Sierra Nevada Foothills Proper subarea along Fancher Creek in the northern part of the subarea. No sites are mapped in the Horsethief Mountain or San Emigdio Range subareas.

Calycanthus occidentalis Association (6216)



Cephalanthus occidentalis Association (6214) of the Cephalanthus
occidentalis – Rosa californica Alliance
Button willow thickets Association



Aerial view of a stand of *Cephalanthus occidentalis* in a moist swale adjacent to a reservoir.



Ground view of an open stand of *Cephalanthus occidentalis* on a cobbly substrate.

***Cephalanthus occidentalis* Association (6214)**

DESCRIPTION: *Cephalanthus occidentalis* is the dominant shrub forming an open to intermittent shrub canopy along exposed sandy/cobbly streambeds. Occasionally *Baccharis salicifolia* may be present or co-dominant.

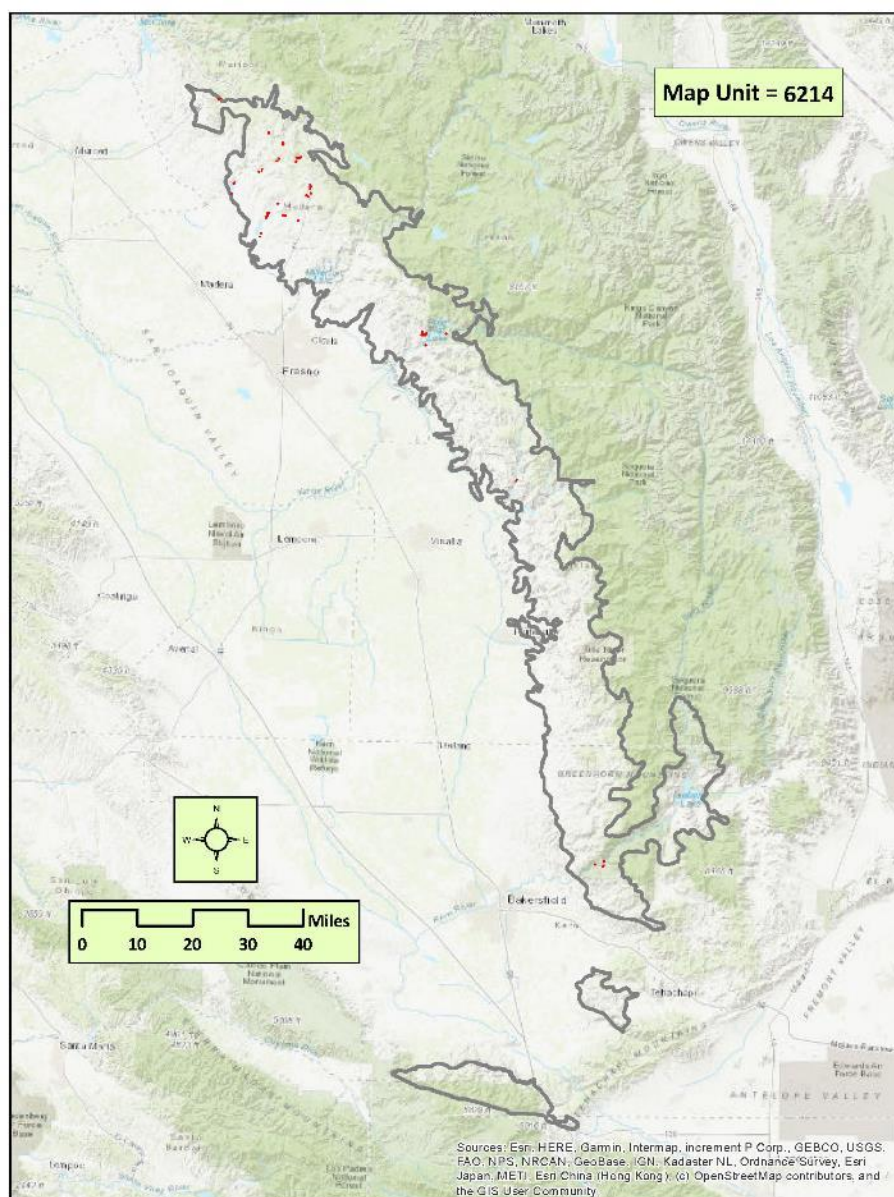
Small *Cephalanthus occidentalis* stands are mapped primarily in the northernmost portion of the Southern Sierra Nevada Foothills Proper subarea. Stands occur in two types of settings; along ultra-rocky/bouldery, fast moving streams and in concavities along the edge of reservoirs. Grasses are very limited or absent and cannot readily establish on the large rock substrates due to the lack of soil development. *Cephalanthus occidentalis* is often a component in the understory of *Fraxinus latifolia* and *Alnus rhombifolia* stands. No stands are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: *Cephalanthus occidentalis* individuals appear as rounded green to dark green shrubs with a smooth flat crown texture. Shrub stature and density can vary widely due to frequent flooding and inundation. Mature individuals that are more protected from flash flooding events are on average medium to tall in stature and can be very dense. On the faster-moving large boulder streams, stands are very sparse and contain stunted shrubs cut back by flooding events. Substrates appear very white and washed out due to the reflectance off of large boulders and lack of significant grass/herbaceous cover.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

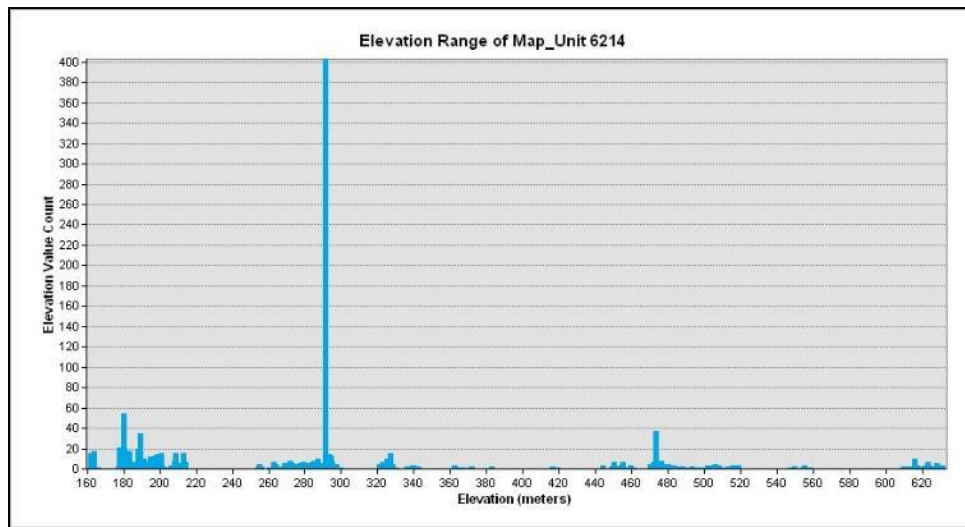
- *Baccharis salicifolia* Alliance (6210) – *Baccharis salicifolia* individuals have a wispy upright crown, a medium-sized stature, and are brown to dark green in color. This species favors more gravelly/cobbly streambeds and is less likely to form stands in confined, fast-moving streams with an abundance of boulders and large rocks.
- *Salix lasiolepis* Alliance (6217) – *Salix lasiolepis* has a similar green color tone and stature compared to *Cephalanthus occidentalis*. But willows do not establish as well on highly rocky more active streambeds and instead need more soil to form stands.

Cephalanthus occidentalis Association (6214)



DISTRIBUTION: In the Southern Sierra Nevada Foothills Proper subarea, stands are mapped primarily in the northernmost portion of the subarea, with a few sites in the central and southern portion. No stands are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Cephalanthus occidentalis Association (6214)



Rosa californica Association (6401) of the Cephalanthus occidentalis –
Rosa californica Alliance
California rose briar patches Association



Aerial view of a stand of *Rosa californica* on a moist wide floodplain terrace.



Ground view of several small rusty-colored thickets of *Rosa californica* in the mid view to the right.

***Rosa californica* Association (6401)**

DESCRIPTION: *Rosa californica* is dominant in the shrub canopy. *Salix* spp. is typically present at low cover. Stands are small and found typically in rocky riparian settings.

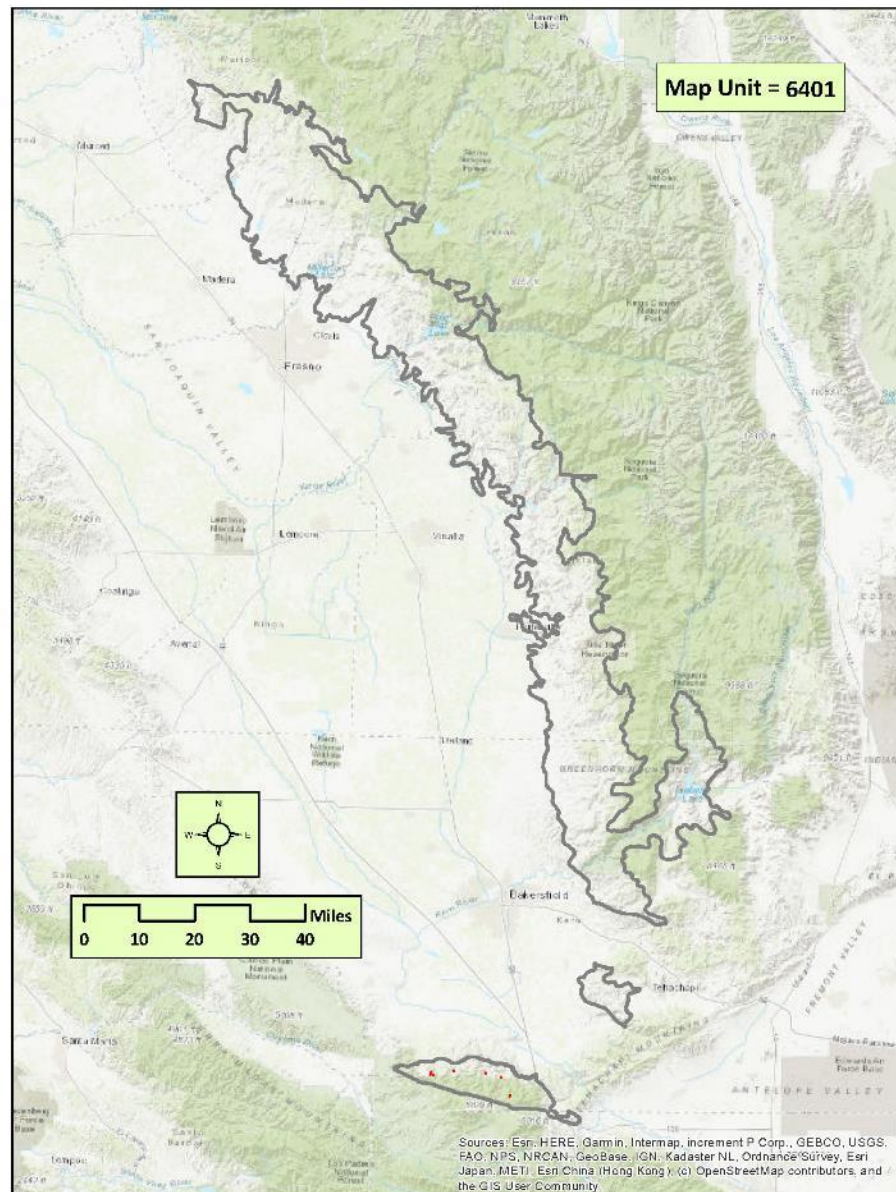
Stands are uncommon in the San Emigdio Range subarea, confined to a few small patches in lower elevations on the northern portions of the San Emigdio Mountains. Mapped stands are high in shrub cover and are strongly dominated with *Rosa californica*. No sites are mapped in the Horsethief Mountain and Southern Sierra Nevada Foothills Proper subareas.

PHOTO INTERPRETATION SIGNATURE: Stands are a uniformly dark green varying only slightly. Shrub cover is high and stands are fairly small. Vegetation within this type generally follows riparian settings. Texture is smooth to slightly stippled with abrupt definitive edges to the stand.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

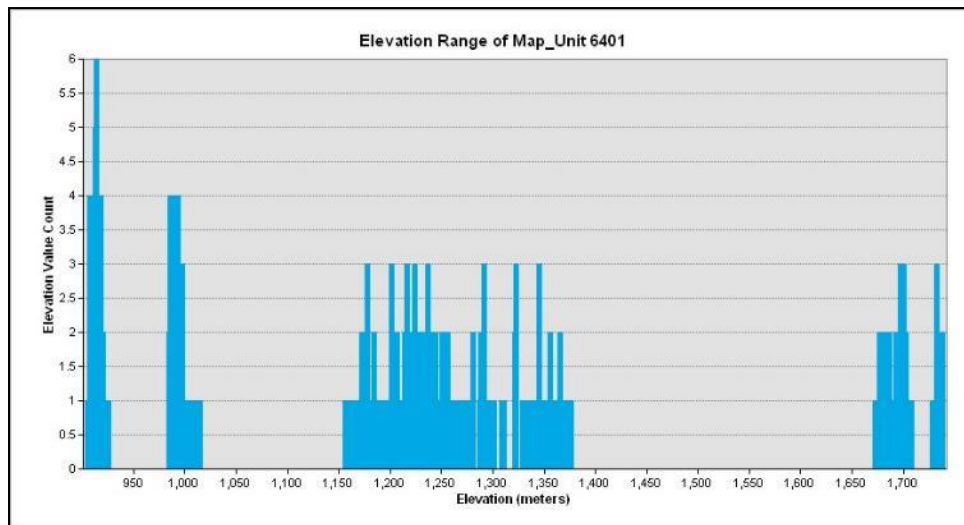
- *Ribes quercetorum* Association (6420) – *Ribes quercetorum* signature color ranges from medium green to occasionally yellow, and in leaf stress conditions, a taupe or gray color. Stands are similarly clonal with abrupt definitive margins. Texture is smooth and continuous across the stand.
- *Rhus trilobata* Association (6231) – Signature of *Rhus trilobata* dominated stands have a green to taupe color and similarly appear in moderate to densely packed clonal clumps.

Rosa californica Association (6401)



DISTRIBUTION: A few scattered stands are mapped throughout the San Emigdio Range subarea. No stands are mapped in the Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas.

Rosa californica Association (6401)



Cercocarpus montanus Alliance (4211)
Birch leaf mountain mahogany chaparral Alliance



Aerial view of an evenly distributed stand of *Cercocarpus montanus* of open to intermittent cover.



Ground view of an open to intermittent stand of *Cercocarpus montanus* on a gentle slope.

***Cercocarpus montanus* Alliance (4211)**

DESCRIPTION: *Cercocarpus montanus* is dominant or co-dominant in the shrub layer with *Ceanothus cuneatus*, *Adenostoma fasciculatum*, or *Juniperus californica* as a small tree or shrub, forming an open to intermittent canopy. Occasionally other shrubs such as *Arctostaphylos viscida* and *Artemisia tridentata* can reach co-dominance. Where *Fremontodendron californicum* has greater cover than co-dominating *Cercocarpus montanus*, then the stand is considered as the *Ceanothus greggii* – *Fremontodendron californicum* Alliance. *Q. garryana* in co-dominance with *Cercocarpus* is considered as the *Quercus garryana* (shrub) Alliance.

Within the upper half of the Southern Sierra Nevada Foothills Proper subarea, stands are scarcely mapped along the eastern boundary, usually on steep upper slope convexities. From Pinehurst, in southeast Fresno County, south to the bottom of the subarea, *Cercocarpus* stands increase in size and frequency with the largest concentrations occurring on the steep semi-arid slopes surrounding Lake Isabella.

Stands are found in steep, mid and upper slope settings on east- and west-facing slopes in the southern portions of the San Emigdio Range subarea. In the Tehachapi foothills of the Horsethief Mountain subarea, they are found on steep mesic north- and east-trending slopes above Bear Valley. All stands share the steep topographic characteristic which define the settings for this species. Their propensity to occupy neutral trending aspects are also a common trait of *Cercocarpus montanus*.

PHOTO INTERPRETATION SIGNATURE: *Cercocarpus montanus* is a medium- to tall-statured shrub with an irregularly shaped crown and a dull green to gray color. The spreading upper crowns appear as a fuzzy, diffuse texture, which can be hard to detect when mixed in dense chaparral.

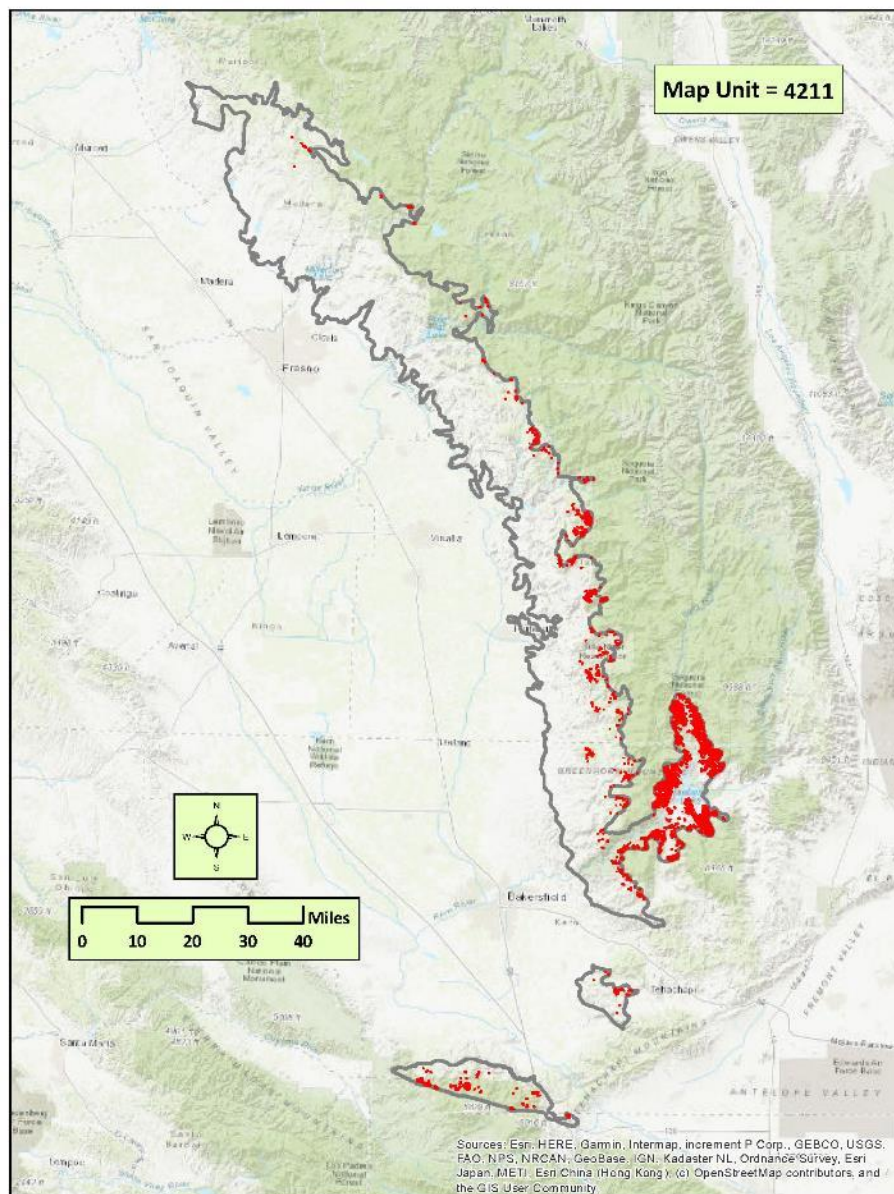
TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

- *Adenostoma fasciculatum* Alliance (4111) – *Adenostoma fasciculatum* appears as a medium- to tall-sized shrub with a color range of dull green/gray/brown/rusty. *A. fasciculatum* usually establishes on ridgetops, whereas *C. montanus* prefers steep upper slopes. These species interface at the slope break/ridgetop where mixing occurs. When these species mix into dense chaparral stands, signatures blend together making it difficult to discern stand composition. For these difficult species breaks, modelling on slope position is necessary to separate these two types.
- *Arctostaphylos viscida* Alliance (4112) – *Arctostaphylos viscida* appears as a medium- to tall-sized shrub with a color ranging from dull gray/lavender to maroon. *A. viscida* has a broad round well-defined crown. *Arctostaphylos viscida* usually establishes on ridgetops or gradually sloping spurs, whereas *C. montanus* prefers steep upper slopes. These species interface at the slope break/ridgetop where mixing occurs. When these species mix into dense chaparral stands, signatures blend together making it difficult to discern stand composition. For these difficult species transitions, modelling on slope position is necessary to separate these two types.

***Cercocarpus montanus* Alliance (4211)**

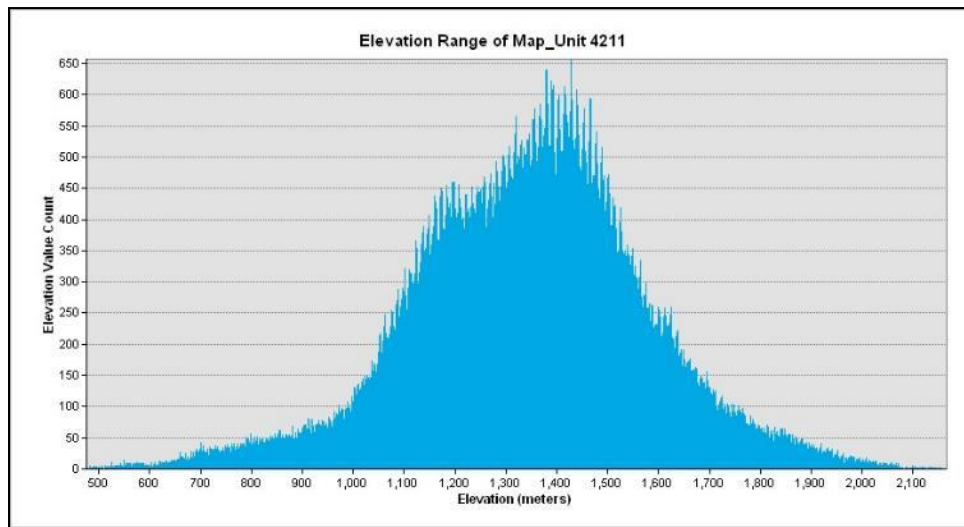
- *Ceanothus cuneatus* Alliance (4113) – *Ceanothus cuneatus* can occur on more variable aspects but tends to intermingle with *C. montanus* on northerly, mid to upper slopes. In dense chaparral areas these species often intermix, with *C. cuneatus* more likely occurring on lower toe and mid slopes or slightly less exposed aspects than *C. montanus*. Signature confusion arises when stands are diverse or evenly mixed, where the slightly taller and diffuse crown of *C. montanus* obscures other species components in the stands. In these cases, modelling on slope position and context aided the final type delineations.
- *Quercus garryana* (shrub) Alliance (6111) – *Quercus garryana* and *C. montanus* stands often occur together, especially since both favor neutral to slightly convex slopes along north faces. *Q. garryana* stands begin to appear at about 3500 feet and higher, and typically exhibit a thick coalescing crown that appears as a smooth dark green signature. Diverse stands, usually with a component or co-dominance of the slightly taller *C. montanus*, can create signature confusion and obscure the shorter *Q. garryana*, making it difficult to discern stand composition.
- *Quercus john-tuckeri* Alliance (6510) – Stands dominated by this oak occur on less steep topography. Crowns are not as rounded and there are more brownish hues in *Q. john-tuckeri*. Substrate signature characteristics are not as brightly white-colored due to their gentler aspects and higher herbaceous cover.
- *Ceanothus greggii* – *Fremontodendron californicum* Alliance (6520) – Stands of this type are uncommon in the study area and limited to a few areas along desert margin southeast of Lake Isabella and in the western portions of the Tehachapi Mountains. Much of the area near Lake Isabella was recovering from a 2016 fire and had to be modelled by field points, proximity to the desert, and elevation. It should be noted that ground samples in the field indicated presence of *Fremontodendron californicum* but the *Ceanothus* species was not positively identified. Both *C. montanus* and *F. californicum* had a medium to tall, upright and diffuse crowns on a range of northerly slopes. In some areas ancillary early season images revealed a yellow crowned signature, exemplifying the dense yellow inflorescences of the *F. californicum*.

***Cercocarpus montanus* Alliance (4211)**



DISTRIBUTION: Uncommon in the northern third of the Southern Sierra Nevada Foothills Proper subarea, but occurs along the higher elevations there. Occurrences increase on the upper elevations southward, becoming very common in the Lake Isabella area. The alliance is scattered in the Horsethief Mountain subarea, and is also mapped throughout the San Emigdio Range subarea.

Cercocarpus montanus Alliance (4211)



Encelia (actonii, virginensis) – Viguiera reticulata Alliance (5211)
Acton's and Virgin River brittle brush – Net-veined goldeneye scrub Alliance



Aerial view of a very open to sparse stand of *Encelia actonii* on thin-soiled convexity of rolling hills among grasslands.



Ground view of open stand of *Encelia actonii* on thin-soil rolling hills, with grassland in the foreground.

***Encelia (actonii, virginensis) – Viguiera reticulata* Alliance (5211)**

DESCRIPTION: *Encelia actonii* has at least 2% cover and other wash indicator species, such as *Ambrosia salsola* are present. No other shrub species has greater or equal cover. Stands occur in washes in the study area near Lake Isabella. Where *Encelia* occurs with disturbance shrubs in more recently disturbed or post-burn settings, the stand is considered as *Lotus scoparius* – *Lupinus albifrons* – *Eriodictyon* spp. Alliance. Where *Encelia* occurs on slopes in less recently burned areas, in drier desert transition settings the stand is considered *Eriogonum fasciculatum* – *Viguiera parishii* Alliance, and on slopes in non-desert settings as *Eriogonum fasciculatum* Alliance.

A limited amount of *Encelia actonii* stands are mapped on south-facing colluvial slopes along the desert edge east of Lake Isabella, as well as on steeper colluvial slopes east of Bakersfield in the heavily grazed western grasslands.

PHOTO INTERPRETATION SIGNATURE: *Encelia actonii* is a short-statured shrub with no distinctive signature on either of the NAIP base images. Field verified data and ancillary images were primarily used to identify locations of stands. Signatures can appear as a faint light or medium gray, short growing shrub. *Encelia actonii* is a drought deciduous shrub which explains why it does not appear well on the summer NAIP imagery.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

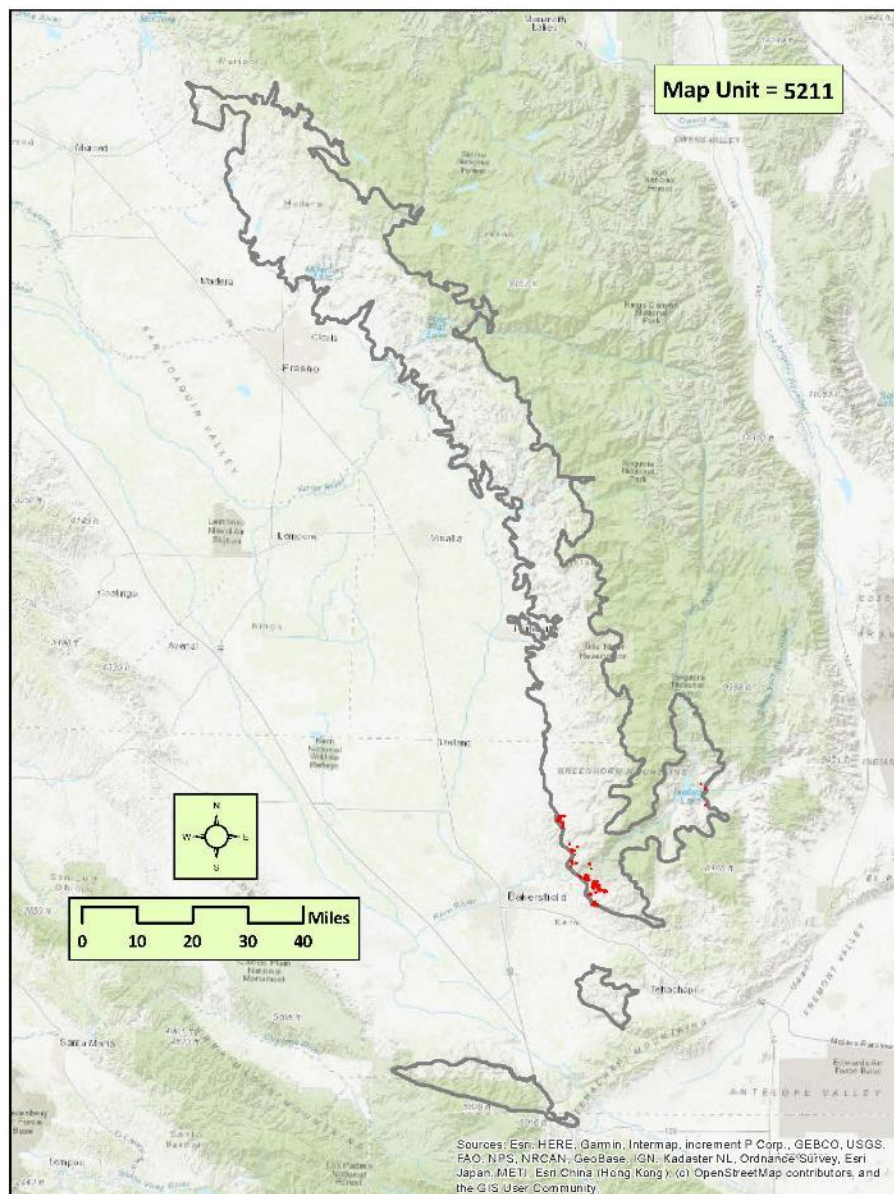
- *Ephedra californica* – *Ephedra trifurca* Alliance (5620) – Both *E. actonii* and *E. californica* occur together in a small area on colluvial slopes above Caliente Creek. *Ephedra californica* can have a broader, more irregular crown than the *E. actonii* and exhibits subtle green color tone, which makes it more distinguishable on the imagery. *E. actonii* sometimes appears as a small gray shrub on winter and spring images, however on many summer images no signature is detectable due to its drought deciduous nature. Therefore, field data is needed to verify the presence or dominance of *E. actonii* in these stands.
- *Eriogonum fasciculatum* Alliance (4810) – This alliance is a commonly mapped type throughout the southern portion of the Southern Sierra Nevada Foothills Proper subarea surrounding the Kern River corridor and Lake Isabella, as well as the Horsethief Mountain and San Emigdio Range subareas. Within the Caliente Creek area, both species mix with *Hesperoyucca whipplei* on low to mid colluvial slopes. *E. actonii* and *E. fasciculatum* intermixing on steep thin-soil slopes have very similar signature characteristics. *E. fasciculatum* has a consistent signature that appears on most images as small round individuals with a light to dark gray, well-defined crown.
- *Eriogonum fasciculatum* – *Viguiera parishii* Alliance (5428) – This alliance is defined by the presence of other desert species associated with these buckwheat stands. Stand distribution of this type is limited to a small section along the desert margin east of Lake Isabella. *Yucca brevifolia*, *Cylindropuntia* spp., *Hesperoyucca whipplei*, *Encelia actonii*, and *Ericameria linearis* are common associates to these desert edge stands. *Eriogonum fasciculatum* and *Encelia*

Encelia (actonii, virginensis) – Viguiera reticulata Alliance (5211)

actonii both have variations of small rounded, gray-colored crown signatures on the imagery, and prefer thin soil or colluvial slopes. Due to these similarities, ground data is primarily used to differentiate these types.

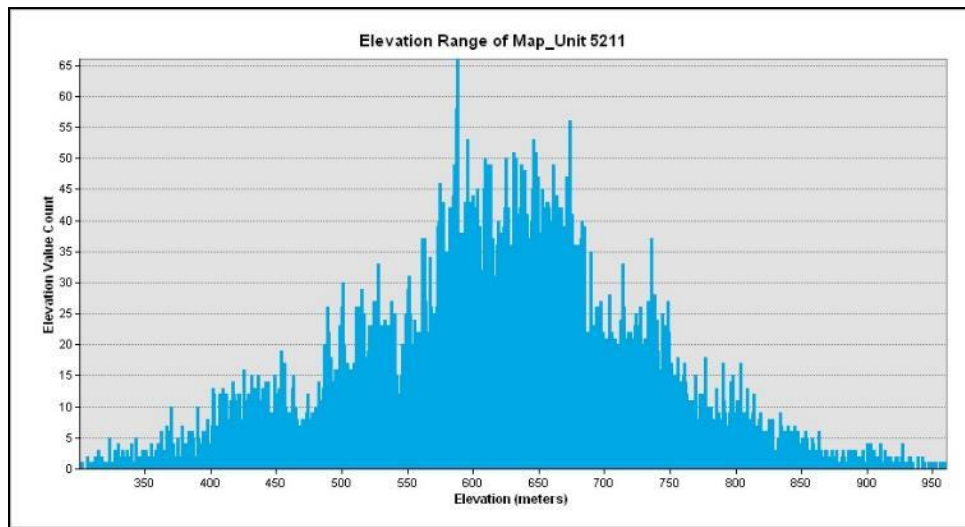
- *Eriogonum wrightii* – *Eriogonum heermannii* – *Buddleja utahensis* Alliance (4820)
– *Eriogonum wrightii* can have a similar ghostly appearance that may be also hard to detect on lower resolution NAIP images. However, *E. wrightii* favors north-facing slopes above 4000 feet in elevation, whereas *E. actonii* typically occurs at lower elevations and on southerly exposed slopes. Both may occupy disturbed stands.

***Encelia (actonii, virginensis) – Viguiera reticulata* Alliance (5211)**



DISTRIBUTION: Mapping of this alliance is restricted to the southwestern edge of the Southern Sierra Nevada Foothills Proper subarea in the dry grasslands north and south of the Kern River, with a few additional sites on the eastern edge of the subarea in the vicinity of Lake Isabella. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

***Encelia (actonii, virginensis) – Viguiera reticulata* Alliance (5211)**



Ephedra californica – *Ephedra trifurca* Alliance (5620)
California joint fir – Longleaf joint-fir scrub Alliance



Aerial view of an open stand of *Ephedra californica* in rolling hills with grass understory.



Ground view of an open stand of *Ephedra californica* on rolling hills with a grass and forb understory.

***Ephedra californica* – *Ephedra trifurca* Alliance (5620)**

DESCRIPTION: *Ephedra californica* is dominant or co-dominant in the shrub overstory, forming a sparse to open canopy. Typically found in disturbed areas.

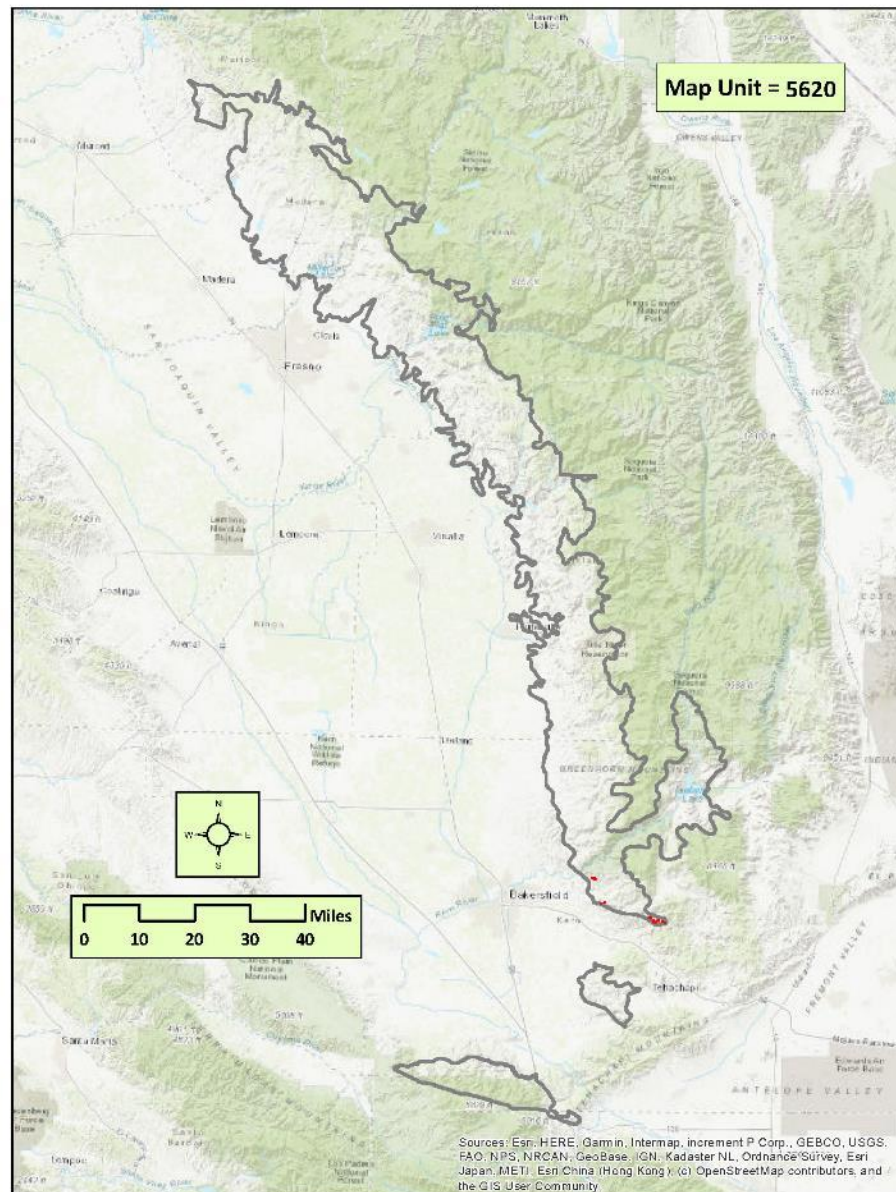
This type represents stands that are dominated by *Ephedra californica*. Stands are restricted to a small area in the southernmost arm of the Southern Sierra Nevada Foothills Proper subarea, where they are mapped on steep south-facing rocky slopes above Caliente Creek. No sites were mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: Stands of this type are typically very sparse in cover with a fuzzy light green to gray color. These plants prefer steep, thin soil, or rocky terrain on exposed south-facing slopes. On some images individuals have irregular to rounded crown shapes ranging from well-defined to diffuse. Many times, *Ephedra californica* is seen on similar slopes as *Eriogonum fasciculatum* and *Hesperoyucca whipplei*, but may be distinguished by its slightly greener and fuller crown.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

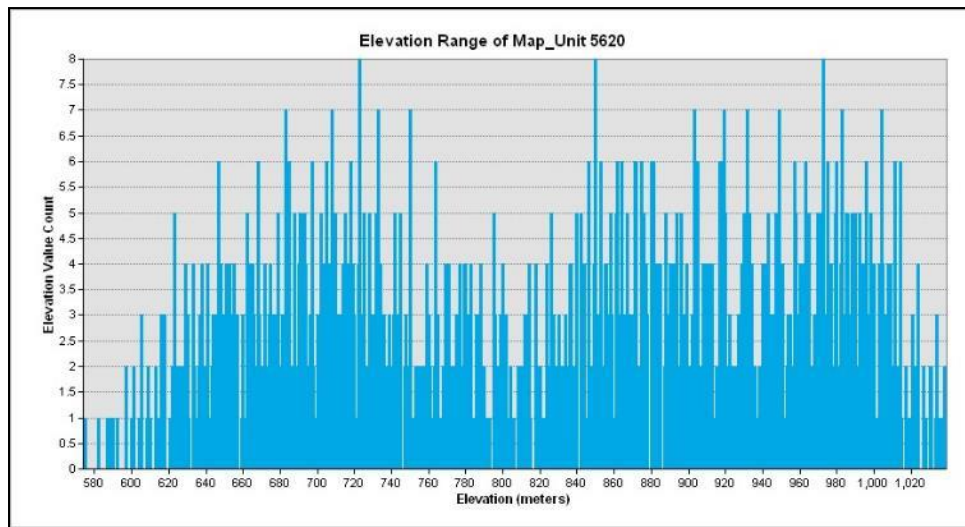
- *Encelia (actonii, virginensis)* – *Viguiera reticulata* Alliance (5211) – *Encelia actonii* was mixed into many of the mapped *Ephedra californica* stands. *Encelia* signatures were very difficult to detect on the summer NAIP images and most were mapped from field data or contextual extrapolation. This is due to the fact that it is drought deciduous and loses much of its leaves in the summer. Both species can tolerate steep rocky terrain, but *Ephedra* signature persists on most images throughout the year.
- *Ephedra viridis* Alliance (5417) – *Ephedra viridis* and *Ephedra californica* stands are difficult to tell apart using image signature, but can be differentiated by elevation and the type of substrate on which it occurs. *Ephedra viridis* is commonly mapped on uppermost slopes and ridgelines above 3000 feet. *E. viridis* also commonly occurs in clonal clumps along the edges of dark talus, however, is more individual and open along shallow soil ridgelines. In contrast, stands of *Ephedra californica* are restricted to lower elevations (usually below 3000 feet) on light-colored rocky or thin-soil substrates. *E. californica* does not exhibit a clumpy clonal appearance on imagery, but is more scattered and individual.
- *Eriogonum fasciculatum* Alliance (4810) – *Eriogonum fasciculatum* and *Hesperoyucca whipplei* also favor steep south-facing thin soil slopes, similar to *E. californicum* stands. *Eriogonum fasciculatum* signature shows a rounded to oval shrub with a dark to light gray color, while *Hesperoyucca whipplei* appears as a small dark circle. In contrast, *Ephedra californica* has a broader irregular crown, and tends to congregate on slightly less steep upper slopes or hilltops.

Ephedra californica – *Ephedra trifurca* Alliance (5620)



DISTRIBUTION: The alliance is restricted to the southernmost tip of the Southern Sierra Nevada Foothills Proper subarea, with a few sites at the southwest edge south of the Kern River. No sites were mapped in the Horsethief Mountain and San Emigdio Range subareas.

***Ephedra californica* – *Ephedra trifurca* Alliance (5620)**



Ephedra viridis Alliance (5417)

Mormon tea scrub



Aerial view of an upper elevation open stand of *Ephedra viridis* on talus and rock.



Ground view of an open stand of *Ephedra viridis*, in foreground, on a talus slope.

***Ephedra viridis* Alliance (5417)**

DESCRIPTION: *Ephedra viridis* is dominant with greater than 50% relative cover in the shrub layer. *Eriogonum fasciculatum* is present with other shrubs including *Hesperoyucca whipplei*. Herbaceous cover is sparse. Where combined cover of *Eriogonum fasciculatum* and *Hesperoyucca whipplei* is greater than that of *Ephedra viridis*, then the stand is considered as the *Eriogonum fasciculatum* Alliance.

Ephedra viridis stands are mapped only in the southern portions of the Southern Sierra Nevada Foothills Proper subarea, on the rocky exposed slopes in the Lake Isabella area. Many stands in the area are recovering from a 2016 burn. *E. viridis* form stands of highly variable cover on exposed upper slopes with varying aspects, but more typically south-facing. Species like *Juniperus californica* and *Hesperoyucca whipplei* can be associated and found within the vicinity.

This alliance is mapped within small openings of *Pinus monophylla*, *Quercus john-tuckeri* and other chaparral at mid to higher elevations on variable aspects on both the northern and southern sides of the San Emigdio Range subarea. This type is mapped often in areas that are recently burned. Stands frequently have a component of *Eriogonum fasciculatum*. Young post-fire shrubs of this alliance are often noted in areas of standing dead vegetation that were burned about 10 years prior to the imagery.

PHOTO INTERPRETATION SIGNATURE: Individual shrubs are small and form larger clonal patterns. Cover varies considerably even across small stands, and in some areas can be very sparse. Signature ranges from a fuzzy light green to gray color to medium bright to dark green. On some images individuals have irregular to rounded-crown shapes with well-defined to diffuse edges. These plants prefer steep, thin soil, or rocky terrain on exposed south-facing slopes. Many times, *Ephedra californica* is seen on similar slopes as *Eriogonum fasciculatum* and *Hesperoyucca whipplei*, but may be distinguished by its slightly greener and fuller crown.

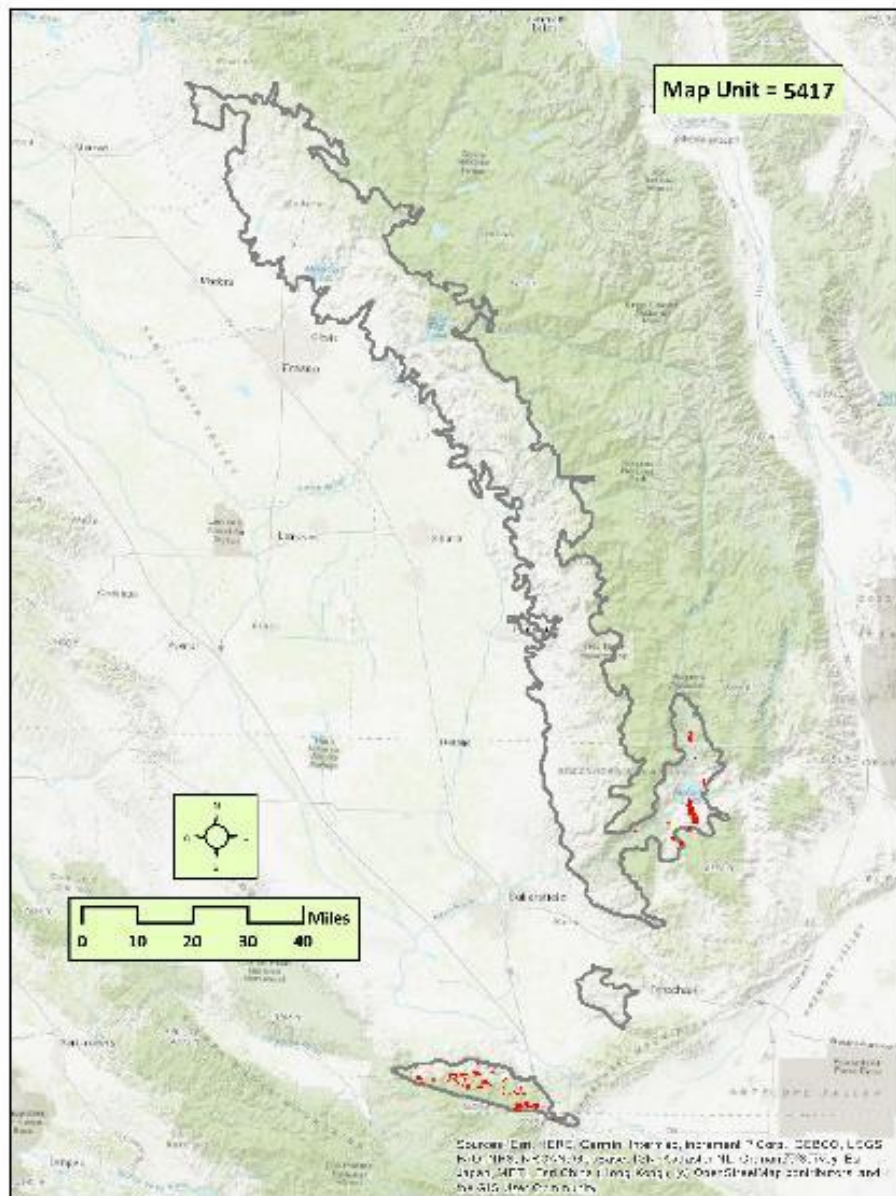
TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

- *Ephedra californica* – *Ephedra trifurca* Alliance (5620) – *Ephedra californica* and *Ephedra viridis* stands are virtually impossible to tell apart using image signature alone, but can be differentiated by elevation and the type of substrate on which it occurs. *Ephedra viridis* is commonly mapped on uppermost slopes and ridgelines above 3000 feet. *E. viridis* also commonly occurs in clonal clumps along the edges of dark talus and appear more individual and open along shallow soil ridgelines. In contrast, stands of *Ephedra californica* are restricted to lower elevations (usually below 3000 feet) on light-colored rocky or thin-soil substrates. *E. californica* does not exhibit a clumpy clonal appearance on imagery, but is more scattered and individual.
- *Eriogonum fasciculatum* Alliance (4810) – *Eriogonum fasciculatum* occasionally co-dominates the stand. Crowns are significantly smaller than the *Ephedra* clones and yield a brownish to gray signature. In numerous examples, *E. fasciculatum* may occupy significant areas of the stand but cover in these micro patches is considerably lower.

***Ephedra viridis* Alliance (5417)**

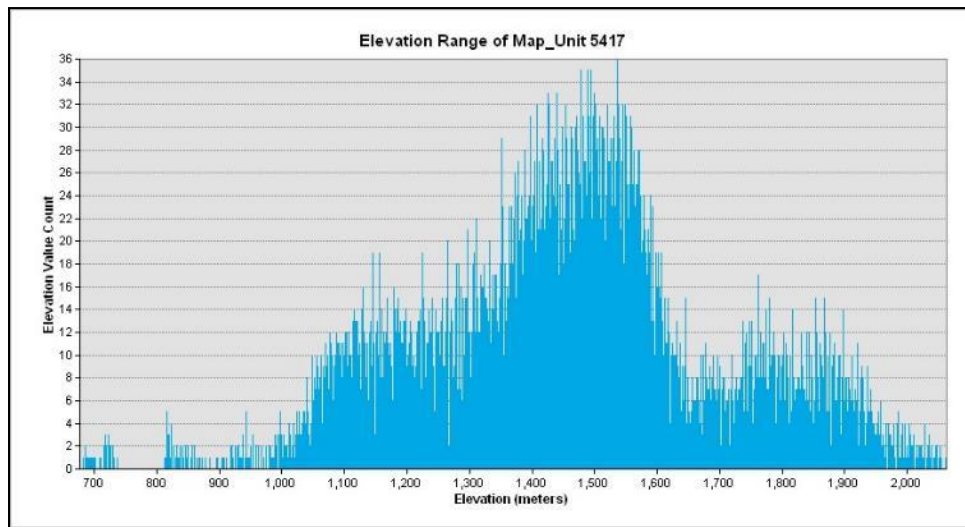
- *Eriogonum wrightii* – *Eriogonum heermannii* – *Buddleja utahensis* Alliance (4820)
– *Eriogonum wrightii* stands are also limited to the slopes surrounding Lake Isabella. This species can be found on a wide variety of aspects and many of the stands are recovering post-fire. *Ephedra viridis*, *E. fasciculatum*, and *Ericameria linearis* may be found mixing into these stands with varying cover and distribution. *Eriogonum wrightii* appears as a dull gray small shrub with hazy undefined crown edges.

***Ephedra viridis* Alliance (5417)**



DISTRIBUTION: This alliance is limited to two areas. First, it occurs in clusters in the Lake Isabella portion of the Southern Sierra Nevada Foothills Proper subarea. Second, it is common and well distributed throughout the San Emigdio Range subarea. No sites are mapped in the Horsethief Mountain subarea.

Ephedra viridis Alliance (5417)



Ericameria linearifolia – *Cleome isomeris* Alliance (4710)

Narrowleaf goldenbush – Bladderpod scrub Alliance



Aerial view of an open stand of *Ericameria linearifolia*-*Cleome isomeris* Alliance on rolling hills with a grass understory.



Ground view of *Cleome isomeris* on a moderate slope with a grass understory.

***Ericameria linearifolia* – *Cleome isomeris* Alliance (4710)**

DESCRIPTION: *Ericameria linearifolia*, *Cleome isomeris*, or *Eastwoodia elegans* are dominant or co-dominant in the shrub layer. Typically found on north-facing, steep slopes in the southern Sierra Nevada Foothills, in the Tehachapi Mountains, and San Emigdio Mountains. Where *Ericameria linearifolia* co-dominates in a desert environment with desert species, then the stand is considered as the *Eriogonum fasciculatum* – *Viguiera parishii* Alliance.

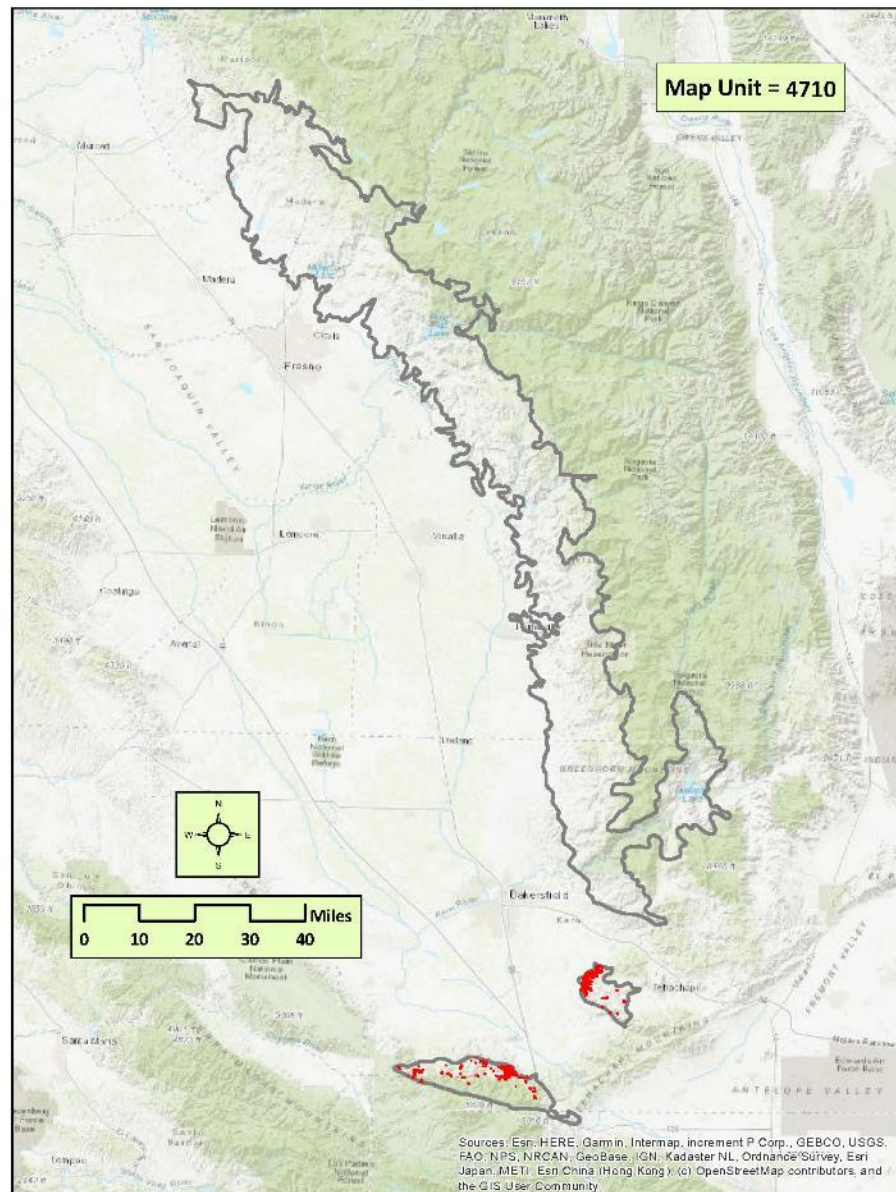
This Alliance is mapped in small to medium stands, almost exclusively on northerly trending aspects in steep settings. Stands are most frequently mapped below 3000 feet in the lower elevations on the western margins of the Tehachapi Mountains of the Horsethief Mountain subarea, and on the north side of the San Emigdio Range subarea below 4000 feet. Where shrub cover is highest, mapped stands appear to be strongly dominated by the single shrub, *Ericameria linearifolia*. No sites are mapped in the Southern Sierra Nevada Foothills Proper subarea.

PHOTO INTERPRETATION SIGNATURE: Cover varies considerably across the stand but where cover is relatively high, shrub spacing is fairly consistent. Individual shrubs are quite small and yield a light gray to light brown signature. Understory herbaceous cover is reliably dense yielding the tan signature characteristic of annual grasses. Exposed rocky or gravelly features are rare in stands. In sparse settings, it is difficult to discern which species dominate but plot data may suggest *Cleome isomeris* has a higher relative cover.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

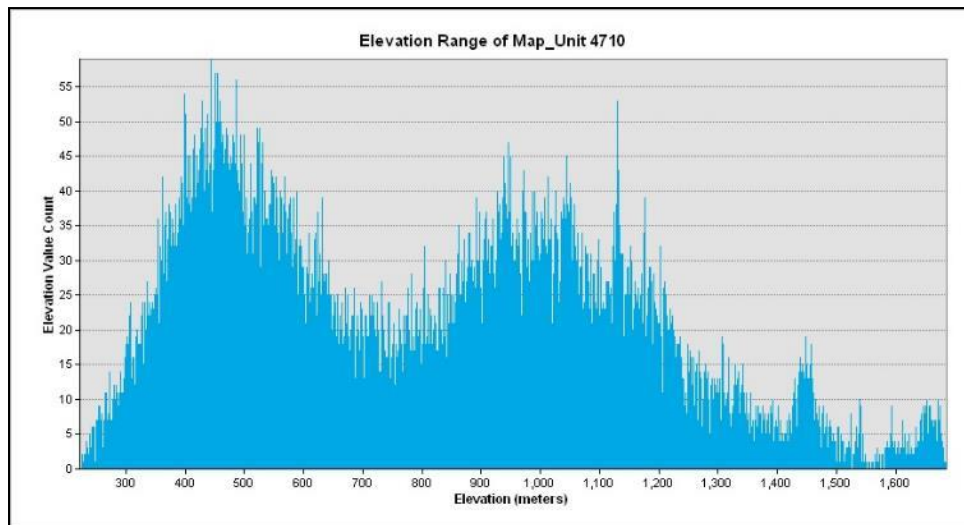
- *Ericameria nauseosa* Alliance (5212) – *Ericameria nauseosa* has a larger crown that is tall enough to yield a shadow in some circumstances. Overall shrub cover never trends towards the browns but rather a light to medium gray color with varying amounts of blue depending on leaf vigor. *E. nauseosa* is not as tied to a specific aspect and cover varies randomly across the stand. Both alliances tend to have a dense herbaceous understory.
- *Eriogonum fasciculatum* Alliance (4810) – *Eriogonum fasciculatum* occupies slightly steeper settings overall on thinner soil. Stands are more frequently mapped on hotter south-trending mid and upper slopes. It is likely for the two alliances to join each other at the summits of small east-west-trending spurs. In healthy peak phenology stands, *E. fasciculatum* has a dark brown signature with a slightly larger crown. In typical phenology, it is difficult to discern the two species.
- *Eriogonum fasciculatum* – *Viguiera parishii* Alliance (5428) – This desert version of *Eriogonum fasciculatum* narrowly overlaps with *Ericameria linearifolia* east of Lake Isabella. Both species intermix on northerly facets, but the *Ericameria* drops out on southerly slopes. Signatures are very similar, appearing as small faint gray shrubs in moderately open to sparse stands. On some images, *Ericameria* may exhibit a light brown color tone with individuals evenly spaced on a north-facing slope. Fires and human disturbance in this area have significantly impacted cover density and species composition of these stands.

***Ericameria linearifolia* – *Cleome isomeris* Alliance (4710)**



DISTRIBUTION: Common in the northern half of the San Emigdio Range subarea and in the western edge of the Horsethief Mountain subarea, with a few more sites in the remainder to the east. No sites are mapped in the Southern Sierra Nevada Foothills Proper subarea.

***Ericameria linearifolia* – *Cleome isomeris* Alliance (4710)**



Ericameria nauseosa Alliance (5212)

Rubber rabbitbrush scrub Alliance



Aerial view of an intermittent to dense stand of *Ericameria nauseosa* on relatively flat terrain. Note the blue-gray color signature.



Ground view of a stand of *Ericameria nauseosa*, in the foreground, with intermittent cover. Note the blue-green color of the plants, and their wispy crown texture.

***Ericameria nauseosa* Alliance (5212)**

DESCRIPTION: *Ericameria nauseosa* dominates stands in recently burned or otherwise disturbed portions of the southern foothills. If *E. nauseosa* is co-dominant with *Eriogonum fasciculatum*, then the stand is considered as the *E. fasciculatum* Alliance. If present, *Juniperus californica* has trace cover. Several subspecies are included in this type (e.g., *E. nauseosa* var. *mohavensis* in the cismontane or desert sides of the study area, or *E. nauseosa* var. *hololeuca* in some semi-riparian stands in the Tehachapi Mountains).

Mapping of the *Ericameria nauseosa* Alliance in the Southern Sierra Nevada Foothills Proper subarea is restricted to disturbed terraces along the shoreline of Lake Isabella, within the Kern River floodplain, and in shallow side drainages feeding into the Kern River. Disturbance influences vary from clearing to grazing to fire, with *E. nauseosa* typically being the sole dominant in many of these stands.

In the San Emigdio Range subarea, this alliance is mapped exclusively in the foothills at lower elevations in the San Emigdio Mountains. Stands are concentrated north of the summit ridgeline and in the eastern margins of the subarea near Lebec and Frazier Park. For the most part, stands are mapped where *E. nauseosa* strongly dominates the shrub layer with highly variable cover. Stands are concentrated in post-disturbance environments, especially where vegetation has been cleared or heavily grazed.

PHOTO INTERPRETATION SIGNATURE: *Ericameria nauseosa* has a highly variable signature albeit within a narrow range of color from gray with a bluish trend, gray with a light tone, to gray with a darker tone. Some stands with a younger leaf may trend slightly green. Color is determined by leaf age and vigor. The most common signature color is blue to light gray. Cover density also varies highly across the stand. Stands on level topography may contain a minor component of *Artemisia tridentata*, and in these settings shrub cover is usually high. On steeper topography there may be a component of *Eriogonum fasciculatum*, and in these settings shrub cover is low.

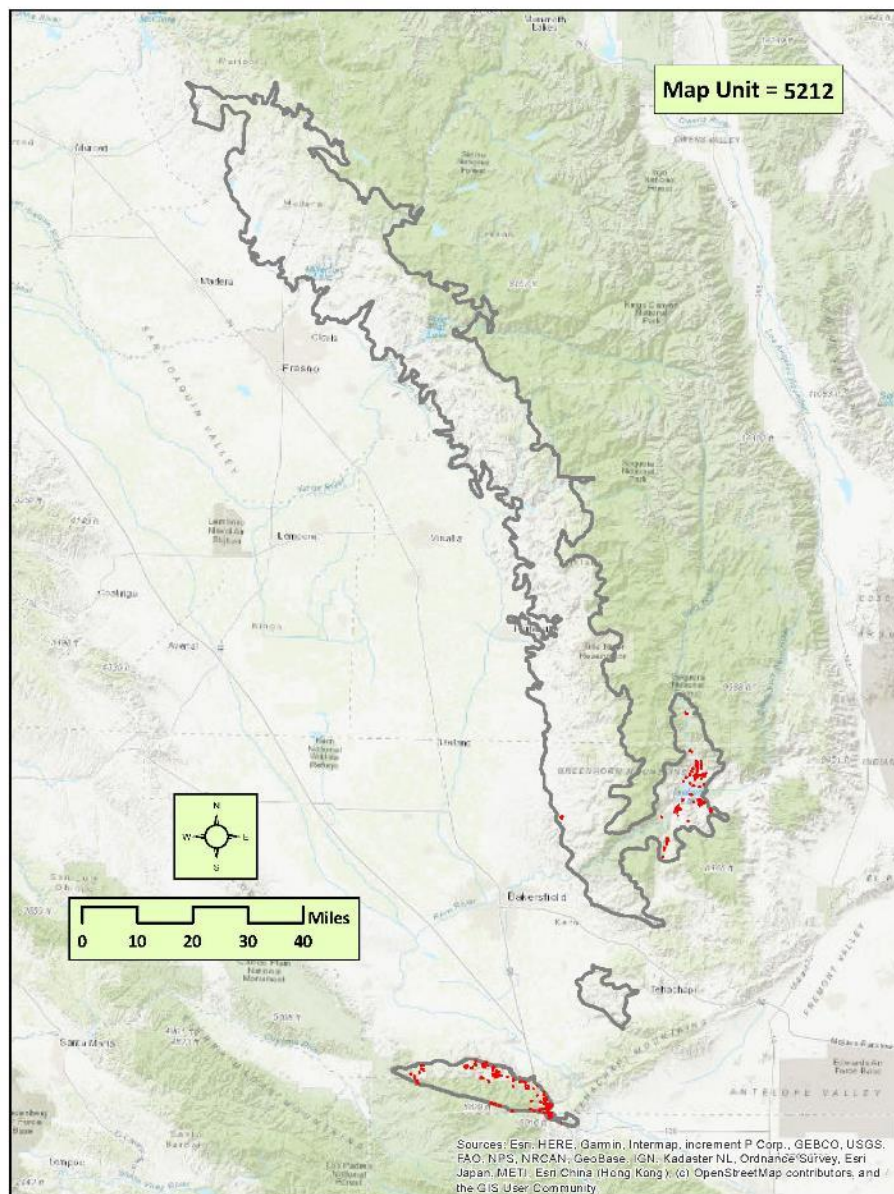
TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

- *Artemisia tridentata* Alliance (5311) – *Artemisia tridentata* is generally higher in cover, is found on more level topography, and yields a darker blue signature.
- *Atriplex polycarpa* Alliance (5710) – *Atriplex polycarpa* is mapped in lower elevations in hotter more arid regions closer to the San Joaquin Valley. Signature color varies considerably less than *E. nauseosa*, generally trending from light gray to gray with a slight bluish cast. Cover is similar but more erratic and patchier with less of a gradient across the stand.
- *Ericameria linearifolia* – *Cleome isomeris* Alliance (4710) – *Ericameria linearifolia* is restricted to north-trending slopes. Shrubs are smaller and color variability less extreme, ranging from light gray to light gray with a slightly brownish tint. Although mapped stands are significantly smaller, cover density still varies considerably.

***Ericameria nauseosa* Alliance (5212)**

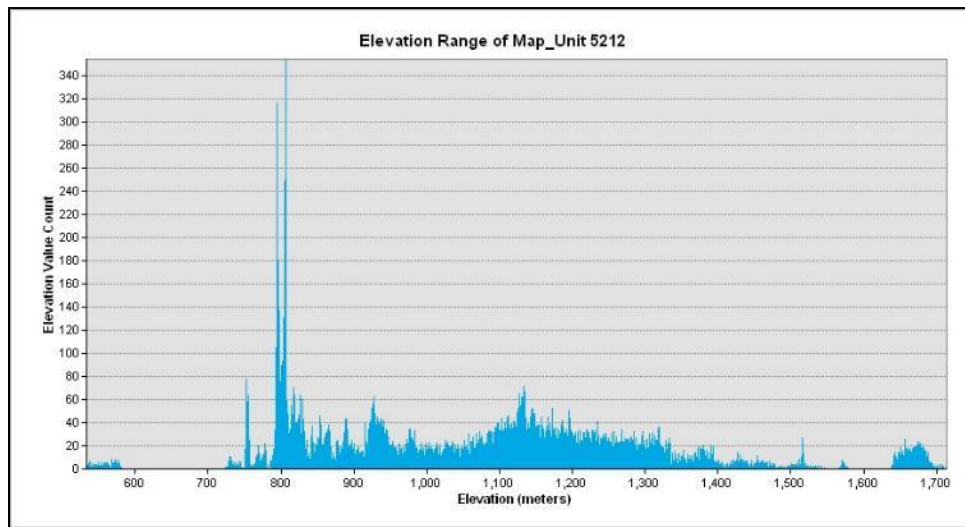
- *Lepidospartum squamatum* Alliance (5610) – *Lepidospartum squamatum* is restricted to gravelly or cobbly washes. At times the two alliances are mapped next to each other where fluvial scouring decreases. In these settings the stand boundary can be difficult to determine.

Ericameria nauseosa Alliance (5212)



DISTRIBUTION: The alliance is common in the Lake Isabella portion of the Southern Sierra Nevada Foothills Proper subarea, with a couple of sites in the vicinity of Minotti and Grimaud Creeks. It is mapped throughout the San Emigdio Range subarea primarily along the west, northeast, and southeast perimeter. No sites are mapped in the Horsethief Mountain subarea.

Ericameria nauseosa Alliance (5212)



Eriogonum fasciculatum Alliance (4810)

California buckwheat scrub Alliance



Aerial view of an open to intermittent stand of *Eriogonum fasciculatum* on thin-soil to rocky substrate.



Ground view, in foreground, of an open stand of *Eriogonum fasciculatum* on a thin-soil substrate with some grass in the understory. Note the rusty-colored dried inflorescences characteristic of *Eriogonum*.

***Eriogonum fasciculatum* Alliance (4810)**

DESCRIPTION: *Eriogonum fasciculatum* and/or *Hesperoyucca whipplei* are dominant or co-dominant in the shrub layer together usually accounting for greater than 50% of the shrub cover. Stands are found on steep slopes typically west of the Sierra crest from west of Sequoia National Park to the Tehachapi and San Emigdio Mountains. Occasionally, *Encelia actonii* is dominant on steep gravelly slopes with *H. whipplei* present. *E. actonii* dominant in washes or with desert species is considered as the *Encelia (actonii, virginensis) – Viguiera reticulata* Alliance. Where combined cover of *Eriogonum fasciculatum* and *Hesperoyucca whipplei* is less than that of *Ephedra viridis*, then the stand is considered as the *Ephedra viridis* Alliance.

The *Eriogonum fasciculatum* Alliance is extensively mapped throughout the southern portion of the Southern Sierra Nevada Foothills Proper subarea, on exposed rocky or thin-soil slopes and ridgelines. Aspect is typically south-facing but stands may spill over the ridge onto the north slope. It can also be a disturbance follower (fire/clearing/grazing) on low toe slopes and floodplain terrace margins. Stand cover can vary widely from very sparse and open without much of an herbaceous component, to denser stands on gentler slopes with less shallow soils and a moderate amount of herbaceous cover. Associated species for this type include *Hesperoyucca whipplei*, *Encelia actonii*, *Ephedra californica*, and *Ephedra viridis*.

This alliance is frequently mapped in the low to mid elevations, especially in the northern portions of the San Emigdio Range subarea and western slopes of the Tehachapi Mountains in the Horsethief Mountains subarea. Stands are best developed on southerly aspects on moderately steep mid to upper slopes. Shrub cover is typically low and variable across the stand. This alliance is mapped on thin soils, often with intermittently-occurring exposed rocky outcroppings. Herbaceous cover is variable depending on the substrate characteristics but is usually lower than other small shrub alliances such as *E. linearifolia* and almost always lower than vegetation dominated by *E. nauseosa*.

PHOTO INTERPRETATION SIGNATURE: Sparse stands of *Eriogonum fasciculatum* may yield an indistinct light to medium dark gray signature, with only the most vigorous stands containing a rounded and more distinctive brown or reddish-brown signature in plants with healthy stems. There is a fairly strong correlation to this species topographic and substrate characteristics. The sparse cover can at times be obscured by annual grasses making this alliance difficult to delineate.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

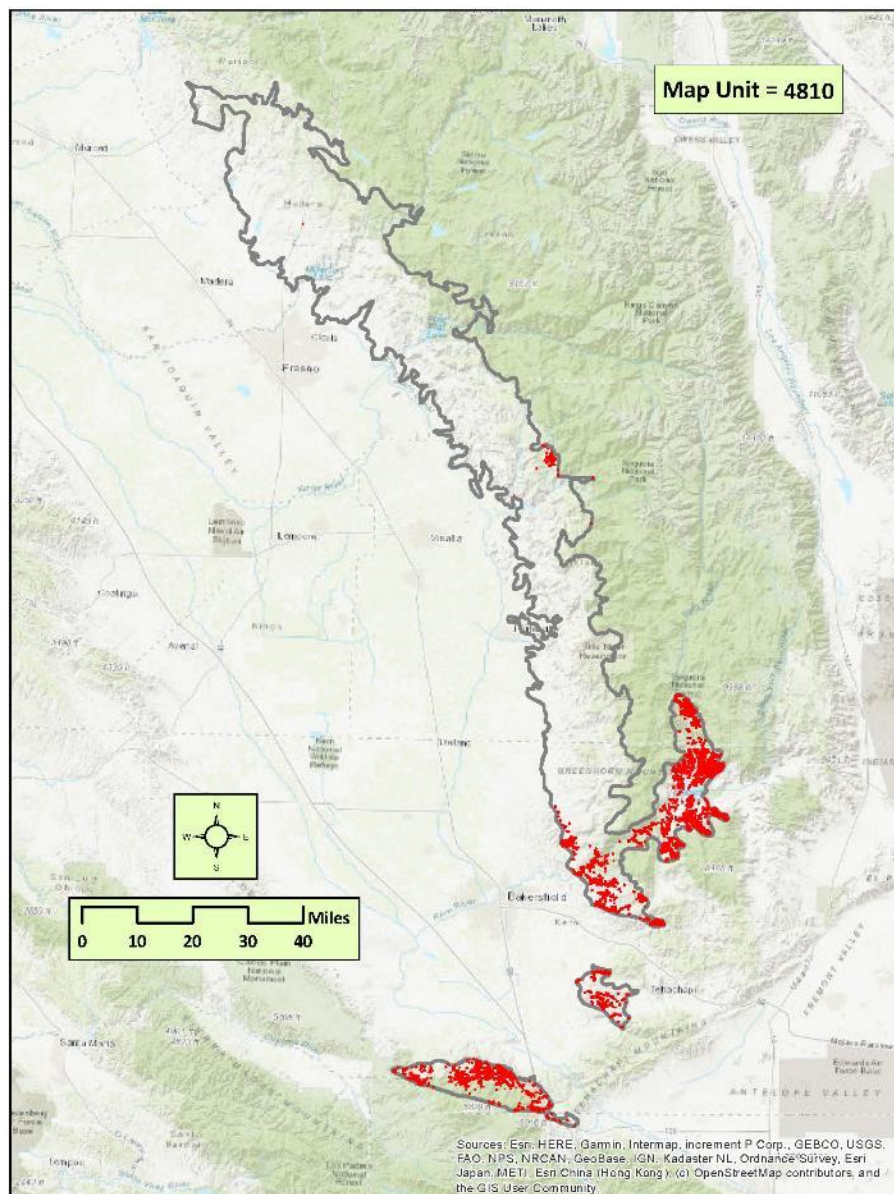
- *Ceanothus cuneatus* Alliance (4113) – *Ceanothus cuneatus* has a larger rounded gray crown that is well-defined for healthy individuals.
- *Encelia (actonii, virginensis) – Viguiera reticulata* Alliance (5211) – *Encelia actonii* mixes into *Eriogonum fasciculatum* stands in the Caliente Creek area and in the heavily grazed western grassland hills along the edge of the *Quercus douglasii* savannah zone. Due to *Encelia actonii*'s drought deciduous nature, signatures on the NAIP base imagery (which are usually flown in the summer)

***Eriogonum fasciculatum* Alliance (4810)**

are many times undetectable or very faint. Therefore, ground data is used to verify presence and distribution of this species.

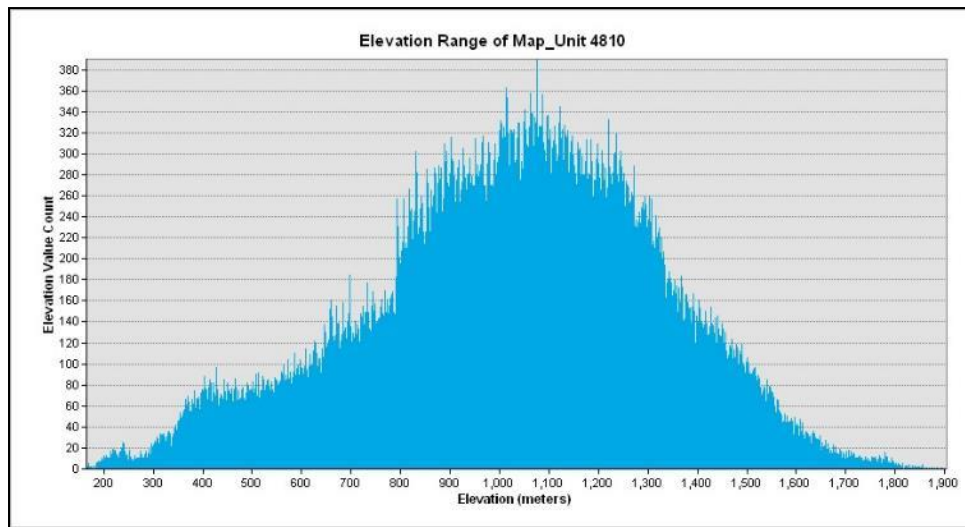
- *Ephedra californica* – *Ephedra trifurca* Alliance (5620) – *Ephedra californica* locally interfaces with *Eriogonum fasciculatum* stands in the Caliente Creek area. Both can occur on steep thin-soil substrates, but locally *E. californica* dominant stands occurred on substrates with slightly more soil and grass. *Ephedra* signatures exhibit a slightly larger and more irregularly shaped crown than *E. fasciculatum*. Both species' signatures can vary on the gray color scale, although on some images a green tone might be visible, correlating it to *Ephedra californica*.
- *Ephedra viridis* Alliance (5417) – *Ephedra viridis* at times will occur in proximity to or overlay with *E. fasciculatum*. Signature differences are generally recognizable. *Ephedra viridis* forms distinct clones with visible small openings within the clone. Signature color is a distinct medium green when stands are mature. Stressed clones can have similar colors to *E. fasciculatum* (light to medium grays) but the *Eriogonum* does not exhibit typical clonal patterning.
- *Ericameria linearifolia* – *Cleome isomeris* Alliance (4710) – *Ericameria linearifolia* is reliably found on slopes trending north while *E. fasciculatum* generally trends on south-trending aspects. Shrub cover density in stands of *E. linearifolia* are usually higher.
- *Eriogonum fasciculatum* – *Viguiera parishii* Alliance (5428) – This alliance is defined by the presence of other desert species associated with these buckwheat stands. Stand distribution of this type is limited to a small section along the desert margin east of Lake Isabella. *Yucca brevifolia*, *Cylindropuntia* spp., *Hesperoyucca whipplei*, *Encelia actonii*, and *Ericameria linearis* are common associates to these desert edge stands.
- *Eriogonum wrightii* – *Eriogonum heermannii* – *Buddleja utahensis* Alliance (4820) – *Eriogonum wrightii* is smaller in size and is typically found at higher elevations. Within the San Emigdio Range mapping subarea, it is generally found in conifer openings.
- *Lotus scoparius* – *Lupinus albifrons* – *Eriodictyon* spp. Alliance (4720) – This alliance is hard to distinguish from *E. fasciculatum*. Both stands occur in sparse cover but stands dominated with species in this alliance tend to occur in dense herbaceous cover with minimal rock or gravelly outcroppings. *E. fasciculatum* often will have small areas where cover is relatively high giving it a discontinuous cover appearance. Shrub cover in the *Lotus-Lupinus-Eriodictyon* Alliance is usually low across the stand.

Eriogonum fasciculatum Alliance (4810)



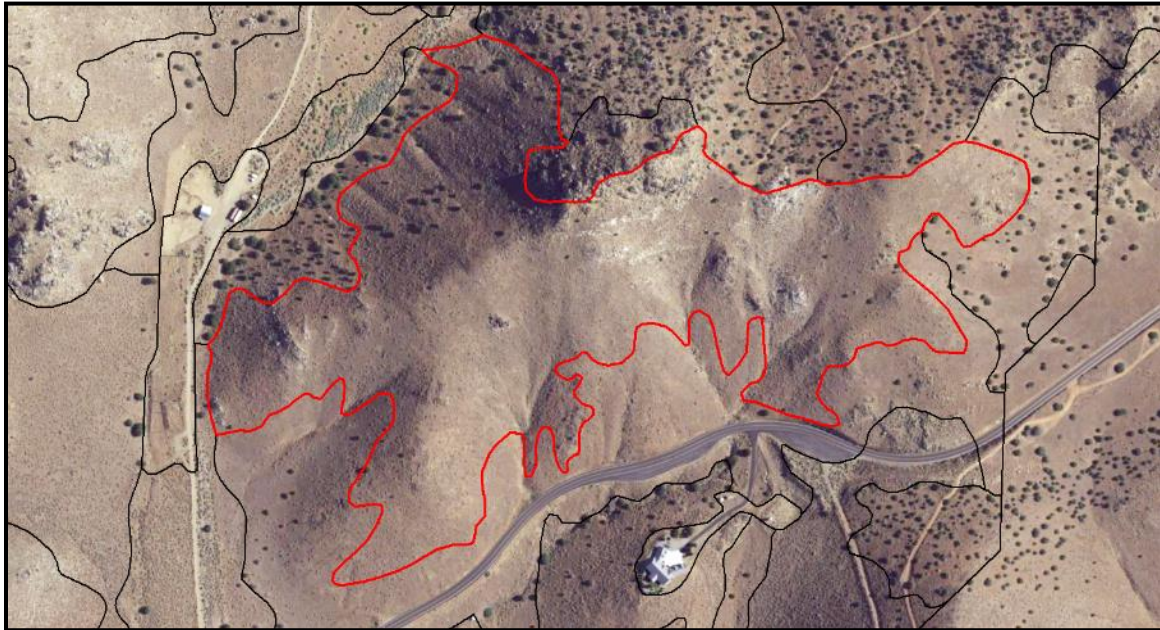
DISTRIBUTION: The alliance is very prevalent in the southernmost portion of the Southern Sierra Nevada Foothills Proper subarea, in the Lake Isabella area and south of Nightingale Gulch and Granite Road, with additional limited occurrences mapped at Sheep Ridge, Milk Ranch Peak, Shepherd Peak, and along Dry Creek. It is also very common and mapped throughout the Horsethief Mountain and San Emigdio Range subareas.

Eriogonum fasciculatum Alliance (4810)



Eriogonum fasciculatum – *Viguiera parishii* Alliance (5428)

California buckwheat – Parish's goldeneye scrub Alliance



Eriogonum fasciculatum – *Viguiera parishii* Alliance, with a mix of desert shrubs at the northeast end of Lake Isabella.



Ground view of *Eriogonum fasciculatum* – *Viguiera parishii* Alliance composed of *Eriogonum fasciculatum*, *Ericameria linearifolia*, cholla, herbs and grasses, in a desert influence environment.

***Eriogonum fasciculatum* – *Viguiera parishii* Alliance (5428)**

DESCRIPTION: *Eriogonum fasciculatum* is dominant in the shrub layer with other desert scrub species including *Ericameria* spp., *Ephedra* spp., and *Opuntia* spp. Cismontane shrub species including *Hesperoyucca whipplei* and *Ceanothus cuneatus* are typically absent. Occurs in areas transitioning to desert in the San Emigdio Mountains and east of Lake Isabella. *Ericameria linearifolia* may co-dominate.

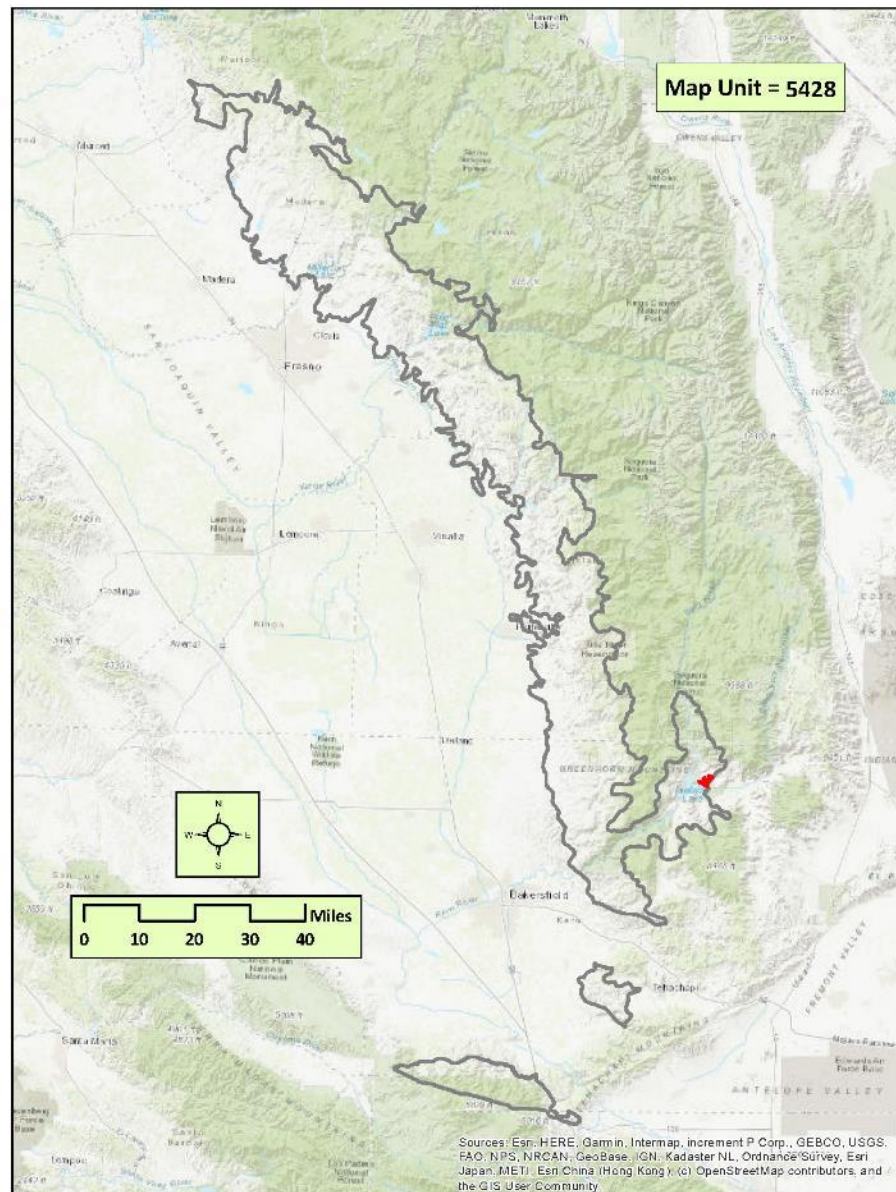
This alliance is defined by the presence of other desert species associated with these buckwheat stands. In the Southern Sierra Nevada Foothills Proper subarea, stand distribution of this type is limited to a small section along the desert margin east of Lake Isabella. Stands occurring with *Yucca brevifolia*, *Cylindropuntia* spp. *Hesperoyucca whipplei*, *Encelia actonii*, and/or *Ericameria linearis* are common associates to these desert edge stands. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: Sparse stands of *Eriogonum fasciculatum* may yield an indistinct light to medium dark gray signature, with only the most vigorous stands containing a rounded and more distinctive brown or reddish-brown signature in plants with healthy stems. There is a fairly strong correlation to this species' topographic and substrate characteristics. The sparse cover can at times be obscured by annual grasses making this alliance difficult to delineate.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

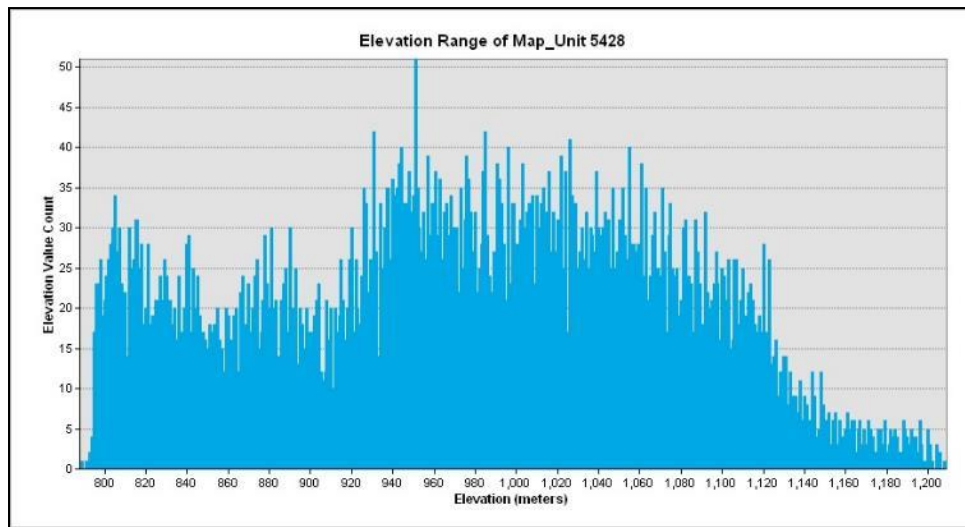
- *Ericameria linearifolia* – *Cleome isomeris* Alliance (4710) – This alliance narrowly overlaps with the desert version of the *Eriogonum fasciculatum* – *Viguiera parishii* Alliance in a small area east of Lake Isabella. Both species intermix on northerly facets, but the *Ericameria* drops out on southerly slopes. Signatures are very similar, appearing as small faint gray shrubs in moderately open to sparse stands. On some images, *Ericameria* may exhibit a light brown color tone with individuals evenly spaced on a north-facing slope. Fires and human disturbance in this area have significantly impacted cover density and species composition of these stands.
- *Eriogonum fasciculatum* Alliance (4810) – The majority of *Eriogonum fasciculatum* stands mapped in the study area are of the non-desert type. Signatures between these two types are indistinguishable and have many overlapping species. However, if *Eriogonum fasciculatum* occurs in a montane or cismontane setting, lacking desert species like *Yucca brevifolia*, *Opuntia* spp., and *Cylindropuntia* spp. in the area, then the stand is classified to the *Eriogonum fasciculatum* Alliance.
- *Eriogonum wrightii* – *Eriogonum heermannii* – *Buddleja utahensis* Alliance (4820) – *Eriogonum wrightii* is smaller in size and is typically found at higher elevations. Within the San Emigdio Mountains mapping area, it is generally found in conifer openings.

***Eriogonum fasciculatum* – *Viguiera parishii* Alliance (5428)**



DISTRIBUTION: Rare within the entire study area. Mapped only as a cluster on the northeast edge of Lake Isabella in the Southern Sierra Nevada Foothills Proper subarea. Not mapped in the Horsethief Mountain and San Emigdio Range subareas.

***Eriogonum fasciculatum* – *Viguiera parishii* Alliance (5428)**



**Eriogonum wrightii – Eriogonum heermannii – Buddleja utahensis Alliance
(4820)**

Wright's buckwheat – Heermann's buckwheat – Utah butterfly-bush scrub Alliance



Aerial view of an open stand of short-statured *Eriogonum wrightii* south of Lake Isabella.



Ground view of an open to sparse post-burn stand of *Eriogonum wrightii* on rolling terrain, with an understory of grasses and forbs.

***Eriogonum wrightii* – *Eriogonum heermannii* – *Buddleja utahensis* Alliance (4820)**

DESCRIPTION: The low shrub *Eriogonum wrightii* is characteristic and is usually dominant or co-dominant with native perennial and non-native annual herbs in rocky sites on ridges and upper slopes that often have experienced some disturbance. *Eriogonum wrightii* is found on nutrient-poor, gravelly slopes in the southern Sierra Nevada Foothills. Where *Eriogonum fasciculatum* and/or *Hesperoyucca whipplei* co-dominate, then the stand is considered as the *Eriogonum fasciculatum* Alliance (non-desert setting), or *Eriogonum fasciculatum* – *Viguiera parishii* Alliance (desert transition setting).

Eriogonum wrightii stands are limited in the Southern Sierra Nevada Foothills Proper subarea, and are mapped on grassy hills surrounding Lake Isabella. Fires have repeatedly burned and impacted many of these stands. Most are sparse in cover and still undergoing post-fire recovery. A majority of the mapped stands occur at around 3000 feet in elevation and higher. Associated species in the area include *Ericameria linearifolia*, *Eriogonum fasciculatum*, *Hesperoyucca whipplei*, and *Ericameria nauseosa*.

This alliance is mapped in high elevations of the San Emigdio Range subarea, in what was once *Pinus jeffreyi* forests that were burned in the Scott Fire about 10 years prior to the imagery. Its occurrence is uncommon in this region. It is also mapped in a few areas in lower elevation openings to *Pinus monophylla* woodlands. Stands are small to medium in size and occur in variable cover densities. Shrub cover in some stands is quite high. In this region, stands are mapped where *Eriogonum wrightii* strongly dominates the shrub cover.

PHOTO INTERPRETATION SIGNATURE: Shrubs in this alliance are extremely small, but sometimes are visible in stands with relatively high cover. In sparse and/or disturbed stands, faint gray signatures are difficult to detect on the imagery. Shrubs are a subtle brownish red to gray, often over a dense tan-colored herbaceous layer. Downed conifers are visible in several stands in this mapping area.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

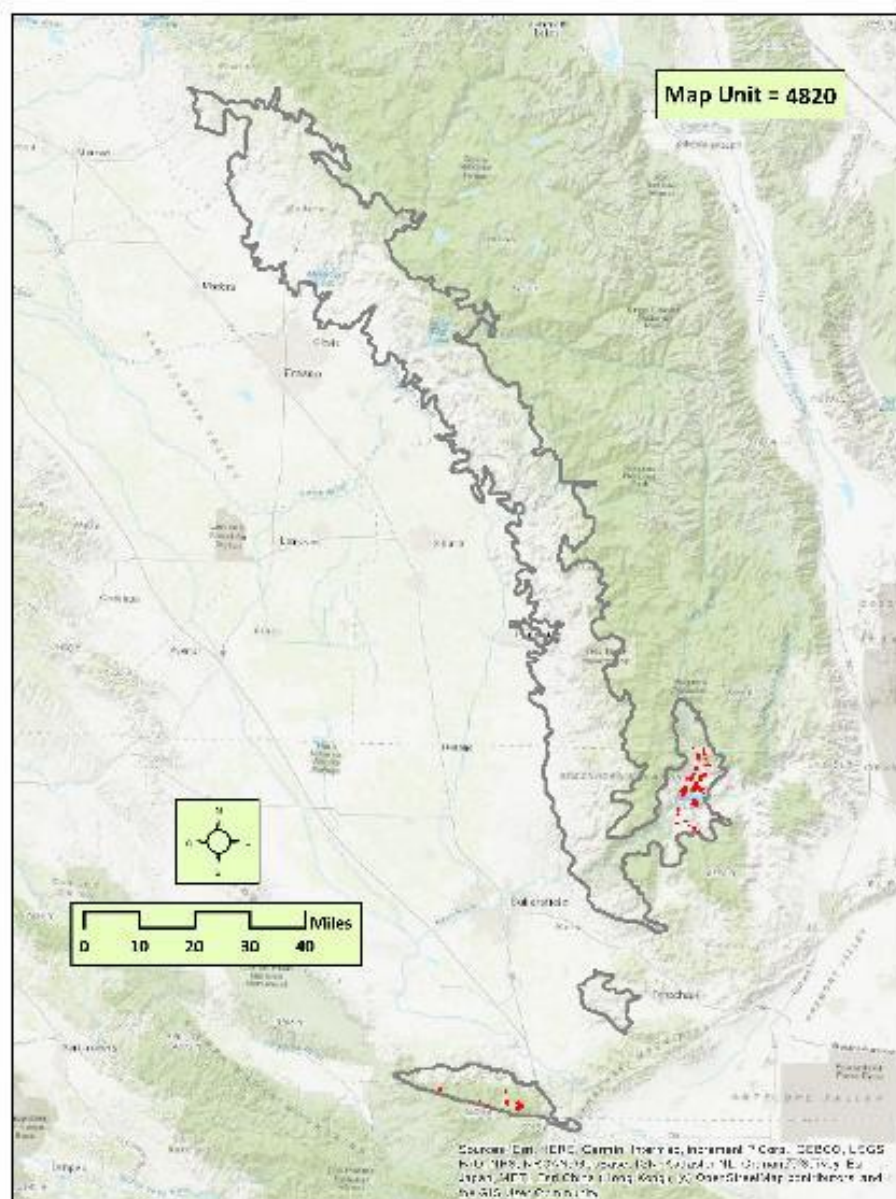
- *Encelia (actonii, virginensis)* – *Viguiera reticulata* Alliance (5211) – *Encelia actonii* mixes into some of the *Eriogonum wrightii* stands surrounding Lake Isabella. Both species in this area exhibit indistinctive signatures that do not allow for confident signature recognition. Therefore, ground data is needed to verify species distribution and stand boundaries.
- *Ericameria linearifolia* – *Cleome isomeris* Alliance (4710) – *Ericameria linearifolia* is typically found at lower elevations. The two alliances can have a high shrub cover but shrubs in the *Ericameria linearifolia* – *Cleome isomeris* Alliance are not as brown, often yielding a gray signature.
- *Eriogonum fasciculatum* Alliance (4810) – *Eriogonum fasciculatum* typically occurs at lower elevations on southerly trending mid and upper slopes on thin soil. Shrub cover in this alliance is significantly lower. Signature color in the San Emigdio Mountains rarely attains a reliably brownish color that regularly occurs in stands dominated by *E. wrightii*. Stand signatures in the Lake Isabella area are

***Eriogonum wrightii* – *Eriogonum heermannii* – *Buddleja utahensis* Alliance (4820)**

poor due to human disturbance and repeated fires. Small faint gray splotches are barely detectable on the NAIP images. For this area, ancillary imagery and field data are required to verify species composition and stand boundaries between these similar signatures.

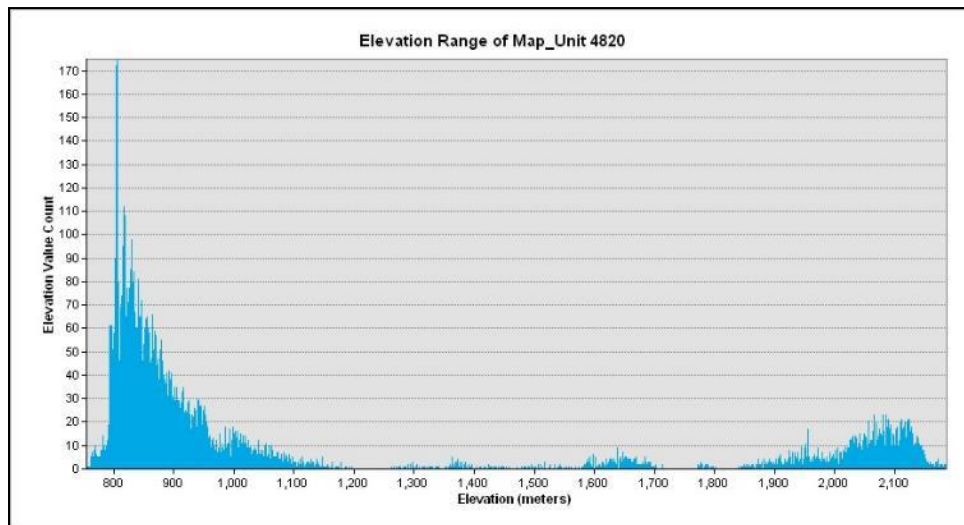
- *Eriogonum fasciculatum* – *Viguiera parishii* (5428) – This alliance is mapped locally in the grassy hills surrounding Lake Isabella, with stands of dominant *Eriogonum wrightii* on slopes nearby. In this narrow overlapping area containing both species, stand signatures are poor due to human disturbance and repeated fires. Small faint gray splotches are barely detectable on the NAIP images. Ancillary imagery and field data are required to verify species composition and stand boundaries between these similar signatures.
- *Lotus scoparius* – *Lupinus albifrons* – *Eriodictyon* spp. Alliance (4720) – This alliance occurs at lower elevations on steeper topography. Shrub cover is significantly lower and signature color is generally varying shades of gray. Where *Lotus scoparius* has a relatively high cover density, signature colors can trend brown with a reddish hue. *Eriodictyon* spp. signature colors vary from a faint hazy gray (usually late season or in decline) to a dull green on early season imagery.

***Eriogonum wrightii* – *Eriogonum heermannii* – *Buddleja utahensis* Alliance (4820)**



DISTRIBUTION: In the Southern Sierra Nevada Foothills Proper subarea, the alliance is mapped exclusively in the Lake Isabella area. It is uncommon, but mapped in several sites on the southern half of the San Emigdio Range subarea. It is not mapped in the Horsethief Mountain subarea.

***Eriogonum wrightii* – *Eriogonum heermannii* – *Buddleja utahensis* Alliance (4820)**



Lepidospartum squamatum Alliance (5610)

Scale broom scrub Alliance



Aerial view of an open to intermittent stand of *Lepidospartum squamatum* on flat terrain surrounded by grassland.



Ground view of an open to intermittent stand of *Lepidospartum squamatum* on a flat floodplain terrace, with a grass understory. Note the wispy texture of the plants.

***Lepidospartum squamatum* Alliance (5610)**

DESCRIPTION: Vegetation characterized by *Lepidospartum squamatum*. Stands are concentrated along washes on the western foothills from the Kern River south in the Sierra Nevada foothills. Usually in larger washes with regular flooding, the substrate texture is coarse sand to small cobbles to gravel. Some old senescent stands have been isolated on higher terraces adjacent to rapidly downcutting stream channels. *Baccharis salicifolia* may be sub-dominant to co-dominant. A diverse mix of species may be present, including the disturbance related species such as *Eriodictyon californicum*, *Hesperoyucca whipplei*, and *Lupinus albifrons*.

Lepidospartum squamatum stands are only mapped within southern portion of the Southern Sierra Nevada Foothills Proper subarea, along the Kern River above Lake Isabella, in tributaries of the Kern River watershed, and in the bottom of Caliente Creek. Stands occur in broad gravelly terraces along the Kern River, as well as on the edge of disturbed floodplains mitigated for flood control. Scouring from seasonal flooding cause variability of cover across stands.

In the San Emigdio Range subarea, this alliance is represented most typically in well-drained gravelly, active floodplains along Cuddy Creek. These are large stands approaching 130 meters in width along portions of the channel. Much smaller stands follow portions of Santiago Creek and along the lower portions of San Emigdio Creek to the east. In the latter two examples, stands are adjacent to *Baccharis salicifolia* thickets. In the mapping area, the alliance typifies examples occurring in semi-arid and summer dry climates where shrub cover is significantly higher than where it is found in the nearby Mojave Desert. No stands are mapped in the Horsethief Mountain subarea.

PHOTO INTERPRETATION SIGNATURE: This Alliance typically has a white to light gray, brightly colored substrate with a low to moderately high cover (highly variable across the stand) of shrubs dominated with *Lepidospartum squamatum*. Typical signature characteristics are defined by medium-sized shrubs that are dull gray-brown in color and frequently tall enough to yield a shadow against the light-colored substrate. The adjacent active stream channel is seasonally flooded and will often contain a very narrow band of riparian vegetation, especially *Baccharis salicifolia*.

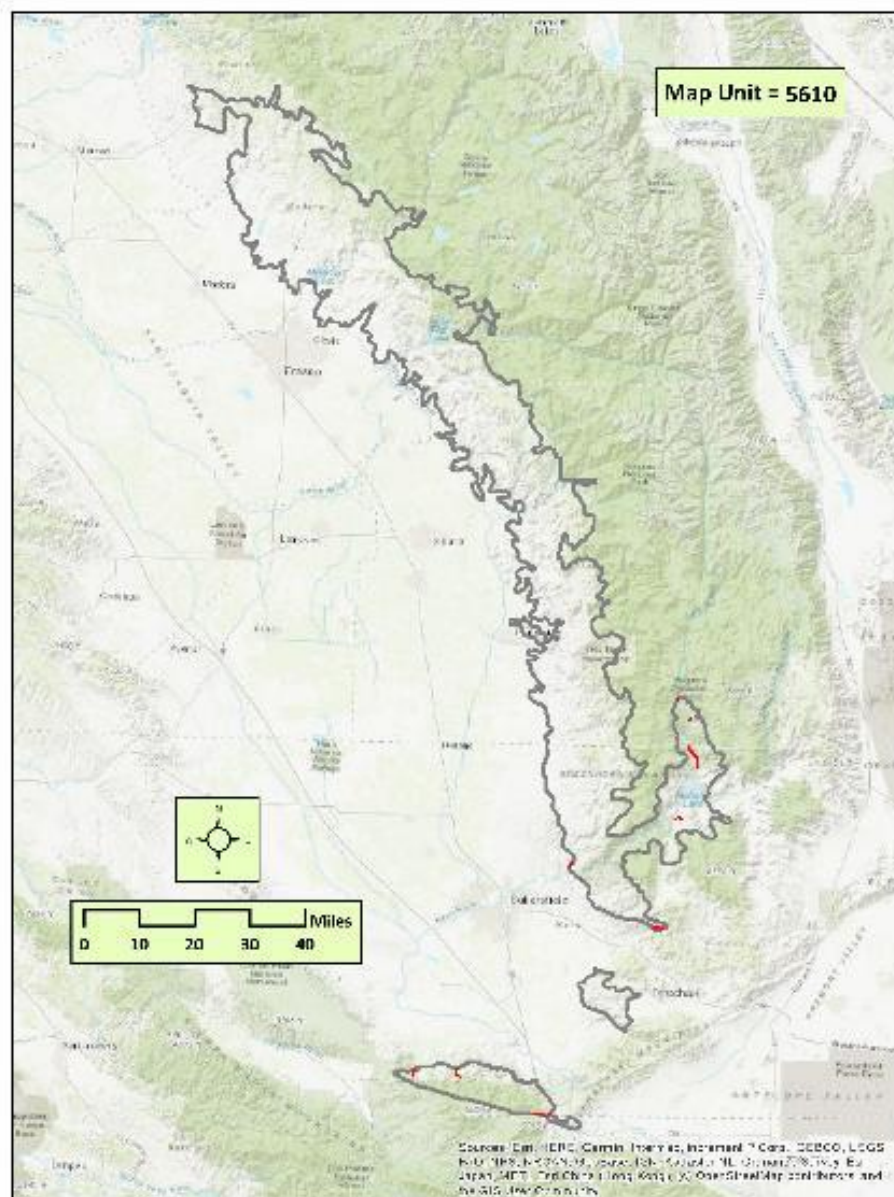
TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

- *Artemisia tridentata* Alliance (5311) – *Artemisia tridentata* can be found upslope immediately adjacent to the floodplain where *L. squamatum* occurs. Vegetation rarely overlaps. Where the two alliances occur nearby, the most reliable signature is the substrate, where *A. tridentata* occurs in dense cover obscuring the lightly colored gravelly substrate characteristic to *L. squamatum*.
- *Atriplex polycarpa* Alliance (5710) – *Atriplex polycarpa* occurs above the active floodplain in narrow bands that occasionally ascend low to mid slope up canyon draws. *A. polycarpa* has a distinct light gray to slightly bluish signature color.

***Lepidospartum squamatum* Alliance (5610)**

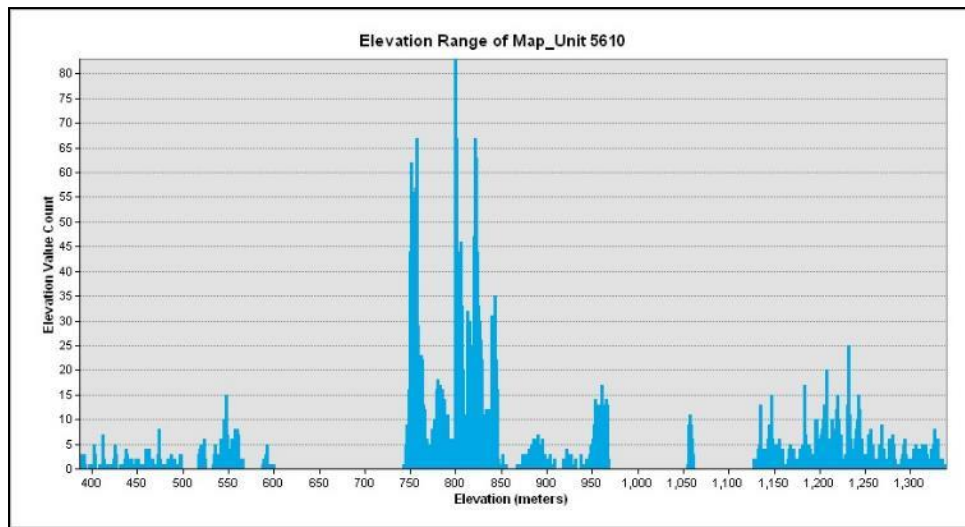
- *Baccharis salicifolia* Alliance (6210) – *Baccharis salicifolia* at times defines the active stream channel running down the center of a stand dominated by *L. squamatum*. *B. salicifolia* typically has a bright green signature contrasting markedly with the adjacent vegetation.
- *Ericameria nauseosa* Alliance (5212) – *Ericameria nauseosa* at times can be adjacent to stands of *Lepidospartum*, generally upslope and off the active floodplain. In these transitions, upland annual grasses increase significantly and yield a tan signature background.

***Lepidospartum squamatum* Alliance (5610)**



DISTRIBUTION: The alliance is mapped in limited stands along the Kern River, Rancheria Road, and Caliente Creek areas of the Southern Sierra Nevada Foothills Proper subarea. It is also mapped in a few isolated patches in several areas of the San Emigdio Range subarea. No sites are mapped in the Horsethief Mountain subarea.

Lepidospartum squamatum Alliance (5610)



Lotus scoparius – Lupinus albifrons – Eriodictyon spp. Alliance (4720)
Deer weed – Silver bush lupine – Yerba santa scrub Alliance



Aerial view of an open to intermittent stand of *Eriodictyon californicum* with a grass understory.



Ground view of an open stand of *Eriodictyon californicum* with a grass understory. Note the irregularly shaped open crowns of each plant.

***Lotus scoparius* – *Lupinus albifrons* – *Eriodictyon* spp. Alliance (4720)**

DESCRIPTION: *Eriodictyon californicum*, *E. crassifolium*, *E. parryi*, *Lupinus* spp., *Lotus scoparius*, or other disturbance related shrubs dominate the shrub canopy with low to moderate cover. *Adenostoma fasciculatum* is typically absent. Where *Encelia* occurs with disturbance shrubs in more recently disturbed or post-burn settings, the stand is considered as *Lotus scoparius* – *Lupinus albifrons* – *Eriodictyon* spp. Alliance.

This alliance is commonly mapped throughout the Southern Sierra Nevada Foothills Proper subarea as an early successional type that establishes after a fire, human, or natural disturbances. *Eriodictyon* spp. and *Lotus scoparius* are the primary disturbance-following species represented in stands of this alliance. Stands can establish on all aspects and at any elevation within the study. Dominant stands of *Lupinus* spp. constitute a smaller portion of mapped stands for this type. These are naturally occurring stands on exposed slopes with a matrix of grass and smaller rock outcroppings. For post-fire stands undergoing successional recovery, the first 3 years are usually strongly dominated by these fire-following species. However, between 3 and 5 years after the fire there is a transitional period where stand composition changes and young resprouting chaparral species begin to establish dominance, and the early successional species begin to wane.

This alliance is uncommon in the Horsethief Mountain subarea, but found in the Tejon Hills. It is poorly represented in the San Emigdio Range subarea where stands occur in lower elevations in the foothills north of the San Emigdio Range on moderately steep mid and upper slopes, and are mapped as very small stands, usually with very low cover. Several stands are represented by a high cover of *Lotus scoparius*.

PHOTO INTERPRETATION SIGNATURE: *Eriodictyon californicum* tends to have a green to grayish signature with a smooth texture; individual crowns are indistinguishable. *Lotus scoparius* has a brownish to reddish signature, occurring as very small shrubs in low to moderately high cover. *Lupinus* spp. is rarely found in cover high enough to be detectable on most imagery.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

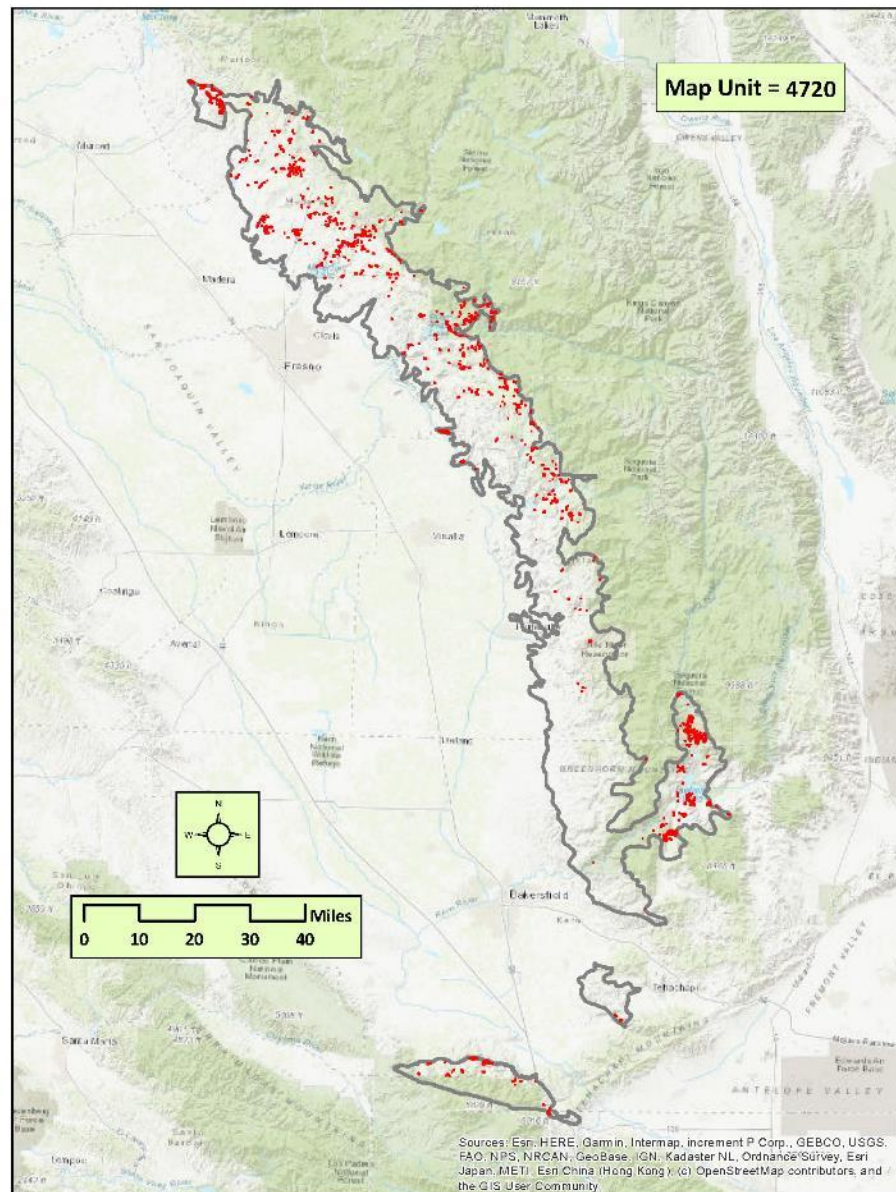
- *Ceanothus cuneatus* Alliance (4113) – *Ceanothus cuneatus* even in post-burn settings tend to have a defined crown even when co-occurring with *Eriodictyon californicum*. However, by the second or third year following a fire, young *Ceanothus cuneatus* may not be distinguishable on the imagery. Therefore, ground data is required to verify what stage of succession the stands are currently exhibiting in order to identify the dominant type.
- *Ericameria linearifolia* – *Cleome isomeris* Alliance (4710) – *Ericameria linearifolia* has a brownish to gray signature and is reliably found on north-trending aspects. Cover over at least portions of a typical stand is significant enough to discern on most imagery.
- *Eriogonum fasciculatum* Alliance (4810) – *Eriogonum fasciculatum* is generally mapped on south-facing mid and upper slopes with a thinner soil and can have visible gravelly or rocky components to the substrate. Shrub cover, although

***Lotus scoparius* – *Lupinus albifrons* – *Eriodictyon* spp. Alliance (4720)**

variable, is high enough to derive a characteristic light to medium dark gray (occasionally with a brownish tint) color signature on most imagery.

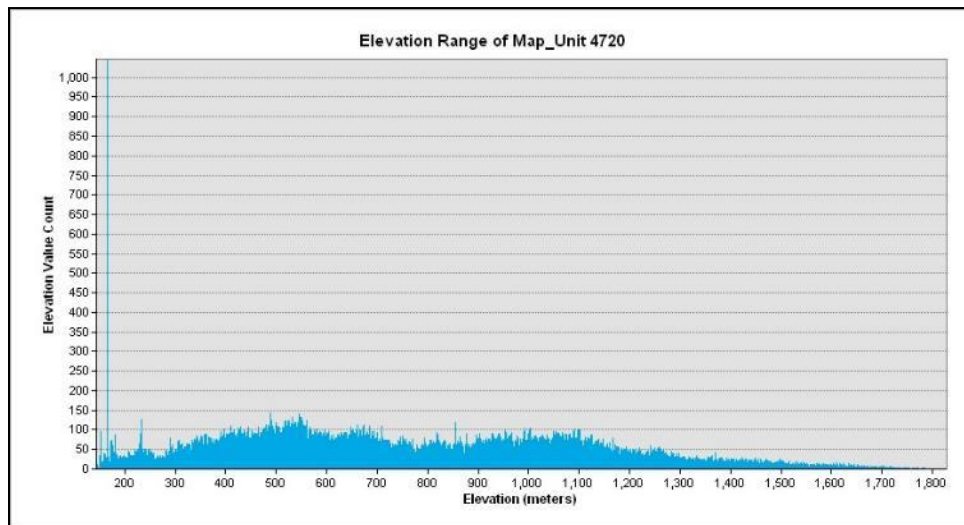
- *Eriogonum wrightii* – *Eriogonum heermannii* – *Buddleja utahensis* Alliance (4820) – *Eriogonum wrightii* is found in higher elevations within the mapping area.
- *Toxicodendron diversilobum* Alliance (6301) – *Toxicodendron diversilobum* has a similar texture but normally yields a significantly greener color.

***Lotus scoparius* – *Lupinus albifrons* – *Eriodictyon* spp. Alliance (4720)**



DISTRIBUTION: The alliance is common throughout the northern half of the Southern Sierra Nevada Foothills Proper subarea, as well as the Lake Isabella area. It is mapped along the northern half of the San Emigdio Range subarea, and in the southeastern corner of the Horsethief Mountain subarea.

Lotus scoparius – *Lupinus albifrons* – *Eriodictyon* spp. Alliance (4720)



Prunus fasciculata – *Salazaria mexicana* Alliance (5415)

Desert almond – Mexican bladdersage scrub Alliance



Aerial view of an open stand of *Prunus fasciculata*-*Salazaria mexicana* on thin-soil substrate with a grass understory.



Ground view of an open stand of *Prunus fasciculata*-*Salazaria mexicana* on a moderately steep slope, with a grass understory.

***Prunus fasciculata* – *Salazaria mexicana* Alliance (5415)**

DESCRIPTION: *Prunus fasciculata* and/or *Salazaria mexicana* are at least 2% cover and at least 25% of total relative cover. Typically, in washes and arroyos, but may occur on wash terraces or on concave rocky slopes. Cover of both *Salazaria* and *P. fasciculata* may be high following resprouting from fire. Occurs adjacent to *Eriogonum fasciculatum*, *Grayia spinosa*, or *Ephedra viridis* stands, and also occurs adjacent to *Artemisia tridentata* stands in the Tehachapi and San Emigdio Mountains.

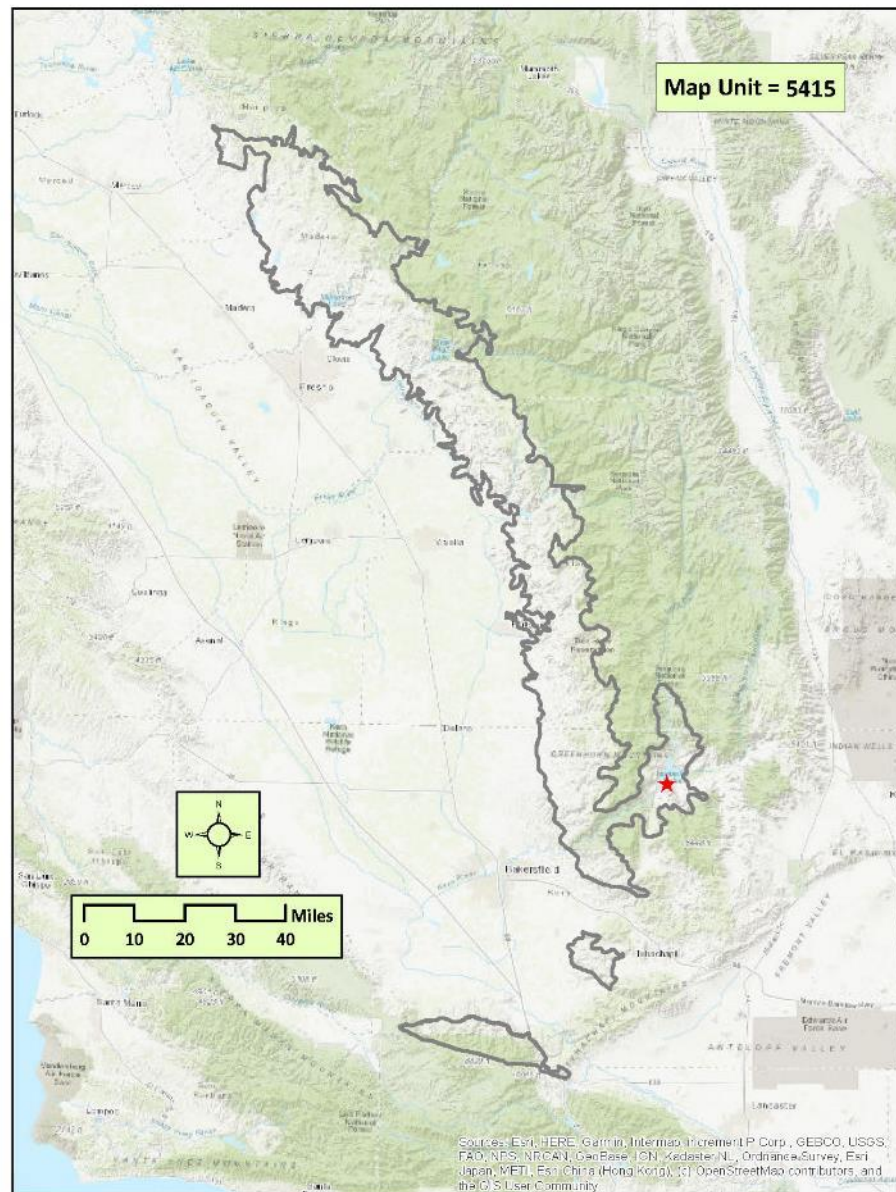
Only one stand south of Lake Isabella is mapped from field data in the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: A small stand dominated by *Prunus fasciculata* is mapped on a protected toe slope adjacent to a narrow drainage concavity. Individuals appear as a hazy light to dark gray, round shrub, with moderately open cover.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

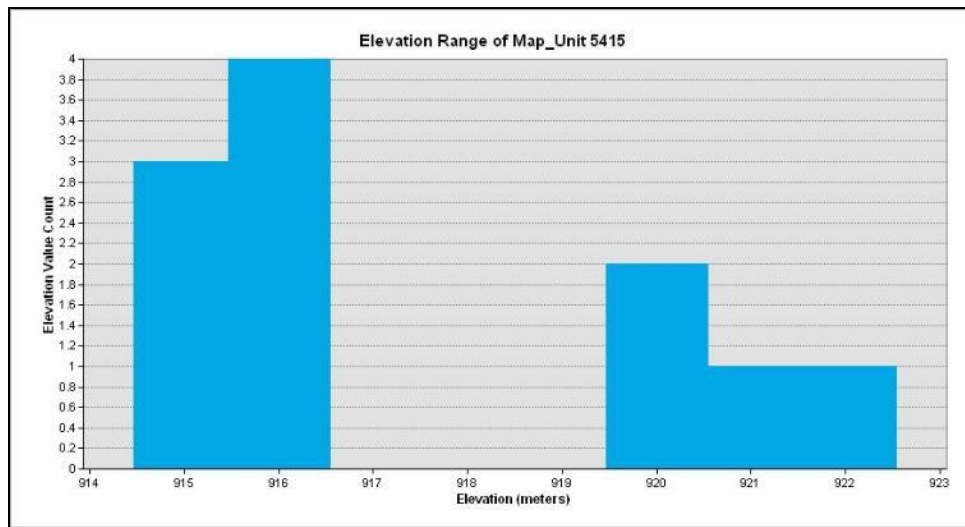
- None

***Prunus fasciculata* – *Salazaria mexicana* Alliance (5415)**



DISTRIBUTION: Only one stand south of Lake Isabella is mapped from field data in the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

***Prunus fasciculata* – *Salazaria mexicana* Alliance (5415)**



Quercus berberidifolia Alliance (4210)

Scrub oak chaparral Alliance



Aerial view of a rather dense stand of *Quercus berberidifolia* on a west-facing undulating moderately steep slope.



Ground view of a dense stand of *Quercus berberidifolia* on a steep slope.

***Quercus berberidifolia* Alliance (4210)**

DESCRIPTION: *Quercus berberidifolia* is dominant or co-dominant with other shrubs in the canopy. Trees may be emergent but have relatively low cover compared to shrubs. *Adenostoma fasciculatum*, *Ceanothus cuneatus*, *Heteromeles arbutifolia*, *Fraxinus dipetala*, or *Cercocarpus montanus* may co-dominate.

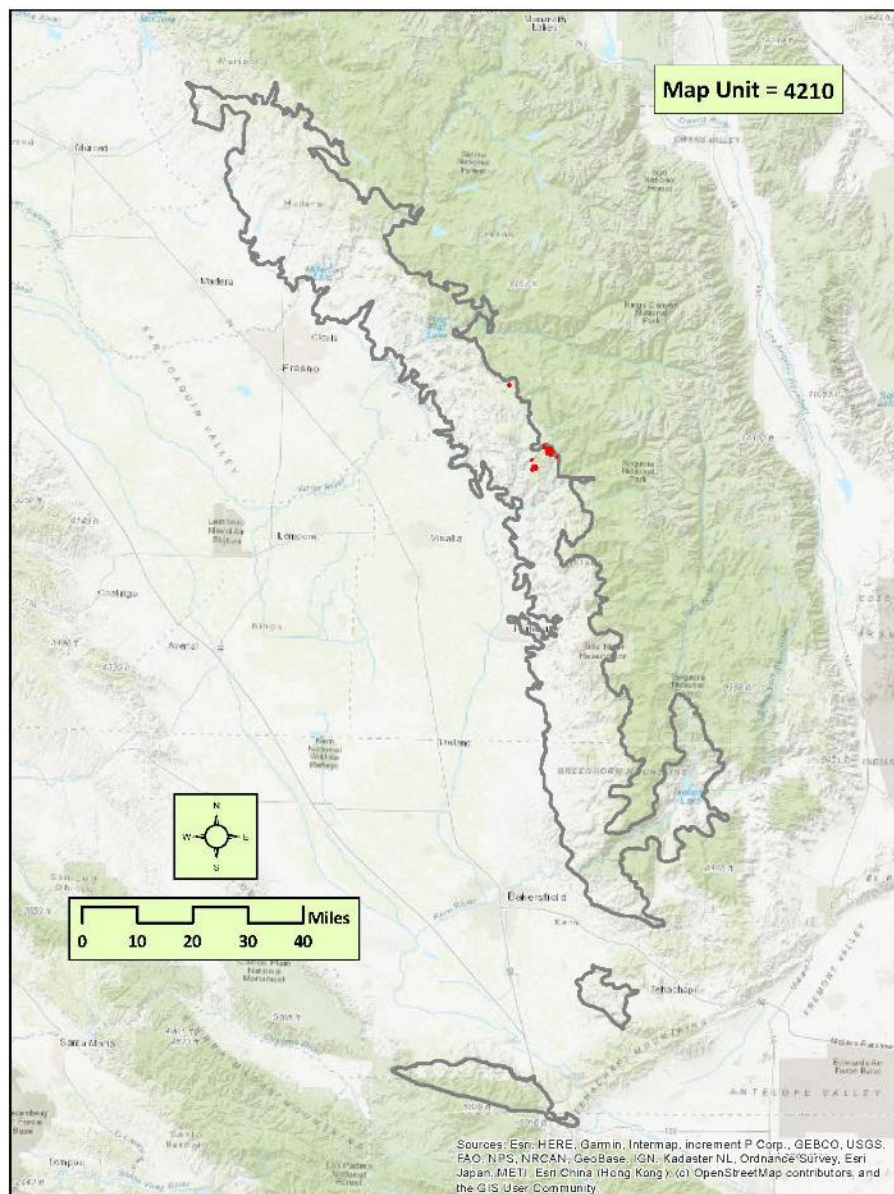
Quercus berberidifolia is mapped in three localized clusters in the central part of the Southern Sierra Nevada Foothills Proper subarea, on the upper west-facing neutral to convex slopes above the East Fork of Dry Creek, along north-facing upper spurs of Sheep Ridge, and a smaller grouping of stands on the south faces of a set of small neutral sloping hills near Johnson Flat. These stands occur between 2800-4200 feet in elevation and all have in common a propensity to establish on neutrally to convexly shaped slopes.

PHOTO INTERPRETATION SIGNATURE: *Quercus berberidifolia* typically occurs as very dense stands on neutral to convexly shaped slopes on well-drained soils. Signature characteristics appear as a green to grayish green (if unhealthy) medium-sized shrub with a fairly even crown height and a slightly bumpy texture. Diverse stands may be more variable in signature and can be difficult to discern stand composition and dominance. Species such as *Ceanothus cuneatus*, *Cercocarpus montanus*, and *Arctostaphylos viscida* can be components to these stands. *Quercus wislizeni*, *Umbellularia californica*, and *Quercus chrysolepis* stands are mapped in the surrounding areas.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

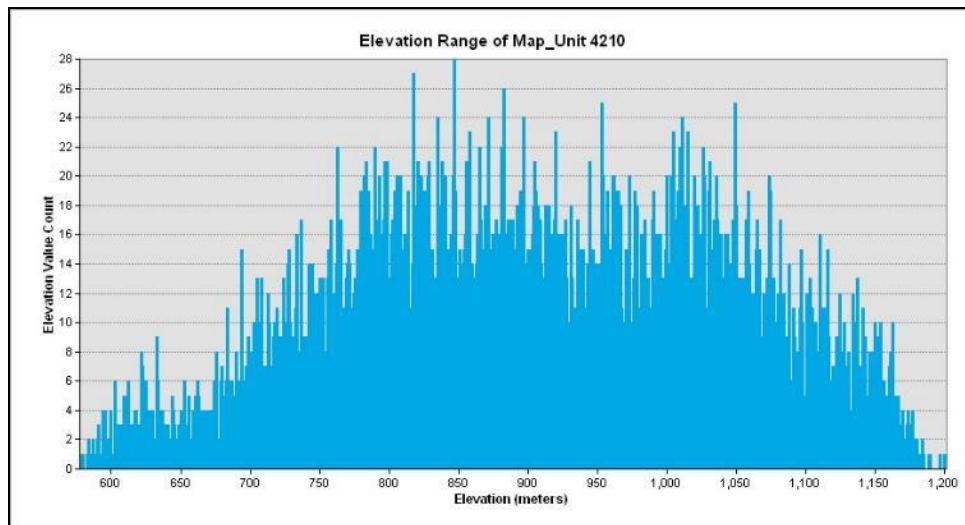
- *Quercus wislizeni* (Short Stature) Mapping Unit (4410) – This shrubby version of *Quercus wislizeni* may be confused with stands of *Quercus berberidifolia* due to the shorter stature of the *Q. wislizeni* and their similar green color. Some differentiation is possible by referencing fire history data coupled with differences in slope position; *Q. berberidifolia* is usually restricted to small neutrally shaped side slopes, whereas shrubby *Q. wislizeni* tends to prefer slightly more protected concavities and lower slopes. In addition, *Quercus berberidifolia* is an uncommonly mapped type and is identified primarily by field data.

Quercus berberidifolia Alliance (4210)



DISTRIBUTION: *Quercus berberidifolia* is mapped in three localized clusters in the central part of the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas. *Quercus berberidifolia* is identified primarily by field data.

Quercus berberidifolia Alliance (4210)



Quercus garryana (shrub) Alliance (6111)
Brewer oak scrub Alliance



Aerial view of a variably intermittent to dense stand of *Quercus garryana* on a moderately steep slope.



Ground view of an intermittent stand of *Quercus garryana* with a grass understory.

***Quercus garryana* (shrub) Alliance (6111)**

DESCRIPTION: *Quercus garryana* is dominant to co-dominant in the shrub canopy with other shrubs including *Cercocarpus montanus* and *Toxicodendron diversilobum*. Emergent trees are often present and may reach greater than 10% absolute cover but shrub cover is at least 3 times greater than tree cover. *Cercocarpus montanus* or *Ceanothus integerrimus* may co-dominate. *Quercus wislizeni* may occur in stands as emergent.

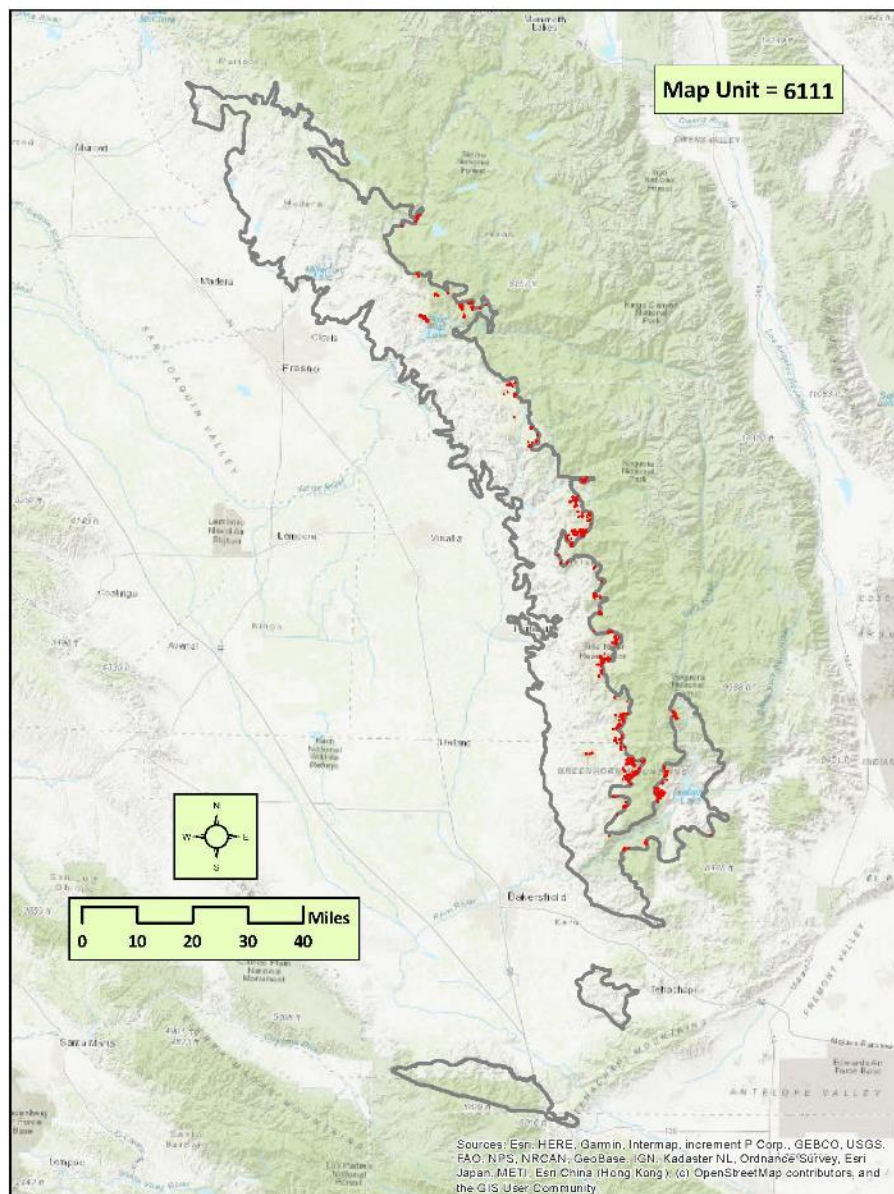
This alliance is commonly mapped in Southern Sierra Nevada Foothills Proper subarea, and stands begin to occur at 3000 feet and higher. *Quercus garryana* consistently occurs on neutrally shaped, north-facing slopes. Slope steepness can be gradually sloping or steep, but the even slope shape on cooler more protected slopes is a highly reliable model. *Cercocarpus montanus*, *Ceanothus cuneatus*, and *Arctostaphylos viscida* are commonly mixed in these stands and can create some signature confusion.

PHOTO INTERPRETATION SIGNATURE: *Quercus garryana* has a medium green signature with a fairly smooth texture; stands tend to be dense and strongly dominant stands have distinct edges. Numerous small patches of other shrub species (*Cercocarpus montanus*, *C. cuneatus*, *Arctostaphylos viscida*, especially) often occur within the stand, at times creating minimum mapping and complexing issues for the photo interpreters.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

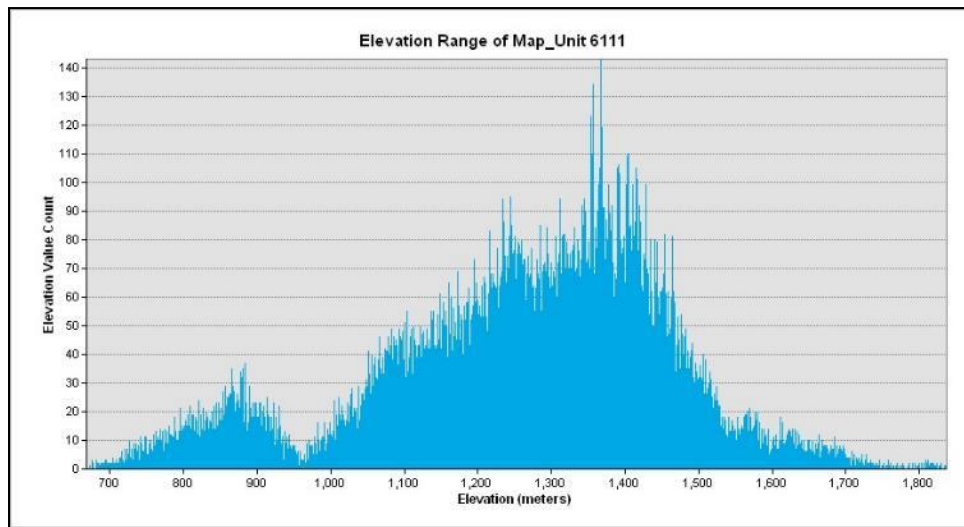
- *Arctostaphylos viscida* Alliance (4112) – *Arctostaphylos viscida* has a distinctive steel blue-gray to a brown/burgundy color with broad hummocky rounded crowns, significantly different than the flatter even-height *Q. garryana*, which has a green crown. Signature recognition difficulties arise in diverse stands with numerous small patches of other chaparral species occurring within the stand, creating minimum mapping and complexing issues for the photo interpreters.
- *Cercocarpus montanus* Alliance (4211) – *Cercocarpus montanus* is commonly associated with *Q. garryana* stands and often co-dominates stands, which are classified to the *Quercus garryana* (shrub) Alliance. *Cercocarpus* has a slightly taller, more diffuse, dull green/gray crown that can blend into the flatter medium/dark green *Quercus garryana* signature. Signature recognition difficulties also arise in diverse stands with numerous small patches of other chaparral species occurring within the stand, creating minimum mapping and complexing issues for the photo interpreters.
- *Quercus wislizeni* (Short Stature) Mapping Unit (4410) – This shrubby version of *Quercus wislizeni* may be confused with stands of *Quercus garryana* due to the shorter stature of *Q. wislizeni* and their similar green color. Some differentiation is possible by referencing fire history data coupled with differences in slope position; *Q. garryana* is usually restricted to small neutrally shaped side slopes, whereas shrubby *Q. wislizeni* tends to have a slightly taller, more textured crown and prefer lower slopes and protected concavities.

Quercus garryana (shrub) Alliance (6111)



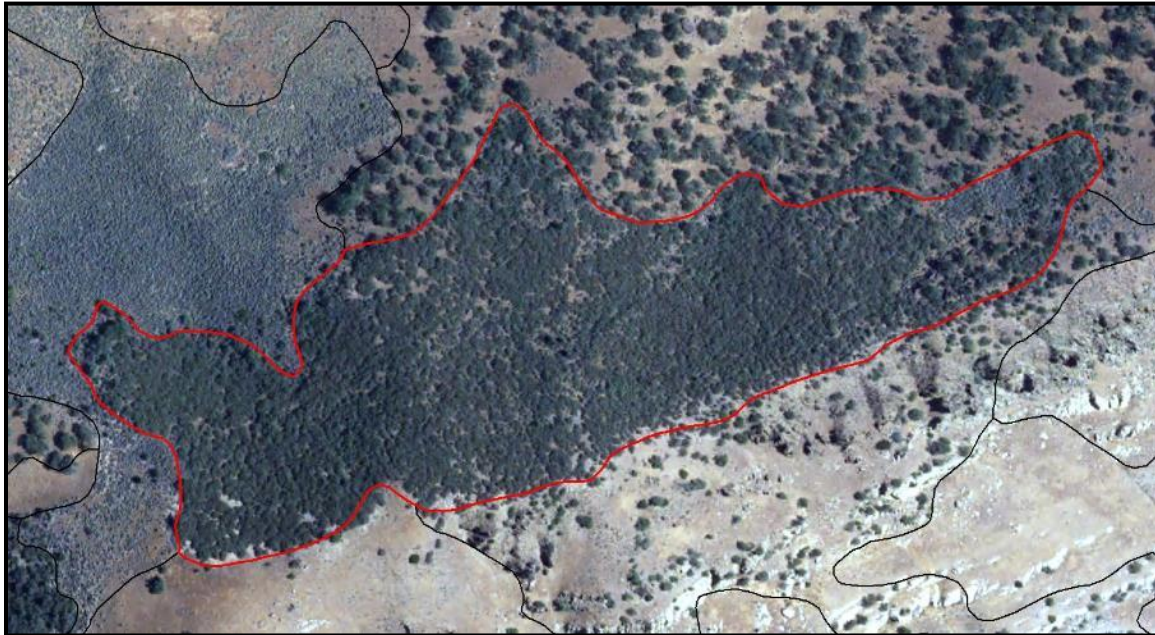
DISTRIBUTION: The alliance is mapped along the higher elevations of the Southern Sierra Nevada Foothills Proper subarea, other than the northernmost quarter. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

***Quercus garryana* (shrub) Alliance (6111)**



Quercus john-tuckeri Alliance (6510)

Tucker oak chaparral Alliance



Aerial view of a dense stand of *Quercus john-tuckeri* on a moderately steep undulating slope.



Ground view of a dense stand of *Quercus john-tuckeri*. Note the dense crown of this live oak.

***Quercus john-tuckeri* Alliance (6510)**

DESCRIPTION: *Quercus john-tuckeri* is dominant in the overstory. Emergent conifers, including *Pinus monophylla* and *Juniperus californica*, may be present. Stands occur in the southern Sierra Nevada foothills from the Kern River watershed, southward to the San Emigdio and Tehachapi Mountains. Hybrid form (*Quercus douglasii* x *Quercus john-tuckeri* or *Quercus* x *alvordiana*) is mapped as *Quercus douglasii* Alliance if it has a tree-like stature, and mapped as *Quercus john-tuckeri* if it has a shrub-like stature. Where *Juniperus californica* co-dominates, the stand is considered as the *Quercus john-tuckeri* Alliance.

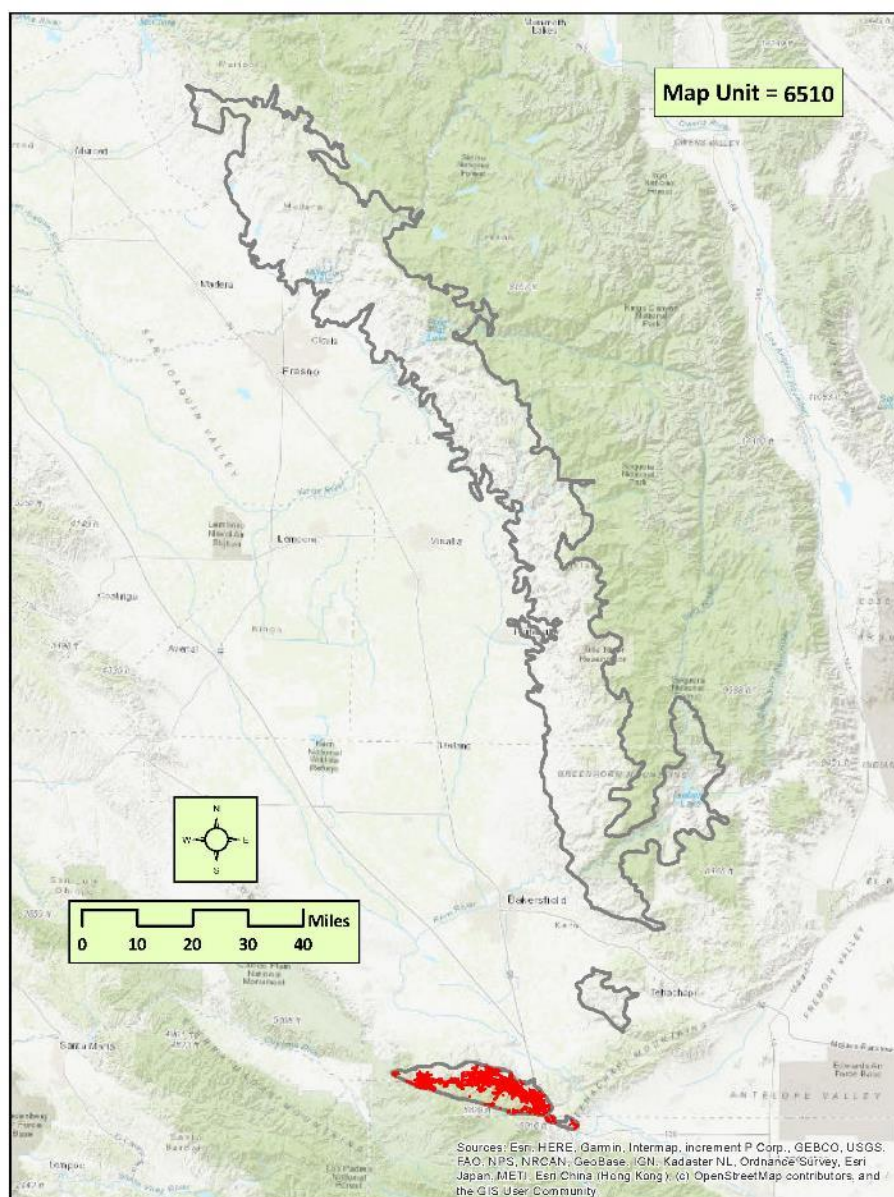
This alliance covers extensive areas (nearly 14,000 acres) of mid-elevation terrain in the San Emigdio Range subarea on a variety of topographical settings. Stands range from small to fairly large in size and shrub cover is moderate to high. Most stands are strongly dominated by *Q. john-tuckeri* but may mix with other adjacent chaparral species such as *Arctostaphylos* spp. or *Cercocarpus montanus*. Emergent *Pinus monophylla* frequently occurs in higher elevation stands. Bands of *Q. chrysolepis* often come down canyon bottoms at higher elevations and form adjacent stands to this alliance. More open stands may have a shrub understory component consisting primarily of *Eriogonum fasciculatum*. At the drier, grassier edges of these open stands, the oaks may locally hybridize with *Q. douglasii* and may also contain a small component of *Juniperus californica*. No sites are mapped in the Horsethief Mountain and Southern Sierra Nevada Foothills Proper subareas.

PHOTO INTERPRETATION SIGNATURE: This alliance is characterized by a high cover of tall shrubs or small trees covering large areas of terrain as a dominant cover. Signature characteristics vary only slightly for such a broadly distributed alliance. Signature color is uniformly dark gray with a minor dark brownish component. Texture is hummocky to complex depending on slope aspect and components of emergent *Pinus monophylla*.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

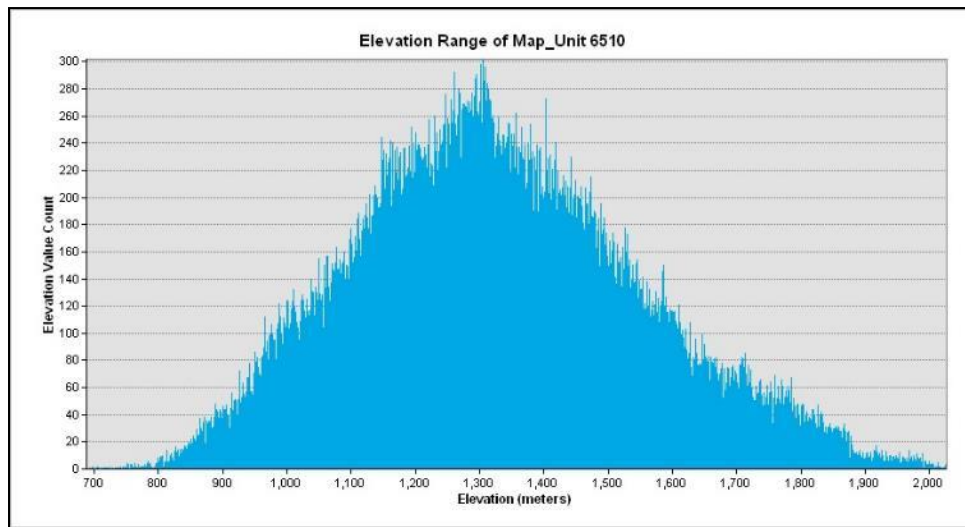
- *Quercus douglasii* Alliance (1311) – *Quercus douglasii* is tree stature and occurs over a dense herbaceous understory. *Quercus douglasii* crowns are more open and generally somewhat larger.
- *Quercus wislizeni* – *Quercus parvula* (tree) Alliance (1111) – For the most part, these two alliances do not occur together in the San Emigdio subarea.
- *Quercus wislizeni* (Short Stature) Mapping Unit (4410) – This mapping unit does not occur in the San Emigdio subarea.
- *Pinus monophylla* – (*Juniperus osteosperma*) Alliance (2310): Although these two types occur in close proximity to one another, their actual zone of mixing is minimal in most cases. Where the two stands do mix, or are nearby, *P. monophylla* tends to be on more northerly facing slopes and occur in higher cover, often obscuring the understory shrubs and substrate. *P. monophylla* are significantly taller than the adjacent oaks and often yield a visible shadow on the imagery. In these mixing zones, even the smaller pines yield noticeable height differences.

Quercus john-tuckeri Alliance (6510)



DISTRIBUTION: The alliance is very common in and occurs throughout the San Emigdio Range subarea. No sites are mapped in the Horsethief Mountain and Southern Sierra Nevada Foothills Proper subareas.

Quercus john-tuckeri Alliance (6510)



Quercus wislizeni (Short Stature) Mapping Unit (4410)
Interior live oak short stature Mapping Unit



Aerial view of an open post-burn stand of *Quercus wislizeni* as shrub stature.



Ground view of an open stand of green shrubby regenerating *Quercus wislizeni* (foreground) in a post-burn situation.

***Quercus wislizeni* (Short Stature) Mapping Unit (4410)**

DESCRIPTION: *Quercus wislizeni* is dominant as a shrub or small tree, with other species in the overstory. *Q. berberidifolia* and *Q. chrysolepis*, if present, occur at low cover. For the *Quercus wislizeni* (Short Stature) Mapping Unit, the stature was the primary criteria used in photo interpreting this mapping unit. No subspecies, variety, or other floristics were involved in discerning this type. This mapping unit is typically mapped where *Quercus wislizeni* displays a shorter stature as a result of resprouting after a recent fire, clearing/disturbance, or other environmental constraint. Chaparral species, such as *Arctostaphylos viscida*, *Adenostoma fasciculatum*, *Ceanothus leucodermis*, *Ceanothus cuneatus*, and *Cercocarpus montanus* may co-dominate.

Note that this Mapping Unit is a name change from *Quercus wislizeni* (shrub) used in the Northern Sierra Nevada Foothills vegetation mapping classification, where it was also considered a short stature form of *Quercus wislizeni* (tree) Alliance (code 1111). Per the floristic classification, stands of shrubby-statured, multi-stemmed *Quercus wislizeni* belong to the *Quercus wislizeni* – *Quercus chrysolepis* (shrub) Alliance. However, due to inconsistencies in the classification of these stands by the NVC and MCV and to maintain consistency between the northern and southern Sierra Nevada Foothills maps, these stands were mapped as *Quercus wislizeni* (Short Stature) Mapping Unit.

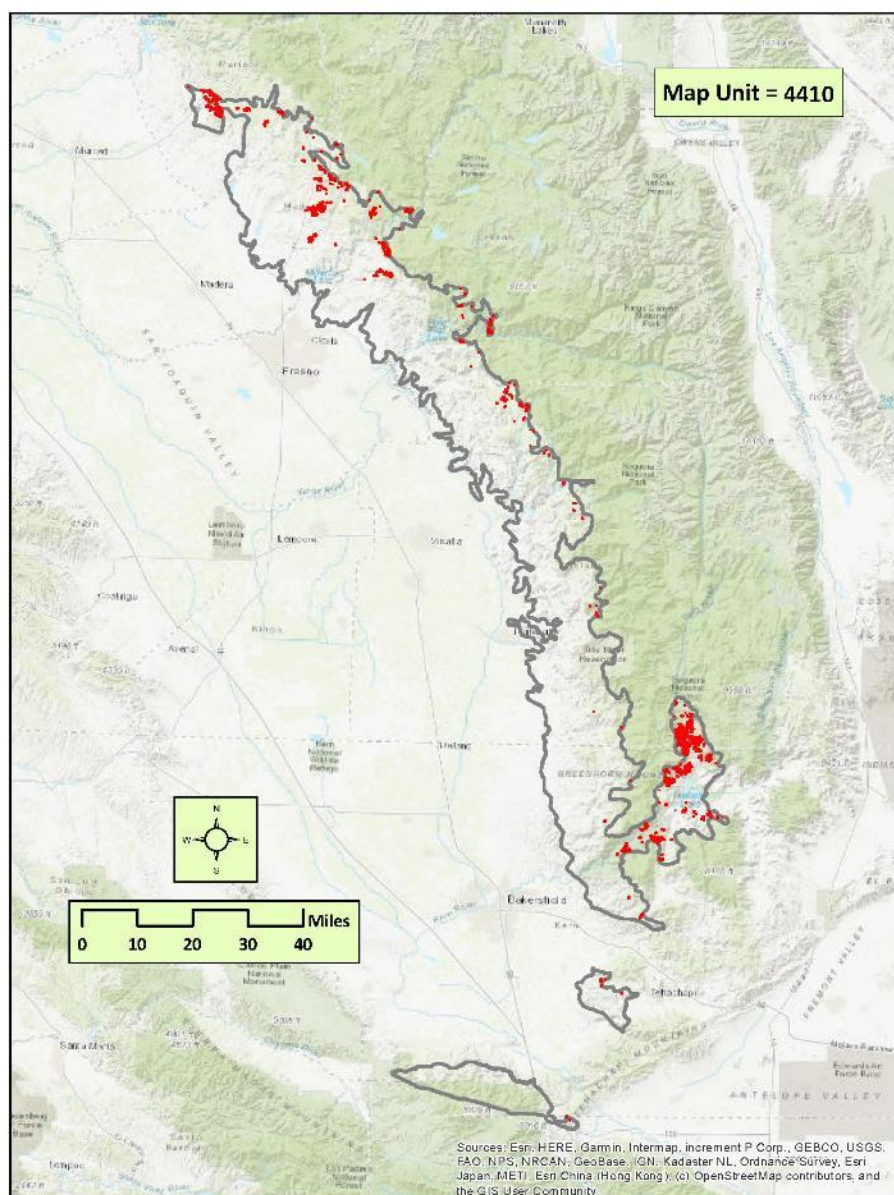
Stands are mapped in the Southern Sierra Nevada Foothills Proper subarea either in a recent post-fire setting, or after a recent clearing and/or other human disturbance. It is sparingly mapped in post-burn settings west of Bear Valley in the Horsethief Mountain subarea. Cover is dense and yields a low-stature chaparral signature. There are little or no grassland openings to the mapped stands. It is also mapped at the southwest end of the Tehachapi Mountains above Oso Canyon in the San Emigdio Range subarea.

PHOTO INTERPRETATION SIGNATURE: Signature color is a dark green, stature is shrub-like with heights appearing typically below 4 meters. Relative height of the *Q. wislizeni* can be compared to taller adjacent or in-stand trees, which yield distinct shadows.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

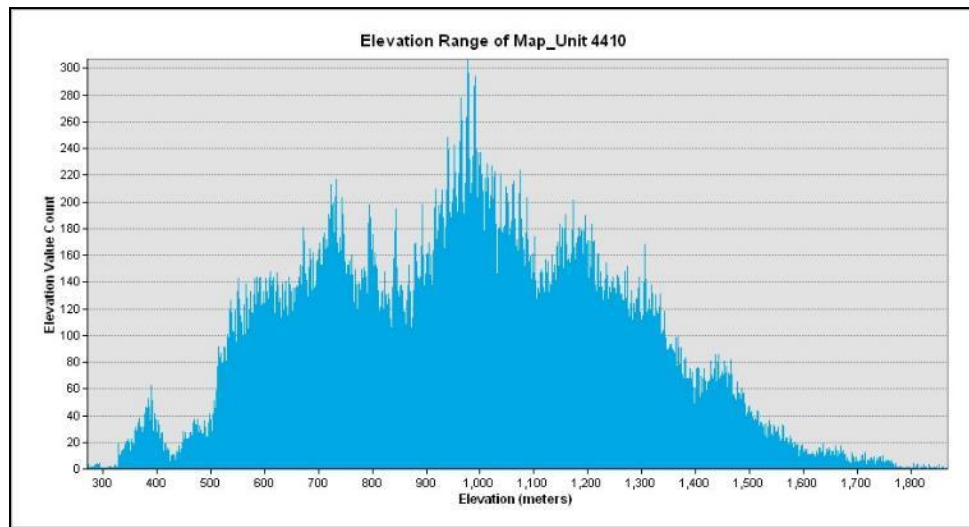
- *Quercus garryana* (shrub) Alliance (6111) – *Quercus garryana* and the shrubby version of *Quercus wislizeni* may be confused with one another due to the shorter stature of the interior live oak and their similar green color. Some differentiation is possible by referencing fire history data coupled with differences in slope position; *Q. garryana* is usually restricted to small neutrally shaped side slopes, whereas shrubby *Q. wislizeni* tends to have a slightly taller, more textured crown and prefer lower slopes and protected concavities.

Quercus wislizeni (Short Stature) Mapping Unit (4410)



DISTRIBUTION: The mapping unit is fairly common in the northern half of the Southern Sierra Nevada Foothills Proper subarea, as well as in the Lake Isabella/Kern River area. It has mapped occurrences on the northern edge of the Horsethief Mountain subarea around Bear Valley, and in the southernmost Tehachapi Mountains of the San Emigdio subarea.

***Quercus wislizeni* (Short Stature) Mapping Unit (4410)**



Rhus trilobata – Crataegus rivularis – Forestiera pubescens Alliance (6230)

Basket bush – River hawthorn – Desert olive patches Alliance

DESCRIPTION: *Rhus trilobata* or *Forestiera pubescens* is dominant in an open to continuous shrub canopy with a sparse to open herbaceous layer. Stands are typically small and can be found on stream banks or other riparian settings.

This alliance is only mapped to the association level as the *Rhus trilobata* Association. The association description follows.

PHOTO INTERPRETATION SIGNATURE: Please refer to the association description for photo interpretation signature discussion.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES: Please refer to the association description for the discussion of similar types.

Rhus trilobata Association (6231) of the *Rhus trilobata* – *Crataegus rivularis*
– *Forestiera pubescens* Alliance
Basket bush patches Association



Aerial view of a dense stand of a *Rhus trilobata* thicket in a riparian setting.

Ground photo is not available.

***Rhus trilobata* Association (6231)**

DESCRIPTION: *Rhus trilobata* is dominant in the shrub overstory. Other riparian indicators are also present, including *Vitis californica*. Stands are typically small and can be found on stream banks or other riparian settings.

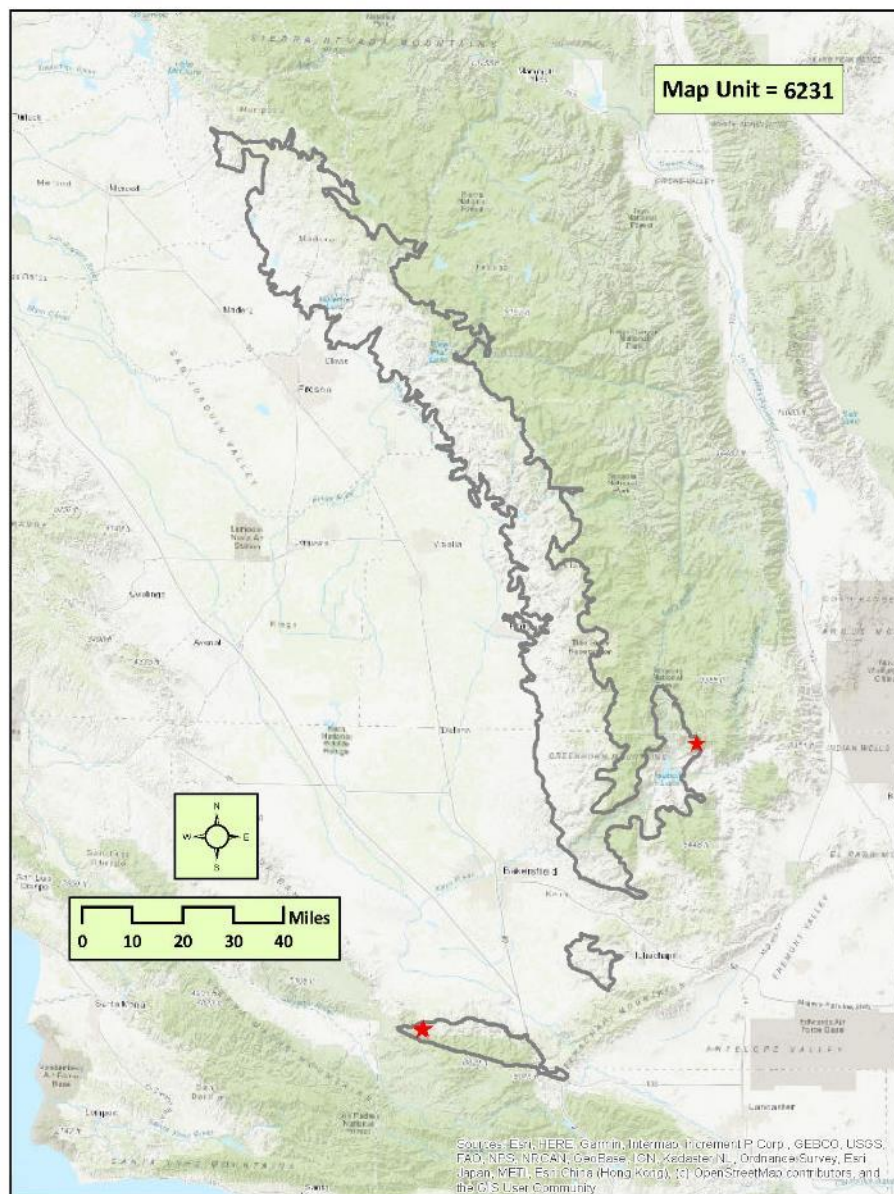
Mappable stands of this type are rare. One mapped site is located northeast of Lake Isabella in the Southern Sierra Nevada Foothills Proper subarea. In addition, two polygons are mapped near Twin Creek in the foothills at the west end of the San Emigdio Range subarea. No sites are mapped in the Horsethief Mountain subarea. The mapped sites were reviewed by CDFW.

PHOTO INTERPRETATION SIGNATURE: *Rhus trilobata* dominated stands have a green to taupe color and typically appears in moderate to densely packed clonal clumps. Most stands occur in gently sloping grasslands near human disturbances.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

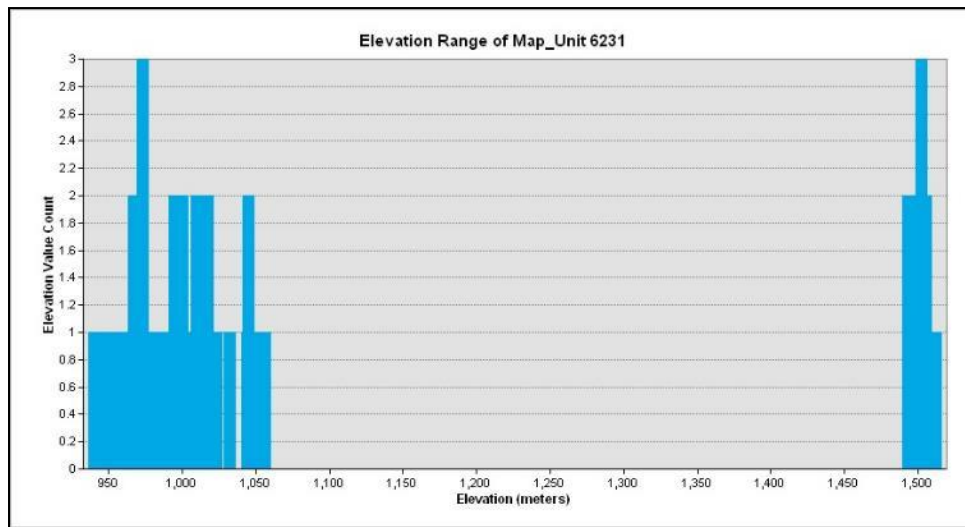
- *Rosa californica* Association (6401) - Structural components are similar, stands are comprised of patchy and dense thickets. Signature color is a more uniform dark green varying only slightly among stands. Stands occur in a more riparian setting.
- *Rhus trilobata* Sierran Association (6218) – Similar signature, however this association is found in a more upland setting, whereas the *Rhus trilobata* Association is riparian.

Rhus trilobata Association (6231)



DISTRIBUTION: Only three sites are mapped. One just northeast of Lake Isabella in the Southern Sierra Nevada Foothills Proper subarea. The other two at the west end of the San Emigdio Range subarea. No sites are mapped in the Horsethief Mountain subarea.

Rhus trilobata Association (6231)



Ribes quercetorum – Rhus trilobata – Frangula californica Alliance (6440)

DESCRIPTION: Stands are dominated by mesic shrubs such as *Ribes quercetorum*, *Rhus trilobata*, *Frangula californica*, *Sambucus nigra*, and *Cercis occidentalis* in mesic upland settings. Stands are often small, less than 1 acre.

This alliance is only mapped to the association level as the *Frangula californica* ssp. *tomentella*, *Rhus trilobata* Sierran, *Ribes quercetorum*, and *Sambucus nigra* Associations. The association descriptions follow.

PHOTO INTERPRETATION SIGNATURE: Please refer to the association descriptions for photo interpretation signature discussion.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES: Please refer to the association descriptions for the discussion of similar types.

***Frangula californica* ssp. *tomentella* Association (4501) of the *Ribes quercetorum* – *Rhus trilobata* – *Frangula californica* Alliance**
California coffeeberry scrub Association



Aerial view of an open stand of *Frangula californica* in thin-soil/rocky setting, on a rise, surrounded by grassland.



Ground view in the background of an open stand for *Frangula californica* in a thin-soil setting on rolling terrain, with a grass understory.

***Frangula californica* ssp. *tomentella* Association (4501)**

DESCRIPTION: *Frangula californica* is dominant in the shrub canopy. Other shrubs may be present at low cover. Stands are in upland settings often on rocky outcrops.

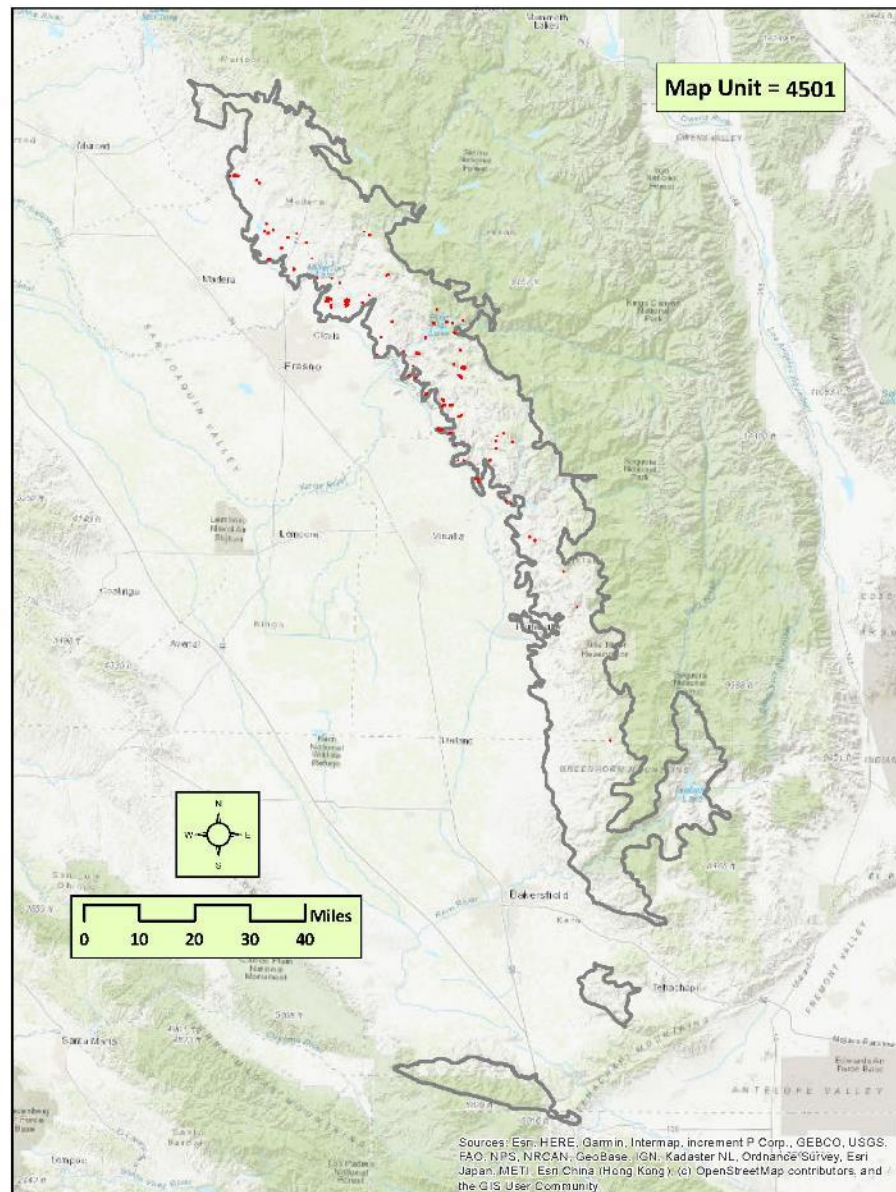
Frangula californica stands are sparsely scattered throughout the Southern Sierra Nevada Foothills Proper subarea. Stands occur on steep exposed hillslopes with an understory matrix of grass and emergent boulders. This type is typically mapped below 3000 feet in elevation in and around rock outcroppings within the western grasslands. Stand density is usually sparse and open, and typically small in size.

PHOTO INTERPRETATION SIGNATURE: *Frangula californica* is a medium-sized shrub with a tight round, dull gray/green crown. *Frangula* is often consistently tucked next to emergent boulders within the open grasslands. Stands of this type are usually sparse in cover with very few other species present.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

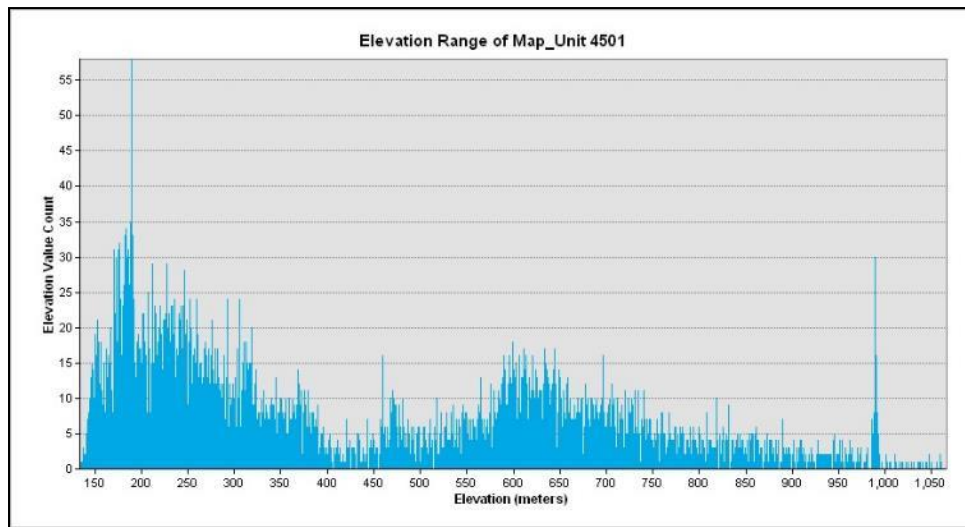
- *Ceanothus cuneatus* Alliance (4113) – *Ceanothus cuneatus* has a very similar gray rounded signature that can be confused with *Frangula californica*. However, the *Ceanothus* begins to appear in the grassy understory of *Quercus douglasii* stands as small clusters of shrubs.

***Frangula californica* ssp. *tomentella* Association (4501)**



DISTRIBUTION: The *Frangula californica* ssp. *tomentella* Association is scattered throughout the Southern Sierra Nevada Foothills Proper subarea, especially in the northern half. It is not mapped in the Horsethief Mountain and San Emigdio Range subareas.

***Frangula californica* ssp. *tomentella* Association (4501)**



Rhus trilobata Sierran Association (6218) of the *Ribes quercetorum* – *Rhus trilobata* – *Frangula californica* Alliance
Basket bush patches Association



Aerial view of a dense thicket of *Rhus trilobata* in a non-riparian setting.



Ground view of a thicket of *Rhus trilobata* in an upland setting.

***Rhus trilobata* Sierran Association (6218)**

DESCRIPTION: *Rhus trilobata* is the dominant shrub in the canopy. Other shrubs may be present but in lower cover, including *Sambucus nigra*, *Prunus* sp., or *Toxicodendron diversilobum*.

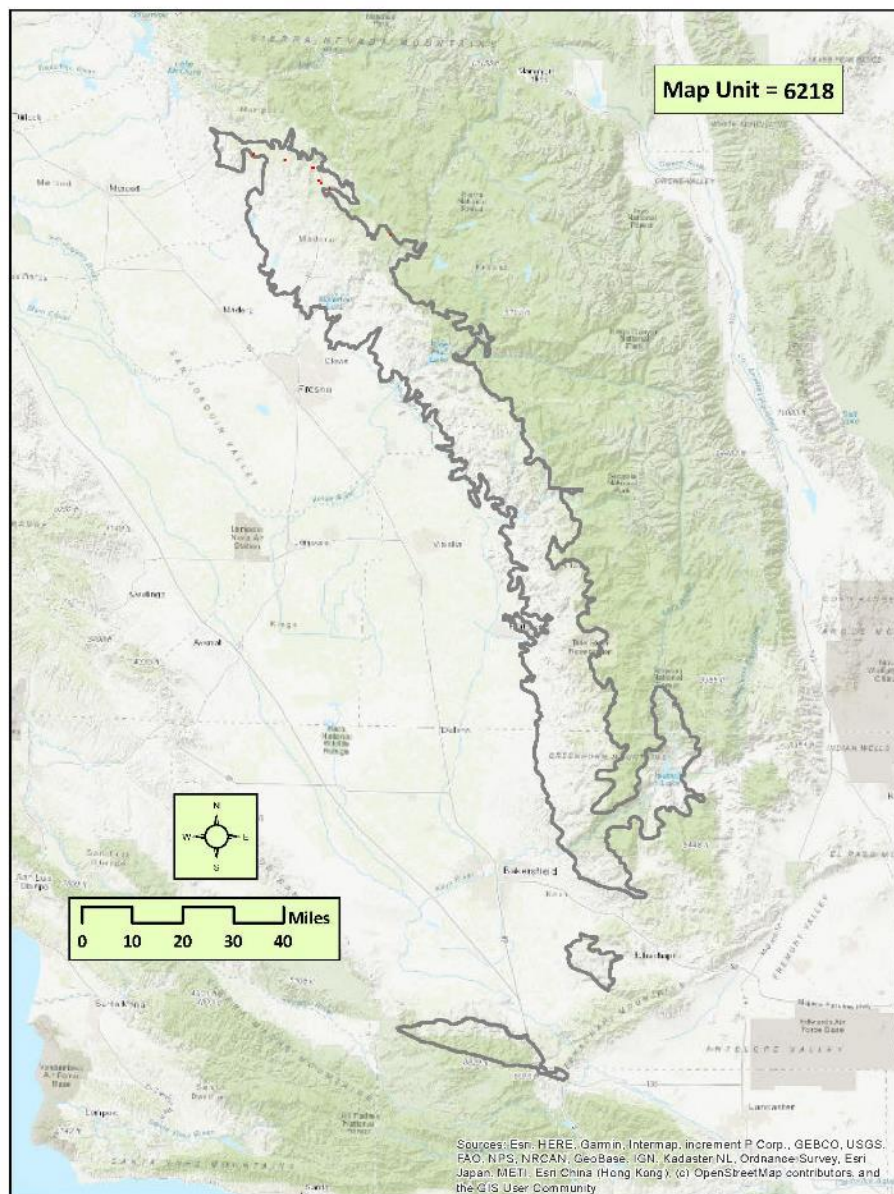
Mappable stands of this type are uncommon with a majority of the mapped stands occurring in northernmost portion of the Southern Sierra Nevada Foothills Proper subarea, between the towns of Mariposa and Oakhurst. One mapped site is located northeast of Lake Isabella. *Rhus trilobata* is the sole dominant species present in these stands. This type was mapped primarily from field points due to its limited distribution. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas. All polygons were reviewed by CDFW.

PHOTO INTERPRETATION SIGNATURE: *Rhus trilobata* dominated stands have a green to taupe color and typically appears in moderate to densely packed clonal clumps. Most stands occur in gently sloping grasslands near human disturbances.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

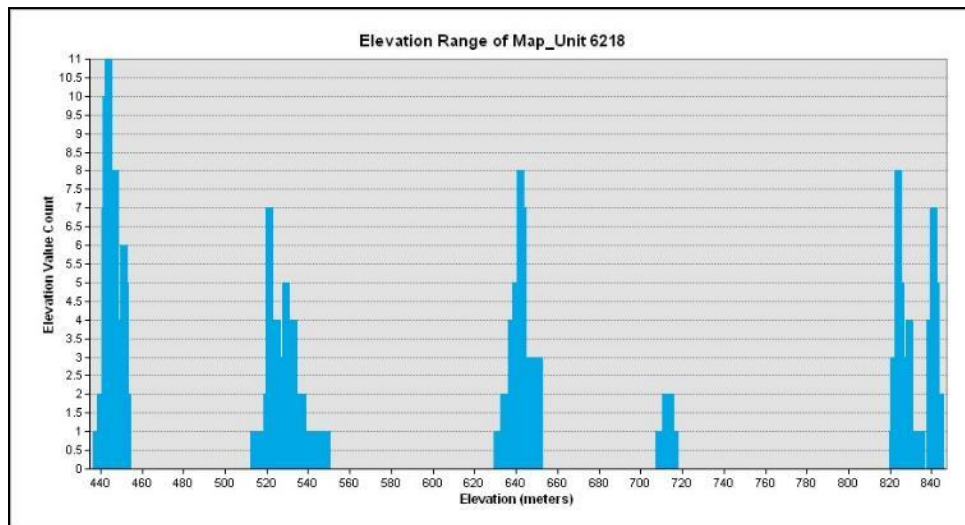
- *Rosa californica* Association (6401) - Structural components are similar, stands are comprised of patchy and dense thickets. Signature color is a more uniform dark green varying only slightly among stands. Stands occur in a more riparian setting.
- *Rhus trilobata* Association (6231) – Similar signature, however this association is riparian, whereas the Sierran Association is found in a drier and more upland setting.

Rhus trilobata Sierran Association (6218)



DISTRIBUTION: Mappable stands of this type are uncommon, occurring in northernmost portion of the Southern Sierra Nevada Foothills Proper subarea, between the towns of Mariposa and Oakhurst. In addition, one site is located northeast of Lake Isabella. This type was mapped primarily from field points. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

***Rhus trilobata* Sierran Association (6218)**



Ribes quercetorum Association (6420) of the Ribes quercetorum – Rhus trilobata – Frangula californica Alliance
Oak gooseberry thickets Association



Aerial view of dense closed canopy stand of a *Ribes quercetorum* thicket.



Ground view of a dense thicket of *Ribes quercetorum* upslope from a drainage.

***Ribes quercetorum* Association (6420)**

DESCRIPTION: *Ribes quercetorum* is strongly dominant in the shrub canopy often occurring with *Sambucus nigra* on steep, rocky, or concave northerly facing slopes. Stands are often small and below the minimum mapping resolution size. Occurs at lower to middle elevations in the foothills.

Ribes quercetorum stands are rarely mapped in Southern Sierra Nevada Foothills Proper subarea, but are more prevalent in the southwestern area west of Lake Isabella. Stands typically occur on gradually sloping, slightly protected slopes over a grassy understory. Most stands occur below 3500 feet in elevation.

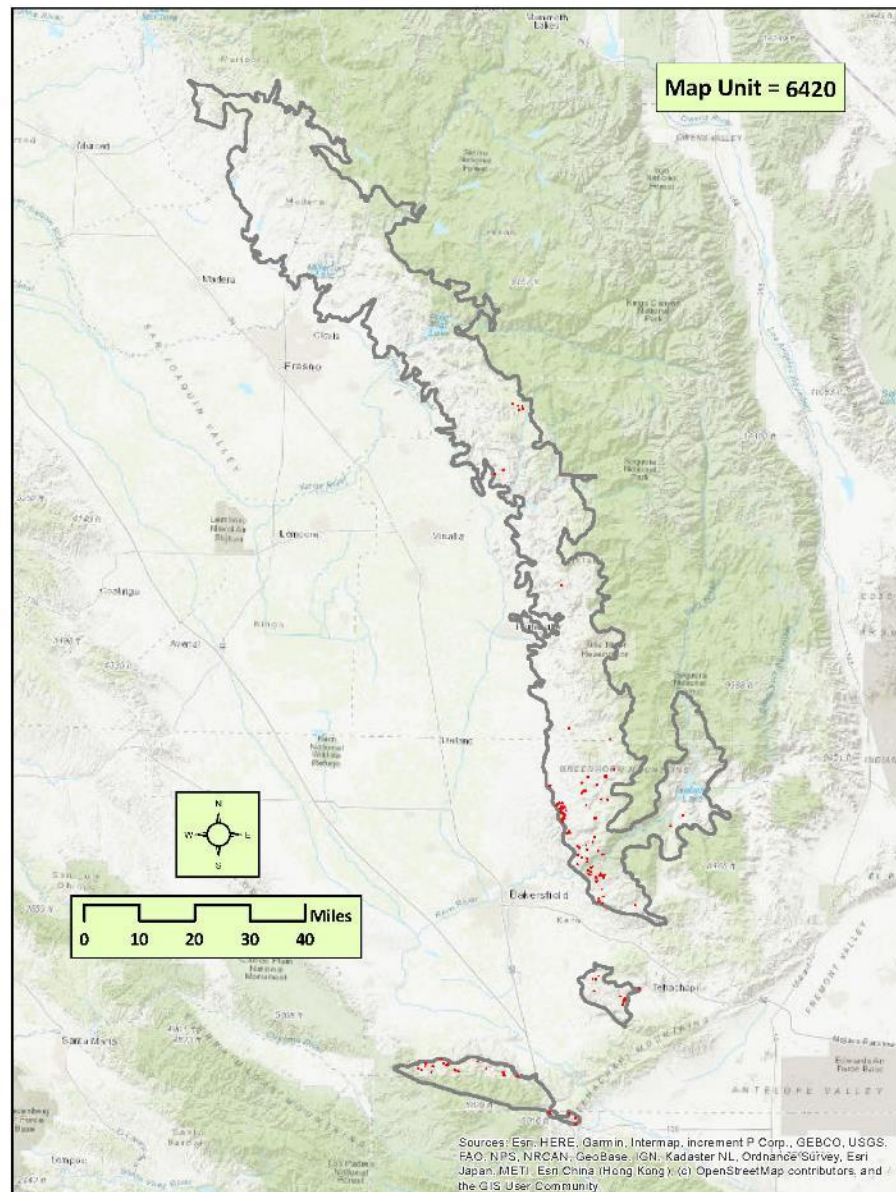
This alliance is mapped in small patches in the foothills in the north part of the San Emigdio Range subarea, and east of Frazier Park in scattered locations in the southwestern edge of the Tehachapi Mountains. It is also mapped in the northwestern part of the Tejon Hills in the Horsethief Mountain subarea. Mapped stands have a high cover of shrubs that are strongly dominated by *Ribes quercetorum*. Examples in the region occur on variable topographic settings but are more common on lower slopes.

PHOTO INTERPRETATION SIGNATURE: Signature color ranges from medium green to occasionally yellow, and in leaf stress conditions, a taupe or gray color. Stands can appear in clonal patches and generally have abrupt definitive margins. In several circumstances, several small patches are aggregated into one stand, usually separated by dense herbaceous cover. Texture is smooth and continuous across the stand.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

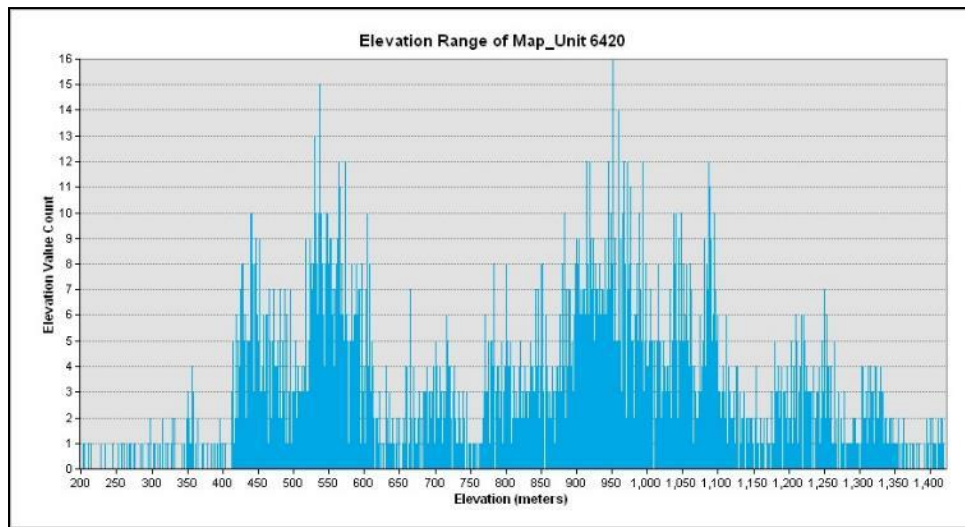
- *Artemisia tridentata* Alliance (5311) – Stands in concavities on mesic slopes with *Ribes quercetorum* at greater than 50% cover, with *Artemisia* and *Sambucus nigra*, are mapped as *Ribes quercetorum* Association. Stands in rocky settings with a mix of *Artemisia*, *Ribes*, and *Sambucus* are mapped as *Artemisia tridentata* Alliance.
- *Rosa californica* Association (6401) - Structural components are similar, stands are comprised of patchy and dense thickets. Signature color is a more uniform dark green varying only slightly among stands. Stands occur in a more riparian setting.

Ribes quercetorum Association (6420)



DISTRIBUTION: Stand mapped occurrences are rare. In the Southern Sierra Nevada Foothills Proper subarea stands are more prevalent in the southwestern area west of Lake Isabella. It is mapped along the northern portion of the San Emigdio Range subarea, as well as at the southernmost end of the Tehachapi Mountains. In the Horsethief Mountain subarea the alliance is scattered over the northeast portion of the Tejon Hills.

***Ribes quercetorum* Association (6240)**



Sambucus nigra Association (6219) of the *Ribes quercetorum* – *Rhus trilobata* – *Frangula californica* Alliance
Black elderberry Association



Aerial view of an open and irregularly distributed stand of *Sambucus nigra* with a grass understory.



Ground view of an open stand of *Sambucus nigra* with a grass understory on flat terrain.

***Sambucus nigra* Association (6219)**

DESCRIPTION: *Sambucus nigra* is dominant in the shrub canopy. Stands are found on moist north-facing slopes but are uncommon in the study area.

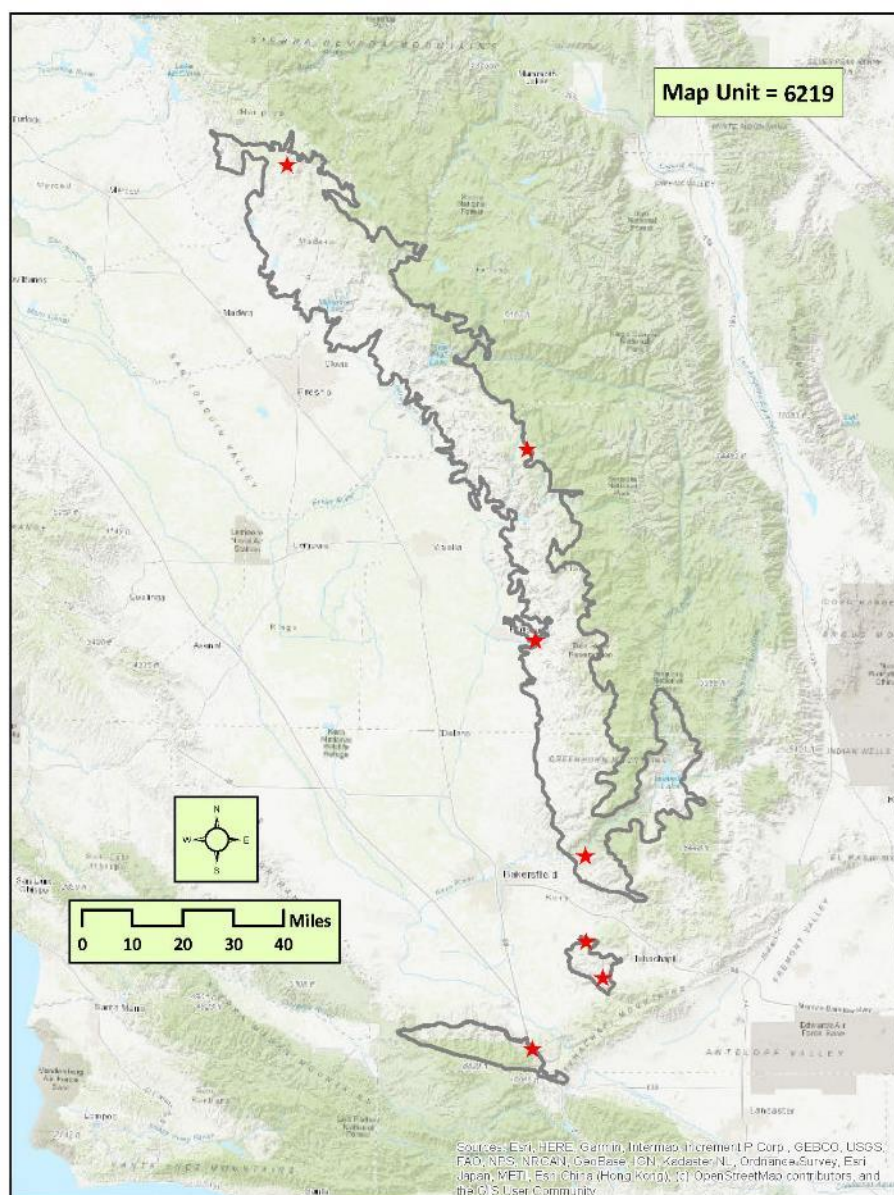
Only 4 small stands are mapped in the Southern Sierra Nevada Foothills Proper subarea. One small stand is mapped in the San Emigdio Range subarea, and 2 small stands are mapped in the Horsethief Mountain subarea, all based primarily on ground assessments.

PHOTO INTERPRETATION SIGNATURE: *Sambucus nigra* appears as scattered green to gray individuals spread intermittently in open grassy swales and floodplain terrace margins. Size can vary from medium-sized shrub to small tree. Crown shape is rounded with a fuzzy crown texture.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

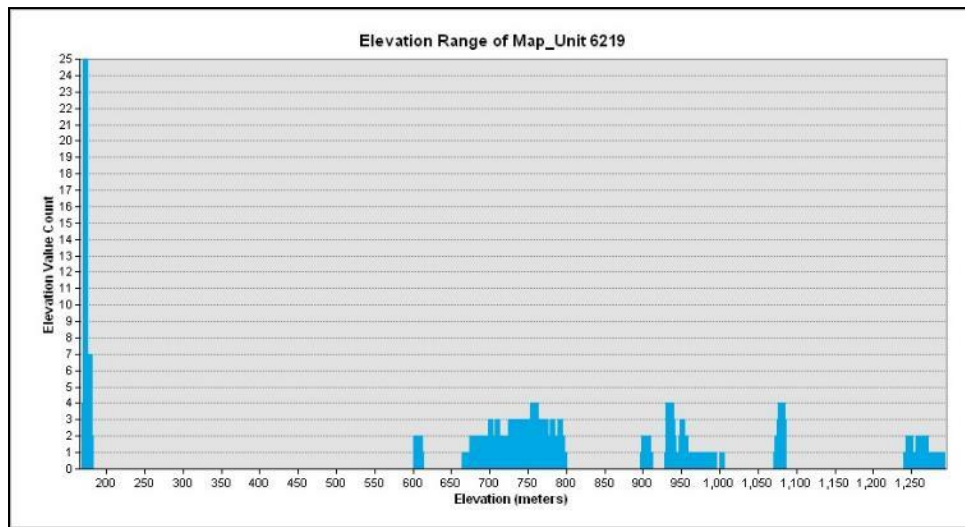
- *Artemisia tridentata* Alliance (5311) – Stands with a mix of *Artemisia tridentata*, *Ribes quercetorum*, and *Sambucus nigra*, in rocky settings are mapped as *Artemisia tridentata* Alliance.
- *Ribes quercetorum* Association (6420) – Dense stands in concavities on mesic slopes with *Ribes quercetorum* at greater than 50% cover, with *Artemisia* and *Sambucus nigra*, are mapped as *Ribes quercetorum* Association.

***Sambucus nigra* Association (6219)**



DISTRIBUTION: Only 4 small stands are mapped in the Southern Sierra Nevada Foothills Proper subarea. One small stand is mapped in the San Emigdio Range subarea, and 2 small stands are mapped in the Horsethief Mountain subarea, all based primarily on ground assessments.

***Sambucus nigra* Association (6219)**



Rubus armeniacus – Sesbania punicea – Ficus carica Semi-Natural Alliance (6213)

Himalayan blackberry – Rattlebox – Edible fig riparian scrub Semi-Natural Alliance



Aerial view of a dense stand of *Rubus armeniacus* in a riparian setting.



Ground view of a dense thicket of *Rubus armeniacus* in a riparian setting in leaf-off condition.

***Rubus armeniacus* – *Sesbania punicea* – *Ficus carica* Semi-Natural Alliance (6213)**

DESCRIPTION: Stands in riparian settings dominated by non-native *Rubus armeniacus* or *Ficus carica*. *Rubus armeniacus* forms dense briar patches in openings between trees and shrubs in riparian settings. This species may also form dense understories in adjacent riparian woodlands and forests, where it is considered part of the tree stands.

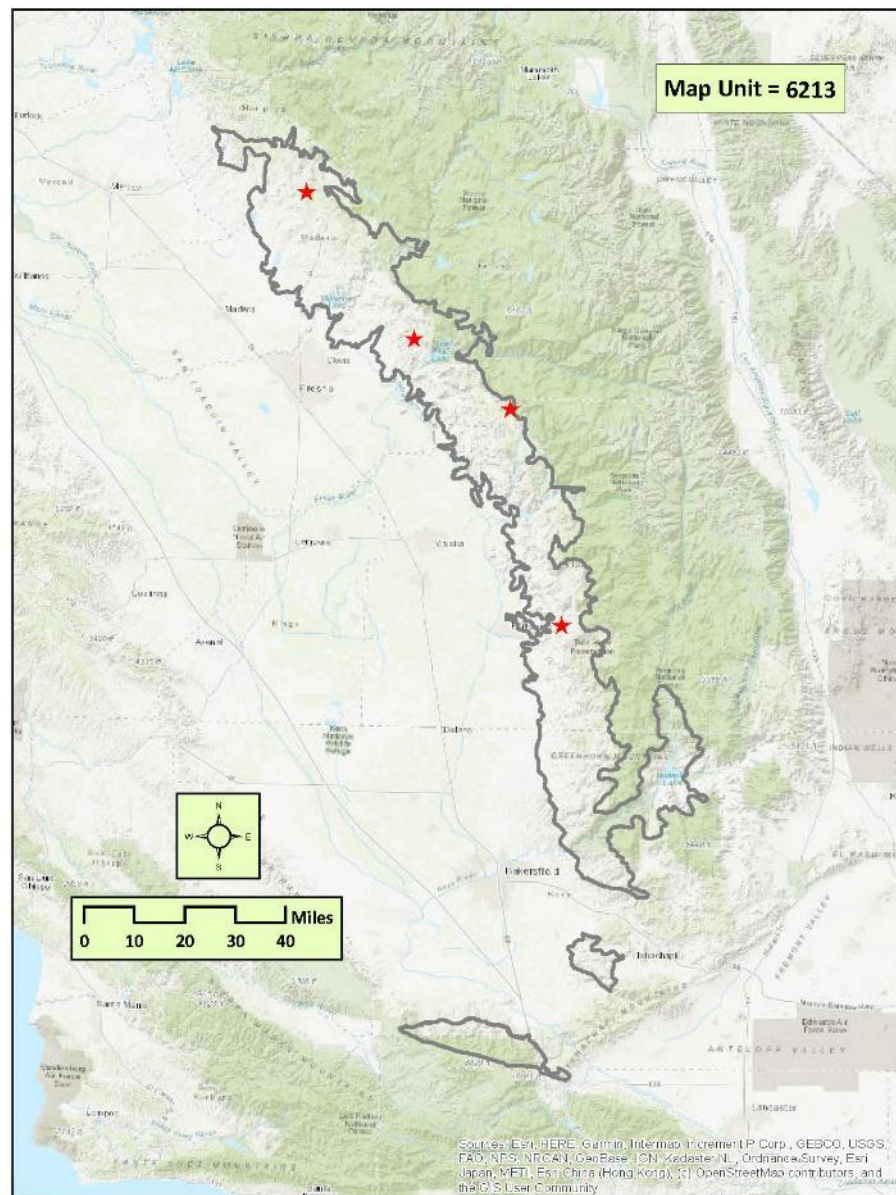
This alliance rarely formed stands in the Southern Sierra Nevada Foothills Proper subarea. Only 4 small stands are mapped near dammed ponds where shallow surface water sustains these dense thickets. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: *Rubus armeniacus* has a smooth green signature with minimal variation within the patch or stand. Complexing with other vegetation types occurs frequently, especially with meadows and annual grasslands with a high weedy component.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

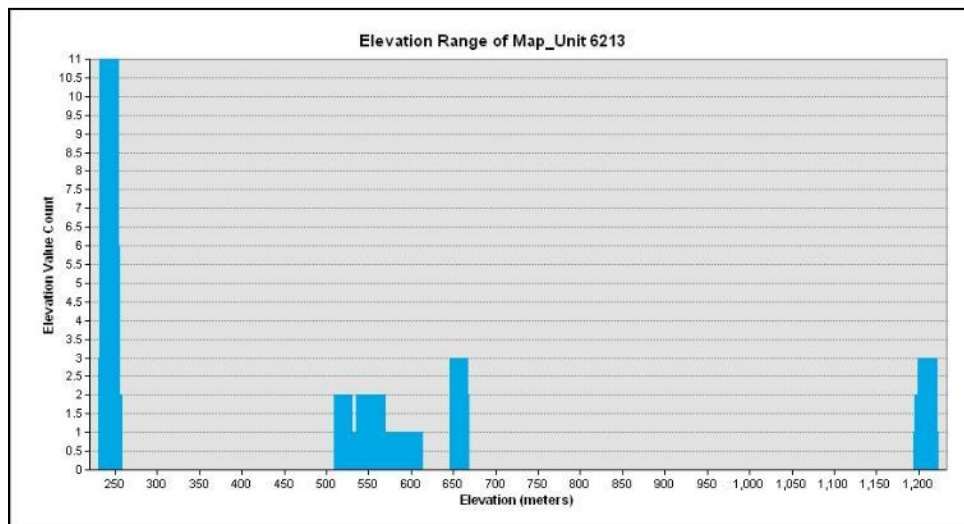
- *Toxicodendron diversilobum* Alliance (6301) – *Toxicodendron diversilobum* has a similar signature (both color & texture) but usually has a less definitive edge to the patch or stand. *T. diversilobum* also occurs in slightly drier environments, often in a post-burn setting rather than an anthropogenic related disturbance environment.
- *Salix gooddingii* – *Salix laevigata* Alliance (3114) – Young willow thickets containing a dominance of *Salix laevigata* have a similar signature but occur in much wetter settings.
- *Vitis arizonica* – *Vitis girdiana* Alliance (6220) – *Vitis* spp. has similar low growing green appearance and can be in wetter more protected drainage settings as well. This type is very limited and rarely forms stands in the project area. Typically, field data is needed distinguish between *Rubus armeniacus* and *Vitis* spp. signature.

***Rubus armeniacus* – *Sesbania punicea* – *Ficus carica* Semi-Natural Alliance (6213)**



DISTRIBUTION: This alliance is rare. In the Southern Sierra Nevada Foothills Proper subarea only 4 small stands are mapped. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

***Rubus armeniacus* – *Sesbania punicea* – *Ficus carica* Semi-Natural Alliance
(6213)**



***Salix exigua* Alliance (6211)**

Sandbar willow thickets Alliance



Aerial view of a dense stand of *Salix exigua* in a typical setting adjacent to a flowing river.



Ground view of a dense stand of *Salix exigua* bordering a river.

***Salix exigua* Alliance (6211)**

DESCRIPTION: *Salix exigua* is characteristically present as a dominant or co-dominant shrub. It forms an open to continuous canopy along riparian corridors. Other willows or riparian tree species may be present as sub-dominants with low cover. *Salix lasiolepis*, *Vitis californica*, *Cephalanthus occidentalis*, *Brickellia californica*, or *Rubus armeniacus* may co-dominate.

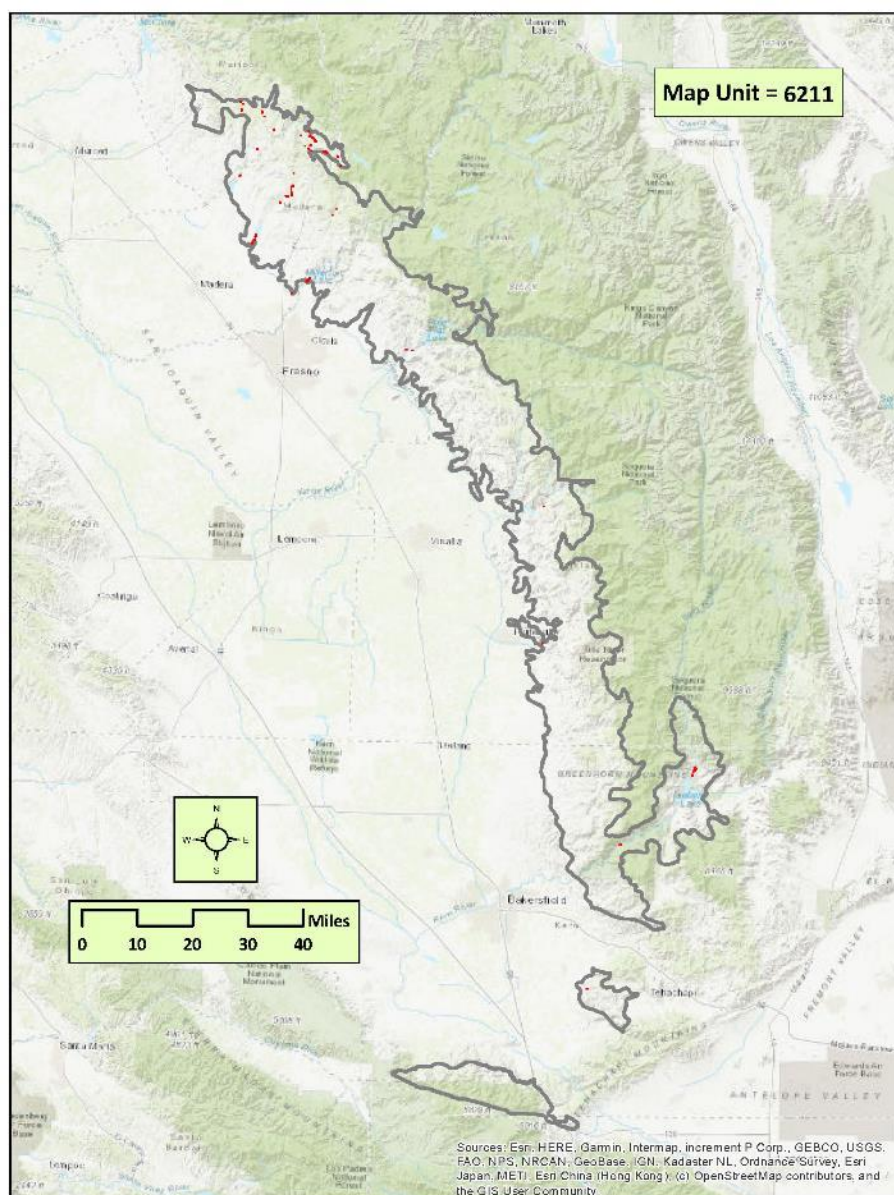
This alliance is mapped more frequently near the towns of Mariposa and Oakhurst in the Southern Sierra Nevada Foothills Proper subarea. Throughout remainder of the subarea, this type is rarely mapped except for a handful of stands along the Kern River. Two small patches are mapped along Little Sycamore Creek in the western edge of the Tehachapi Range in the Horsethief Mountain subarea. No sites are mapped in the San Emigdio subarea.

PHOTO INTERPRETATION SIGNATURE: *Salix exigua* has a distinct signature during the majority of the growing season yielding a blue color with stippled texture due to the dense cover of fairly well-defined small crowns. Most stands contain *S. exigua* as a strongly dominant species, however, the stand size is usually quite small and other riparian species occur frequently along the margins of the stand.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

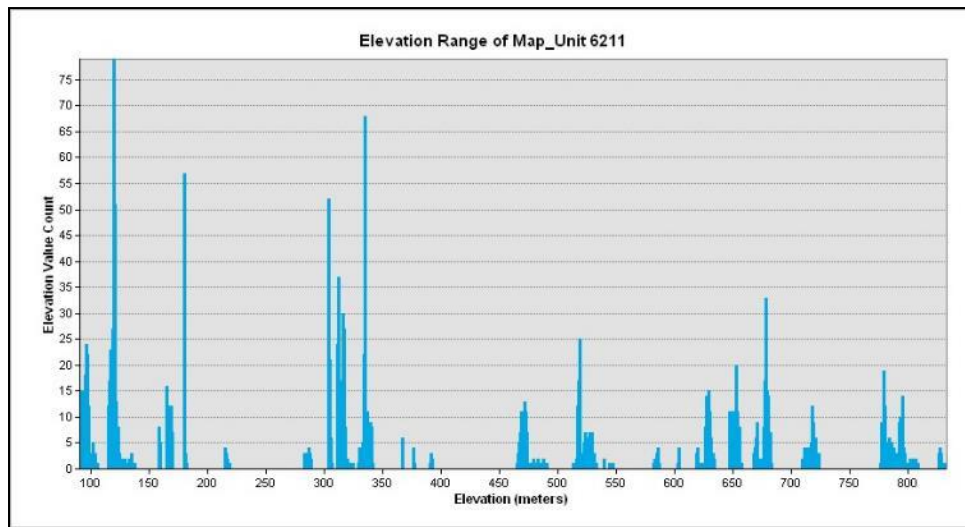
- *Salix gooddingii* – *Salix laevigata* Alliance (3114) – Young stands of *Salix laevigata* in willow thickets lack the characteristic blue color of *S. exigua*.
- *Salix lasiolepis* Alliance (6217) – *Salix lasiolepis* can occur in similar riparian settings, however it can be distinguished by its broader, consistently green rounded crown.

***Salix exigua* Alliance (6211)**



DISTRIBUTION: This alliance is mapped as scattered occurrences near the towns of Mariposa and Oakhurst in the northernmost part of the Southern Sierra Nevada Foothills Proper subarea. Throughout remainder of the subarea, this type is rarely mapped except for a handful of stands along the Kern River. Two small patches are mapped along Little Sycamore Creek in the western edge of the Tehachapi Range in the Horsethief Mountain subarea. No sites are mapped in the San Emigdio subarea.

Salix exigua Alliance (6211)



Salix lasiolepis Alliance (6217)

Arroyo willow thickets Alliance



Aerial view of a dense closed canopy stand of *Salix lasiolepis* in a riparian setting. Note the rounded crowns of the individual plants abutting each other.



Ground view of a dense stand of *Salix lasiolepis* in a riparian setting.

***Salix lasiolepis* Alliance (6217)**

DESCRIPTION: *Salix lasiolepis* is dominant as a shrub or low tree, with at least 10% absolute cover (and at least 50% relative cover). *Rubus armeniacus*, can be characteristic in the understory with a variety of wetland shrubs and herbs. *Rosa californica* and other willow species may be present at low cover.

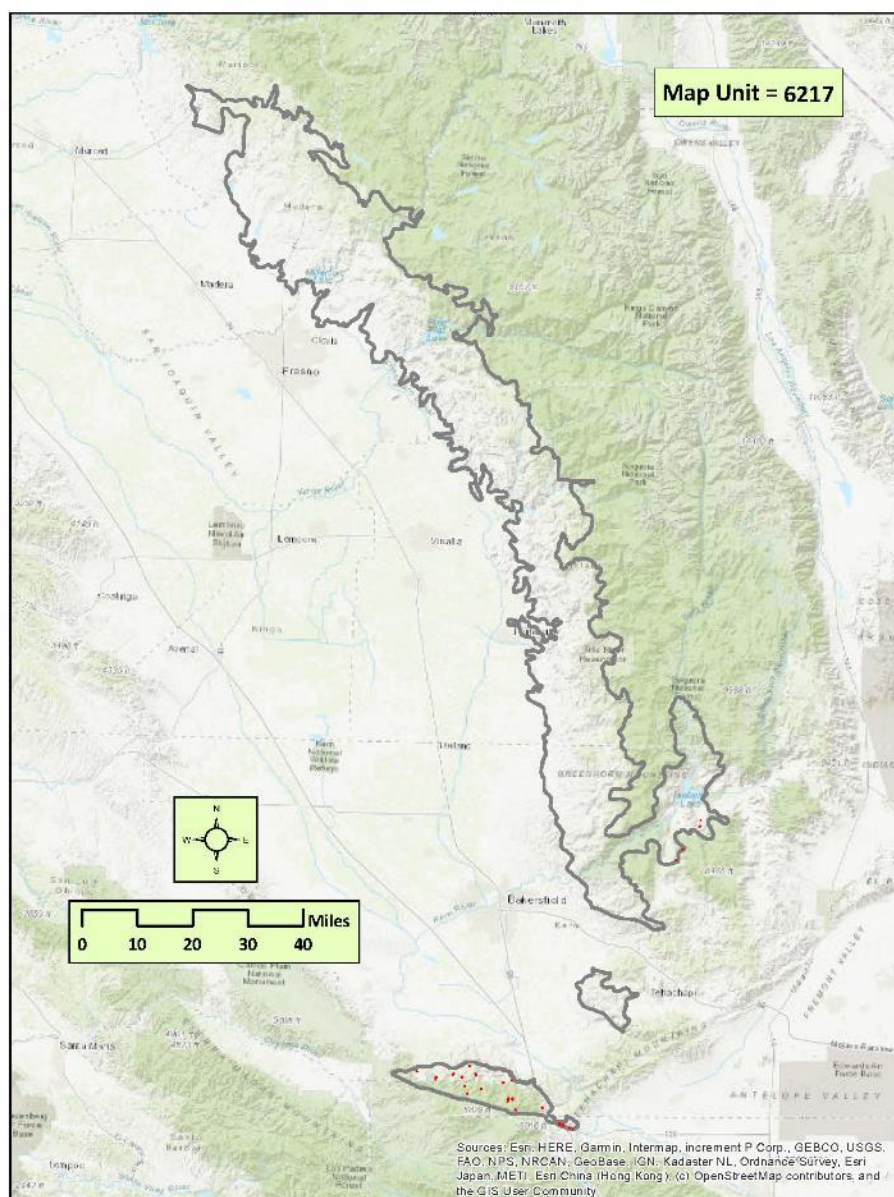
In the Southern Sierra Nevada Foothills Proper subarea, this alliance is mapped in 4 small stands south of Lake Isabella, within confined drainages above 4000 feet. Scattered small patches of this alliance are mapped throughout the San Emigdio Range subarea in riparian settings which are seasonally to permanently flooded. No sites are mapped in the Horsethief Mountain subarea.

PHOTO INTERPRETATION SIGNATURE: Signature colors are uniformly dark green across the stand, usually with a high shrub cover. Overall texture is smooth to slightly stippled or slightly hummocky. Emergent trees such as *Populus fremontii* or *Salix* tree species occur infrequently at cover below 5%. Stands along riparian corridors are often small, occurring in discontinuous patches. At times, this alliance can follow long stretches of the stream channel.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

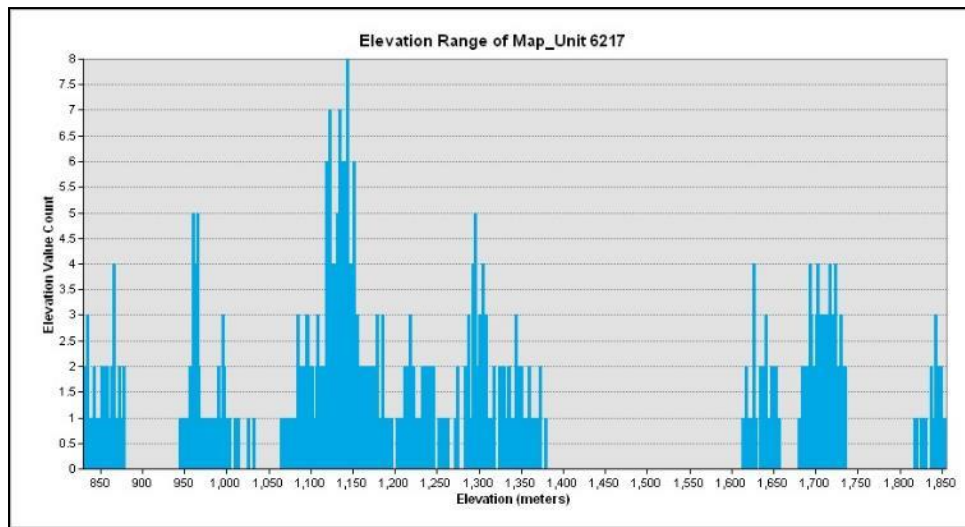
- *Salix exigua* Alliance (6211) – *Salix exigua* tends to have a more stippled signature and overall color of the mature leaf is more of a light blue.
- *Salix gooddingii* – *Salix laevigata* Alliance (3114): Mature individuals of *Salix laevigata* often have multiple sub-crowns. Younger stands of tree willow occurring with *S. lasiolepis* are inseparable.

***Salix lasiolepis* Alliance (6217)**



DISTRIBUTION: Four small stands are mapped south of Lake Isabella in the Southern Sierra Nevada Foothills Proper subarea. Scattered small patches of this alliance are mapped throughout the San Emigdio Range subarea. No sites are mapped in the Horsethief Mountain subarea.

Salix lasiolepis Alliance (6217)



Tamarix spp. Semi-Natural Alliance (6212)

Tamarisk thickets Semi-Natural Alliance



Aerial view of an open stand of *Tamarix* spp. over a sandy substrate and grassy understory.



Ground view of an intermittently covered stand of *Tamarix* spp. bordering a riparian floodplain.

***Tamarix* spp. Semi-Natural Alliance (6212)**

DESCRIPTION: *Tamarix* dominates in the shrub canopy. Other trees or shrubs may be present at low cover, including *Quercus* spp., *Salix* spp., and *Rubus* spp.

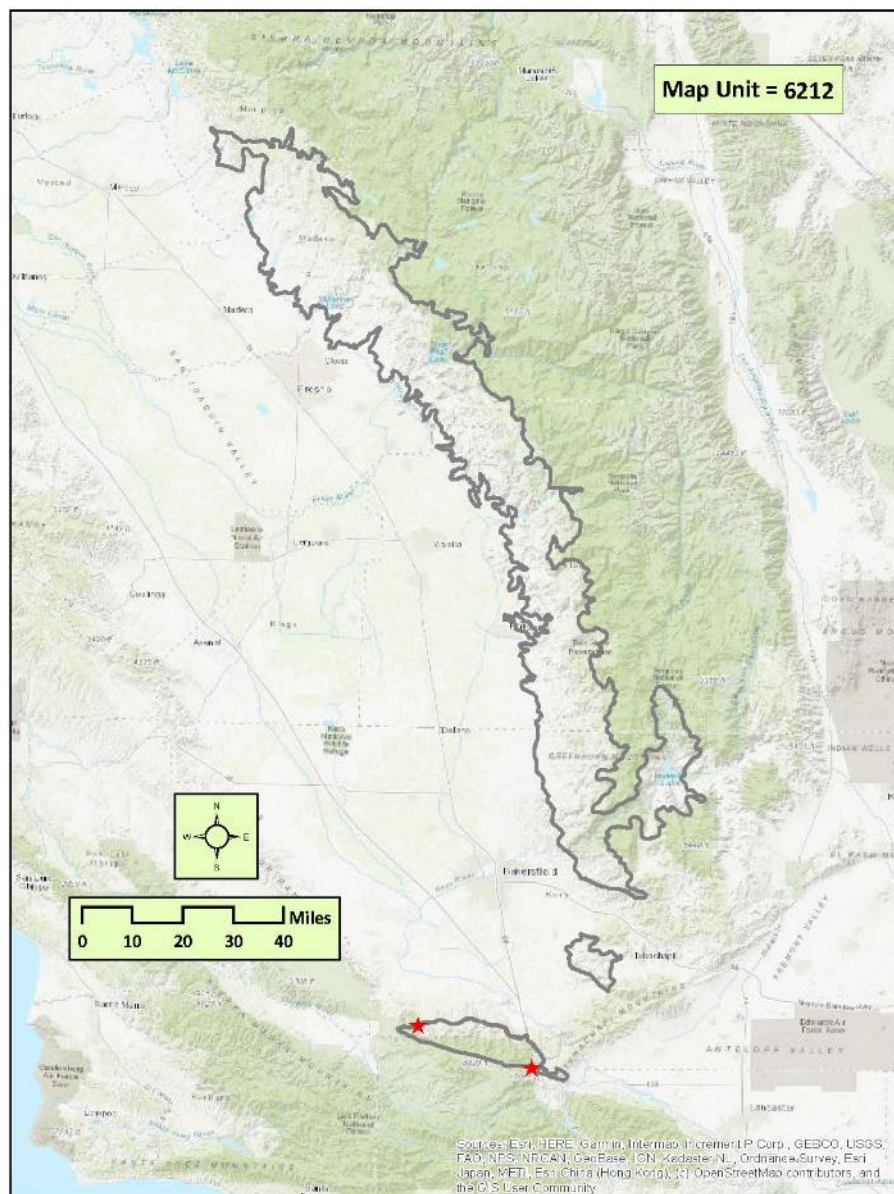
Two polygons are noted in the San Emigdio Range subarea based on ground assessments. No sites are mapped in the Southern Sierra Nevada Foothills Proper and the Horsethief Mountain subareas.

PHOTO INTERPRETATION SIGNATURE: *Tamarix* spp. crowns appear as rounded to irregular in shape with green to blue-green color. Individuals can vary greatly in size from short shrub to a small tree and are typically found in drainages nearer to human disturbance.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

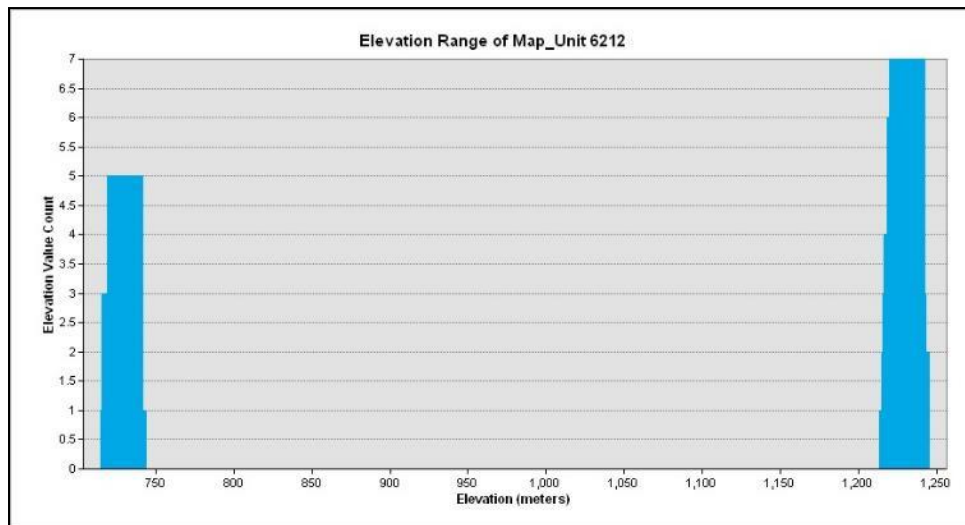
- None

***Tamarix* spp. Semi-Natural Alliance (6212)**



DISTRIBUTION: Only two polygons are mapped in the San Emigdio Range subarea based on ground assessments. No sites are mapped in the Southern Sierra Nevada Foothills Proper and the Horsethief Mountain subareas.

Tamarix spp. Semi-Natural Alliance (6212)



Toxicodendron diversilobum Alliance (6301)

Poison oak Alliance



Aerial view of an intermittent to dense stand of *Toxicodendron diversilobum* on a lower slope position.



Ground view of an open stand of *Toxicodendron diversilobum* growing in rocky terrain.

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

DESCRIPTION: *Toxicodendron diversilobum* dominates the shrub overstory. Other shrubs such *Rhamnus ilicifolia*, *Ceanothus cuneatus*, and *Sambucus nigra* may intermix at low cover. *Toxicodendron* and *Eriogonum fasciculatum* co-dominating in a xeric setting are considered as *Toxicodendron diversilobum* Alliance.

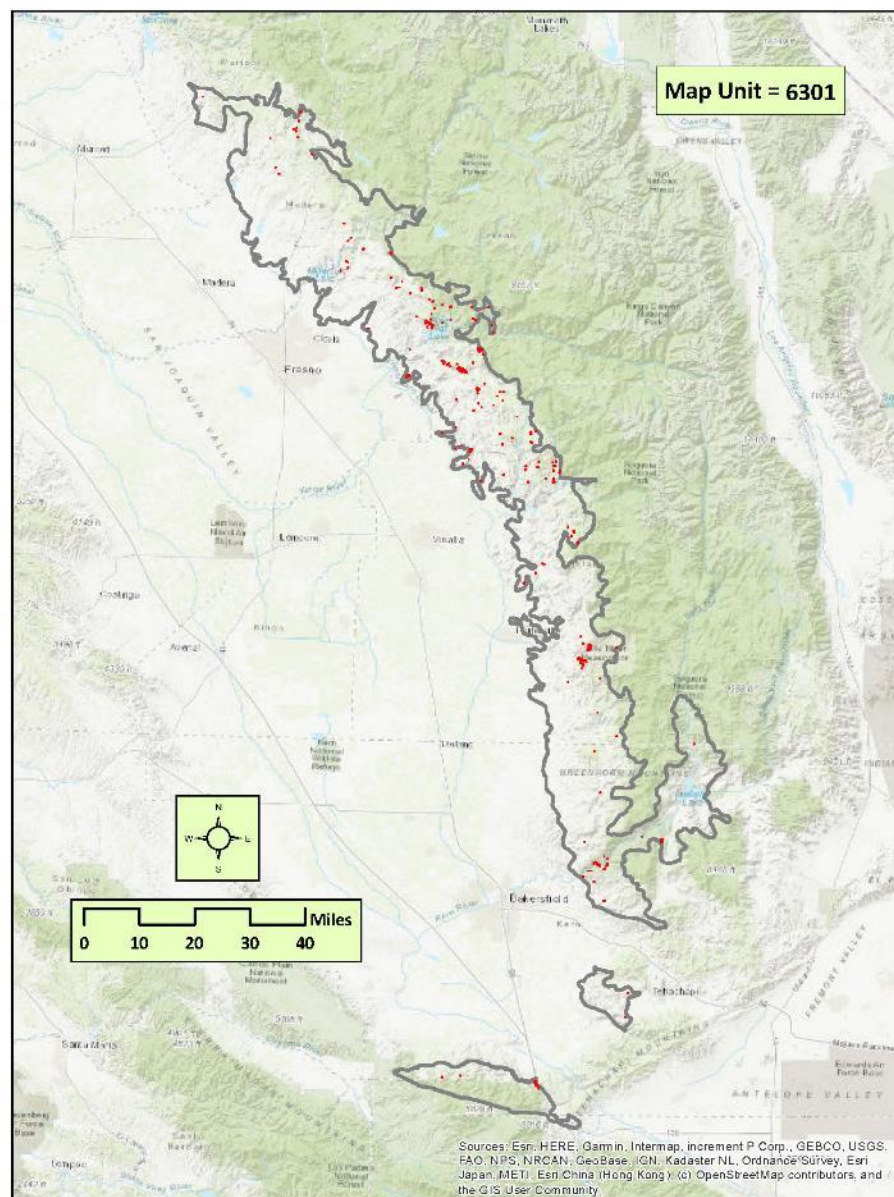
Toxicodendron diversilobum stands are commonly mapped in the Southern Sierra Nevada Foothills Proper subarea. This species occurs in two types of settings, within upper protected north-facing slopes over grass and on more exposed aspects congregating around rock outcroppings. Protected slope settings are usually very homogenous and dense. Exposed rocky settings are typically more open with sparse cover. In the San Emigdio Range subarea, several small stands are mapped for the most part based on ground assessments, on steep, protected east- to northeast-facing slopes above Grapevine Canyon in the Tejon Pass. Two sites are mapped in the Horsethief Mountain subarea.

PHOTO INTERPRETATION SIGNATURE: *Toxicodendron diversilobum* has a range of greenness to the color depending on the dominant structure of the plant (shrubby or vine like), the stress of the leaf in early season drought conditions, which can be determined by topographic settings and the cover density of the stand. Stand cover generally feathers out from dense to more open cover towards the edges of the stand making it at times difficult for photo interpreters to separate from other adjacent types.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

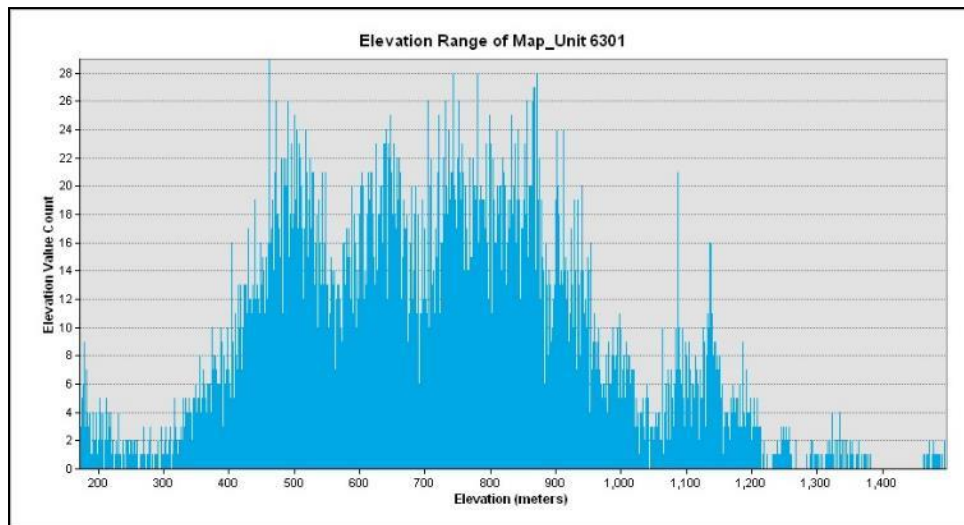
- *Rubus armeniacus* – *Sesbania punicea* – *Ficus carica* Semi-Natural Alliance (6213) – *Rubus armeniacus* has a similar signature (both color & texture) but usually has a more definitive edge to the patch or stand. *R. armeniacus* also occurs in slightly wetter environments, more often in an area of anthropogenic disturbance (nearer a dammed pond) rather than in a post-burn setting.
- *Quercus wislizeni* (Short Stature) Mapping Unit (4410) – Young stands of *Quercus wislizeni* in leaf flush conditions can be similar to this type; however, there is usually more texture in the signature.
- *Vitis arizonica* – *Vitis girdiana* Alliance (6220) – *Vitis* spp. have a similar low growing green appearance but tend to be in wetter more protected drainage settings. This type is very limited and rarely forms stands in the project area.

Toxicodendron diversilobum Alliance (6301)



DISTRIBUTION: This alliance is common and mapped throughout the Southern Sierra Nevada Foothills Proper subarea. In the San Emigdio Range subarea, several small stands are mapped, for the most part based on ground assessments, on steep, protected east- to northeast-facing slopes above Grapevine Canyon in the Tejon Pass, with a couple of other sites on the eastern side of the subarea. Two sites are mapped in east end of the Horsethief Mountain subarea.

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



Vitis arizonica – *Vitis girdiana* Alliance (6220)
Wild grape shrubland Alliance



Aerial view of dense patches of *Vitis* along a drainage bottom.



Ground view of a dense patch of *Vitis* as hummocky growth over other shrubs on a gentle slope.

***Vitis arizonica* – *Vitis girdiana* Alliance (6220)**

DESCRIPTION: Stands composed of dense liana thickets of *Vitis californica* that can occur spreading across gravel and sand on river or creek terraces, or in some rocky, lower slope concavities. Most stands are less than 0.5 ha, but have a distinctive signature.

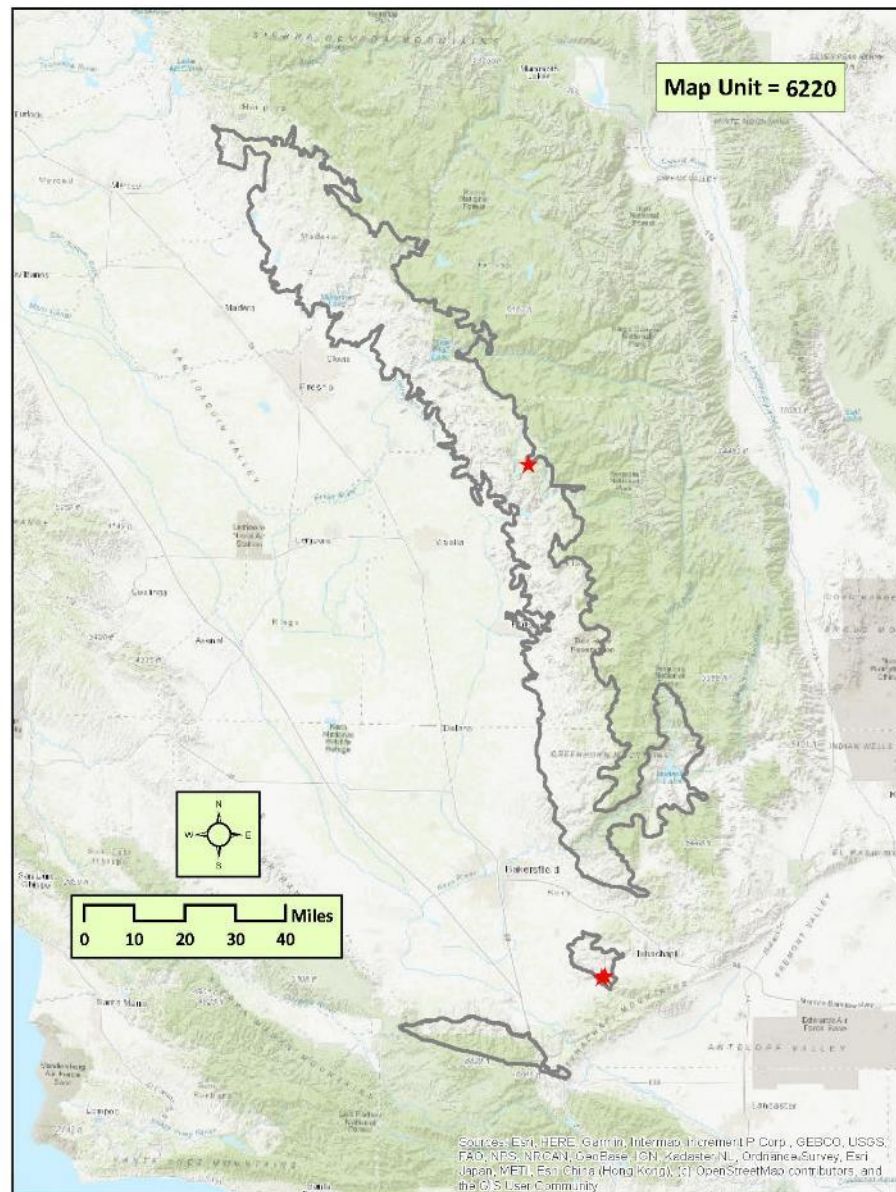
Only one small stand is mapped from classification plot data along Cedar Creek, just south of Shadequarter Mountain, in the Southern Sierra Nevada Foothills Proper subarea. Two small patches are mapped west of Cummings Valley on steep slopes above Chanac Creek in the Horsethief Mountain subarea. No sites are mapped in the San Emigdio Range subarea.

PHOTO INTERPRETATION SIGNATURE: *Vitis* spp. have a low growing green appearance and can be in wetter more protected drainage settings. It may have a slightly bumpy texture since it is a climber and can grow over small shrubs and up tree trunks. This type is very limited and rarely forms stands in the project area, especially since it typically grows in the understory of riparian trees and shrubs. Field data is needed to distinguish *Vitis* spp. signature from other similar low growing green shrubs in a drainage.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

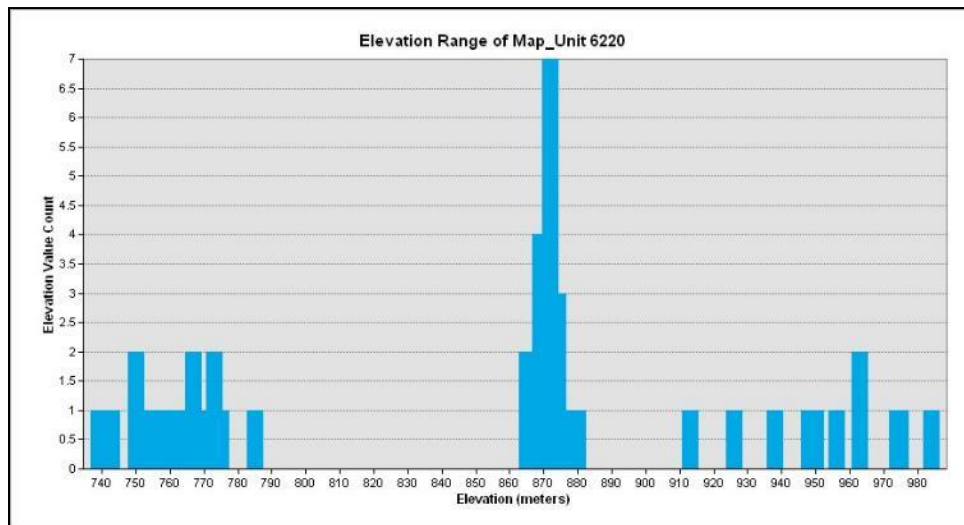
- *Rhus trilobata* Association (6231) – *Rhus trilobata* has a similar green color, stature, and texture as *Vitis* spp. Due to these similarities and limited distribution of both species, field data is needed to verify species and distribution within the study area.
- *Rubus armeniacus* – *Sesbania punicea* – *Ficus carica* Semi-Natural Alliance (6213) – *Rubus armeniacus* has a similar green color, stature, and texture as *Vitis* spp. Due to these similarities and limited distribution of both species, field data is needed to verify species and distribution within the study area.
- *Salix lasiolepis* Alliance (6217) – *Salix lasiolepis* tends to have a taller, more hummocky texture with individuals displaying a broader rounded crown.
- *Toxicodendron diversilobum* Alliance (6301) – *Toxicodendron diversilobum* has a similar signature (both color & texture) but usually has a less definitive edge to the patch or stand. *T. diversilobum* also occurs in slightly drier environments, often in a post-burn setting rather than an anthropogenic related disturbance environment.

Vitis arizonica – *Vitis girdiana* Alliance (6220)



DISTRIBUTION: Only one stand is mapped from classification plot data in the central Southern Sierra Nevada Foothills Proper subarea. Two sites are mapped in the southwest part of the Horsethief Mountain subarea. No sites are mapped in the San Emigdio Range subarea.

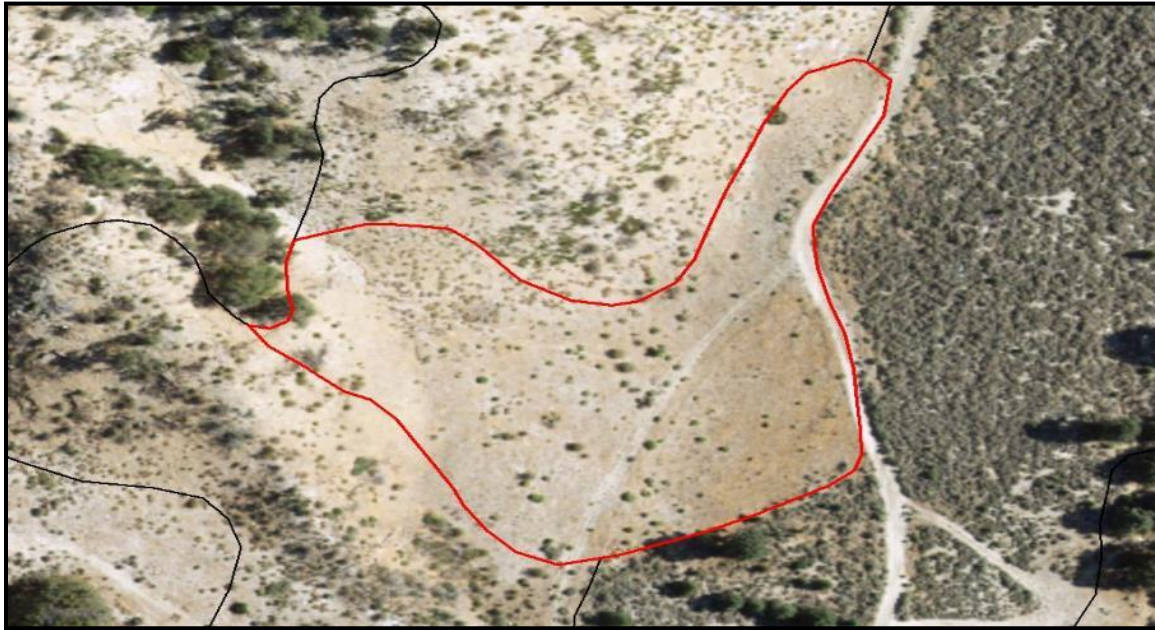
***Vitis arizonica* – *Vitis girdiana* Alliance (6220)**



Herb

Achnatherum speciosum Alliance (5431)
Anemopsis californica – *Helianthus nuttallii* – *Solidago spectabilis* Alliance (8210)
Arid West freshwater emergent marsh Group (7300)
Artemisia dracunculus Alliance (7112)
Avena spp. – *Bromus* spp. Herbaceous Semi-Natural Alliance (7191)
Bromus tectorum – *Taeniatherum caput-medusae* Herbaceous Semi-Natural Alliance (7181)
California Annual and Perennial Grassland Macrogroup (7100)
California annual herb/grass Group (7110)
Californian mixed annual/perennial freshwater vernal pool/swale bottomland Group (7600)
Californian warm temperate marsh/seep Group (7200)
Corethrogyne filaginifolia – *Eriogonum (elongatum, nudum)* Alliance (7121)
Distichlis spicata Alliance (8110)
Heterotheca (oregona, sessiliflora) Alliance (6221)
Holcarpha (heermannii, virgata) Alliance (7114)
Juncus arcticus (var. *balticus, mexicanus*) Alliance (7216)
Juncus (effusus, patens) – *Carex (pansa, praegracilis)* Alliance (7830)
Juncus effusus Association (7820)
Lasthenia californica – *Plantago erecta* – *Vulpia microstachys* Alliance (7104)
Vulpia microstachys – *Selaginella hansenii* Association (7115)
Leymus cinereus – *Leymus triticoides* Alliance (8211)
Leymus condensatus Alliance (7122)
Lotus unifoliolatus Alliance (7116)
Mediterranean California naturalized annual and perennial grassland Group (7101)
Naturalized warm-temperate riparian and wetland Group (7500)
Schoenoplectus (acutus, californicus) Alliance (7320)
Schoenoplectus americanus Alliance (8212)
Southwestern North American alkali marsh/seep vegetation Group (8200)
Typha (angustifolia, domingensis, latifolia) Alliance (7310)
Vancouverian and Rocky Mountain naturalized perennial grassland Group (irrigated pasture) (7102)
Vancouverian coastal/tidal marsh and meadow Group (7800)
Vernal Pool & Californian Annual and Perennial Grassland Matrix Mapping Unit (7400)

Achnatherum speciosum Alliance (5431)
Desert needlegrass grassland Alliance



Aerial view of an open to sparse stand of the bunchgrass *Achnatherum speciosum* with other grasses and forbs.



Ground view of sparse bunchgrass *Achnatherum speciosum* in the foreground, with other grasses and forbs, on a gentle slope.

***Achnatherum speciosum* Alliance (5431)**

DESCRIPTION: *Achnatherum speciosum* is dominant in stands that are typically the result of fire, eliminating desert shrub cover from stands that were formerly *Coleogyne filaginifolia*, *Eriogonum fasciculatum*, etc. Persistence is unknown, but stands probably develop shrub dominance in more than 50 years, without fire or other disturbance. Stands are typically sandy.

Stands of this alliance are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project.

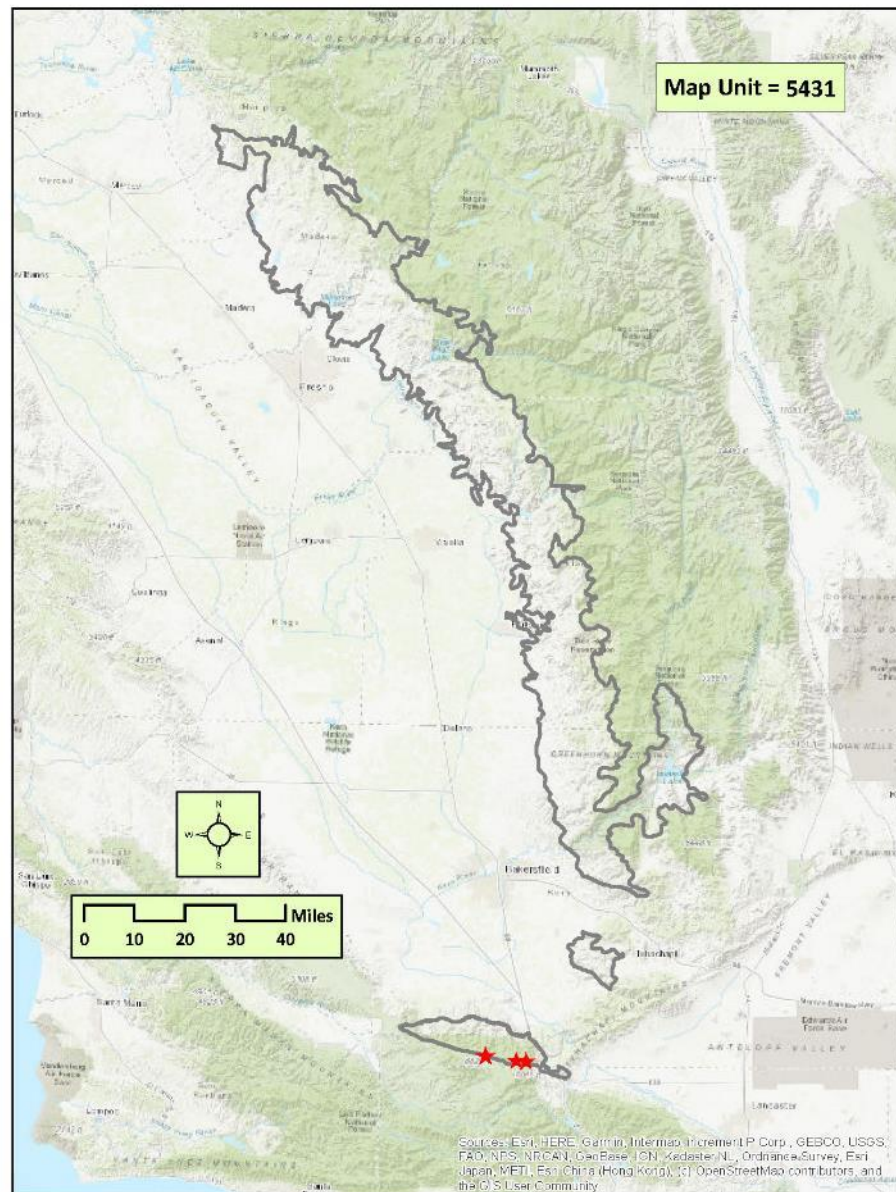
Four polygons are mapped based on ground assessments, all on south-trending slopes south of the San Emigdio Range subarea summit. This type is not mapped in the Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas.

PHOTO INTERPRETATION SIGNATURE: Signatures for this type are undetectable on the NAIP base images. Sometimes, high resolution ancillary images can show the bunch grasses as a slight bumpy gray signature within the tawnier annual grasses.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

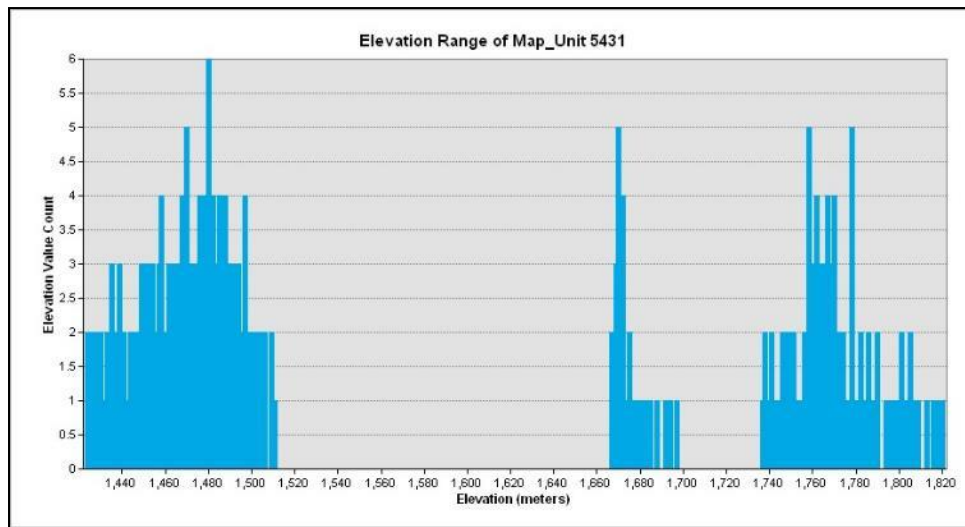
- None

Achnatherum speciosum Alliance (5431)



DISTRIBUTION: Four polygons are mapped based on ground assessments, all on south-trending slopes south of the San Emigdio Range subarea summit. This type is not mapped in the Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas.

Achnatherum speciosum Alliance (5431)



Anemopsis californica – *Helianthus nuttallii* – *Solidago spectabilis* Alliance
(8210)

Yerba mansa – Nuttall's sunflower – Nevada goldenrod alkaline wet meadows Alliance



Aerial view of a small stand of *Anemopsis californica*. Note the mottled appearance of the stand photo signature.



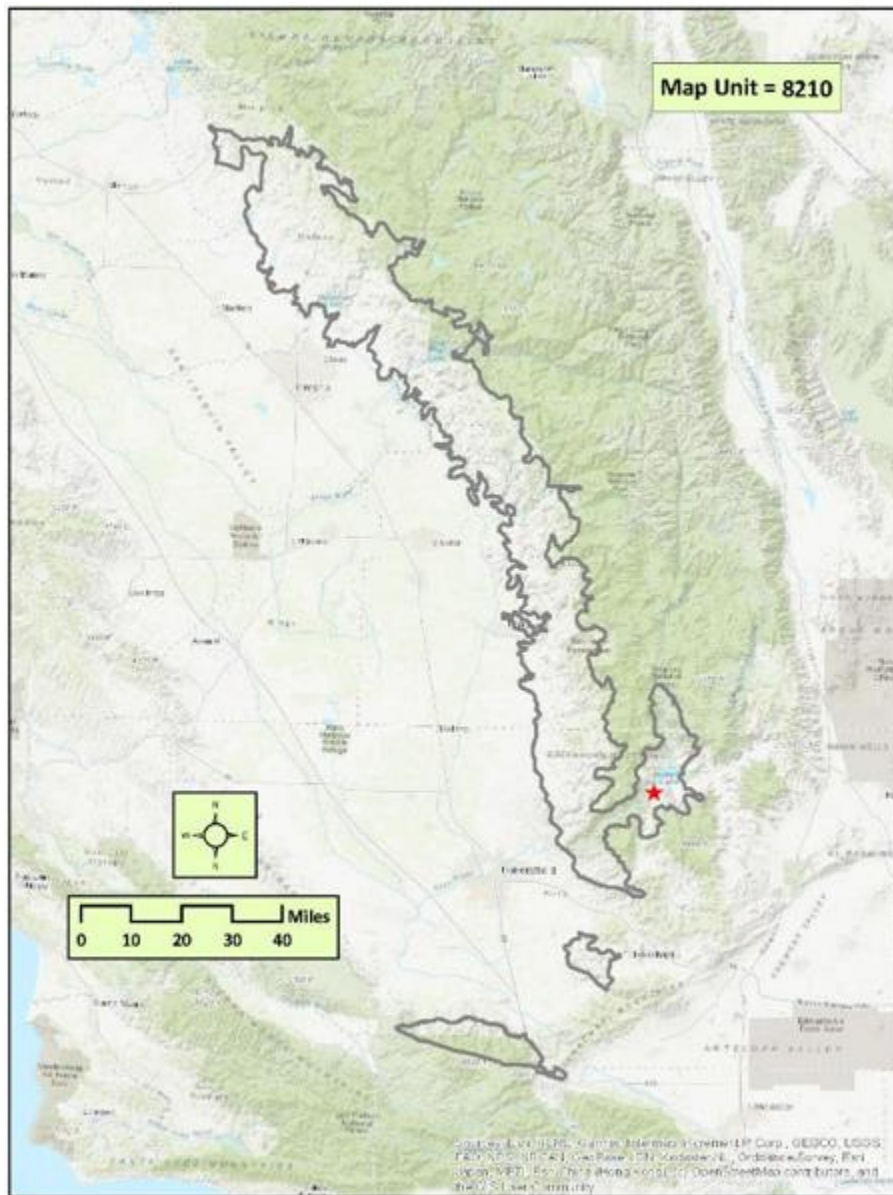
Ground view of the wetland herb *Anemopsis californica*, in a drying stage, in a moist meadow.

***Anemopsis californica* – *Helianthus nuttallii* – *Solidago spectabilis* Alliance (8210)**

DESCRIPTION: Stands of moist to wet alkaline or saline meadows characterized by broad-leafed flowering herbs including *Anemopsis californica*, *Helianthus* spp., and/or *Solidago* spp.

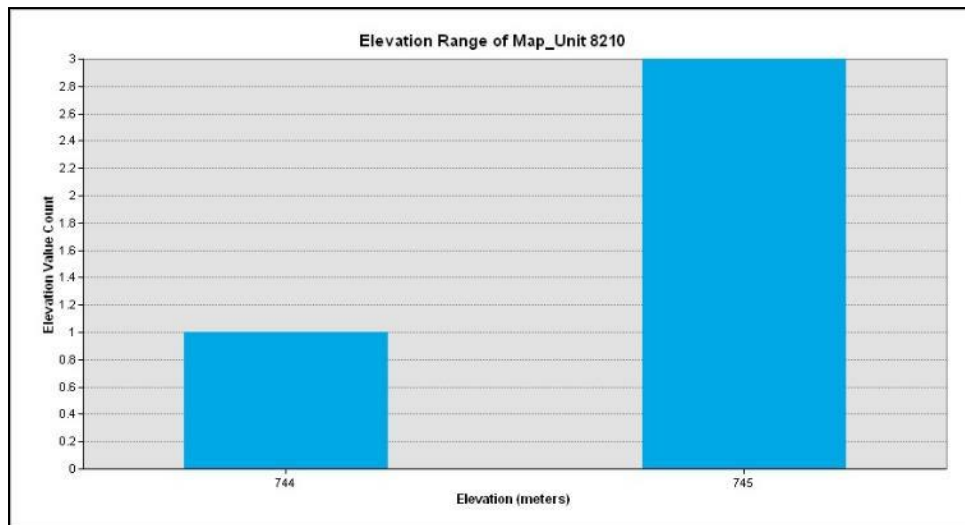
Stands of this alliance are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. In the Southern Sierra Nevada Foothills Proper subarea, one polygon mapped in a disturbed wet meadow south of Lake Isabella was identified from field data. No sites are mapped in the San Emigdio Range and Horsethief Mountain subareas.

***Anemopsis californica* – *Helianthus nuttallii* – *Solidago spectabilis* Alliance (8210)**



DISTRIBUTION: In the Southern Sierra Nevada Foothills Proper subarea, one polygon is mapped south of Lake Isabella, identified from field data. No sites are mapped in the San Emigdio Range and the Horsethief Mountain subareas.

***Anemopsis californica* – *Helianthus nuttallii* – *Solidago spectabilis* Alliance (8210)**



Arid West freshwater emergent marsh Group (7300)



Aerial view of a freshwater marsh with *Typha* and *Schoenoplectus*.



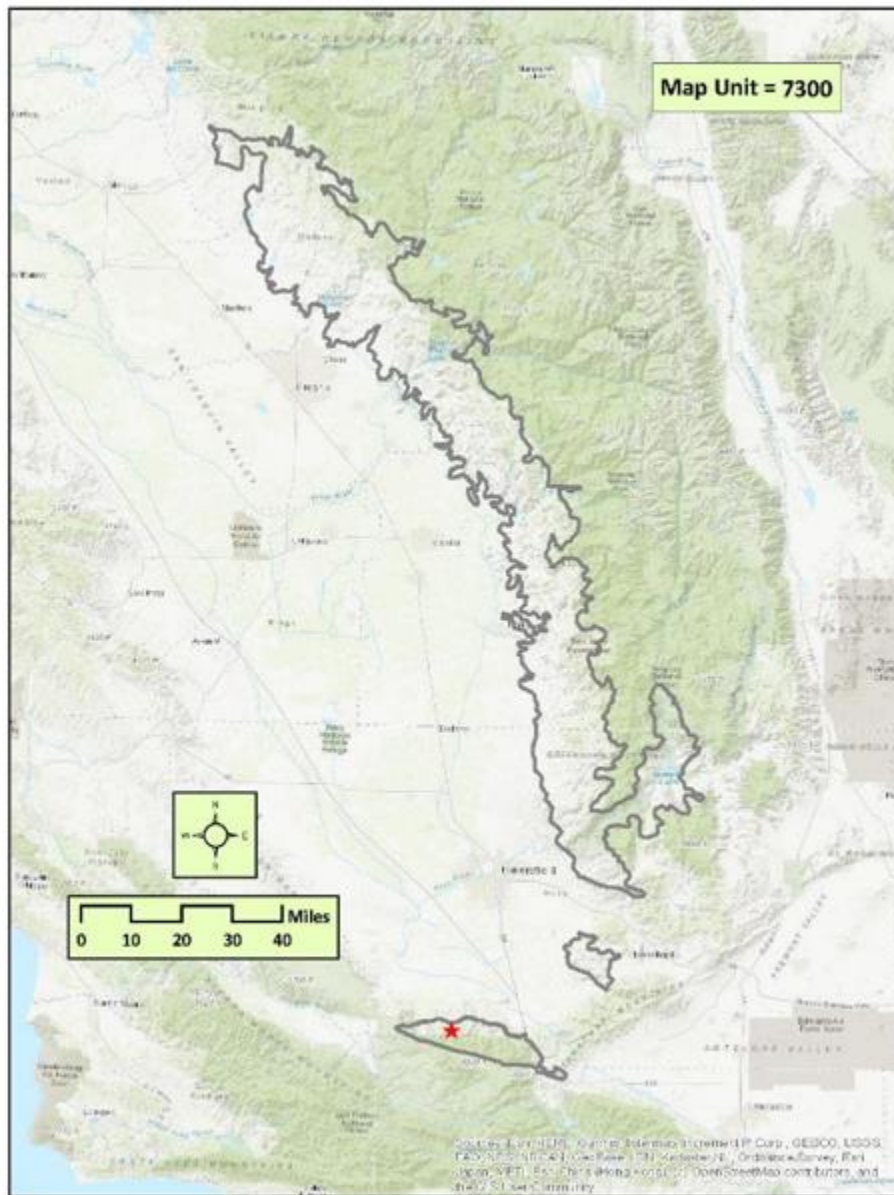
Ground view of new growth and past dead stalks of *Typha* at the edge of a water body.

Arid West freshwater emergent marsh Group (7300)

DESCRIPTION: Stands of marshes with persistent standing water through much of the growing season. May contain *Schoenoplectus* spp. and/or *Typha* spp. Mapped in semi-permanently or permanently flooded settings where *Typha* spp. or *Schoenoplectus* spp. dominates the herbaceous layer in clumped or continuous cover.

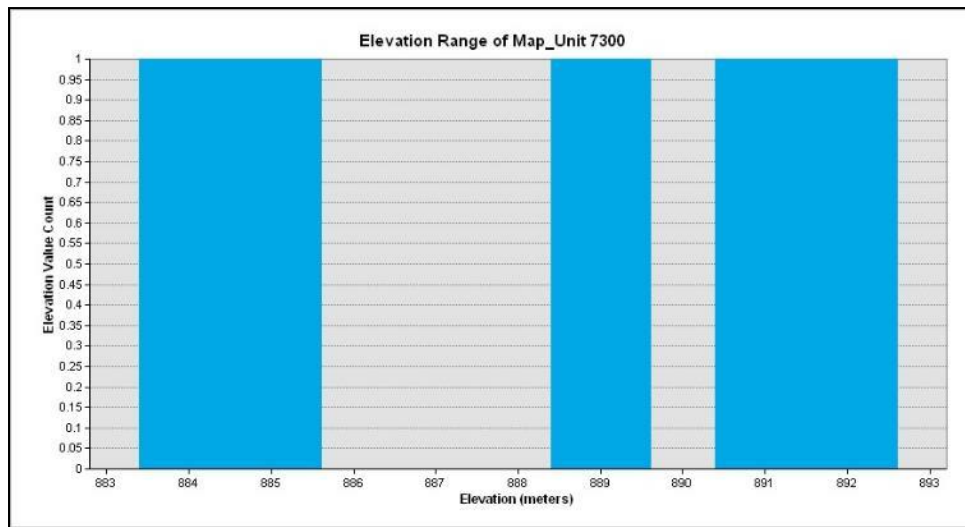
Stands of this Group are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. One small polygon is mapped in Williams Canyon in the San Emigdio Range subarea based on ground assessments. No sites are mapped in the Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas.

Arid West freshwater emergent marsh Group (7300)



DISTRIBUTION: One small polygon is mapped in Williams Canyon in the San Emigdio Range subarea based on ground assessments. No sites are mapped in the Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas.

Arid West freshwater emergent marsh Group (7300)



Artemisia dracunculus Alliance (7112)
Wild tarragon patches Alliance



Aerial view of a stand of *Artemisia dracunculus* in a flat meadow.



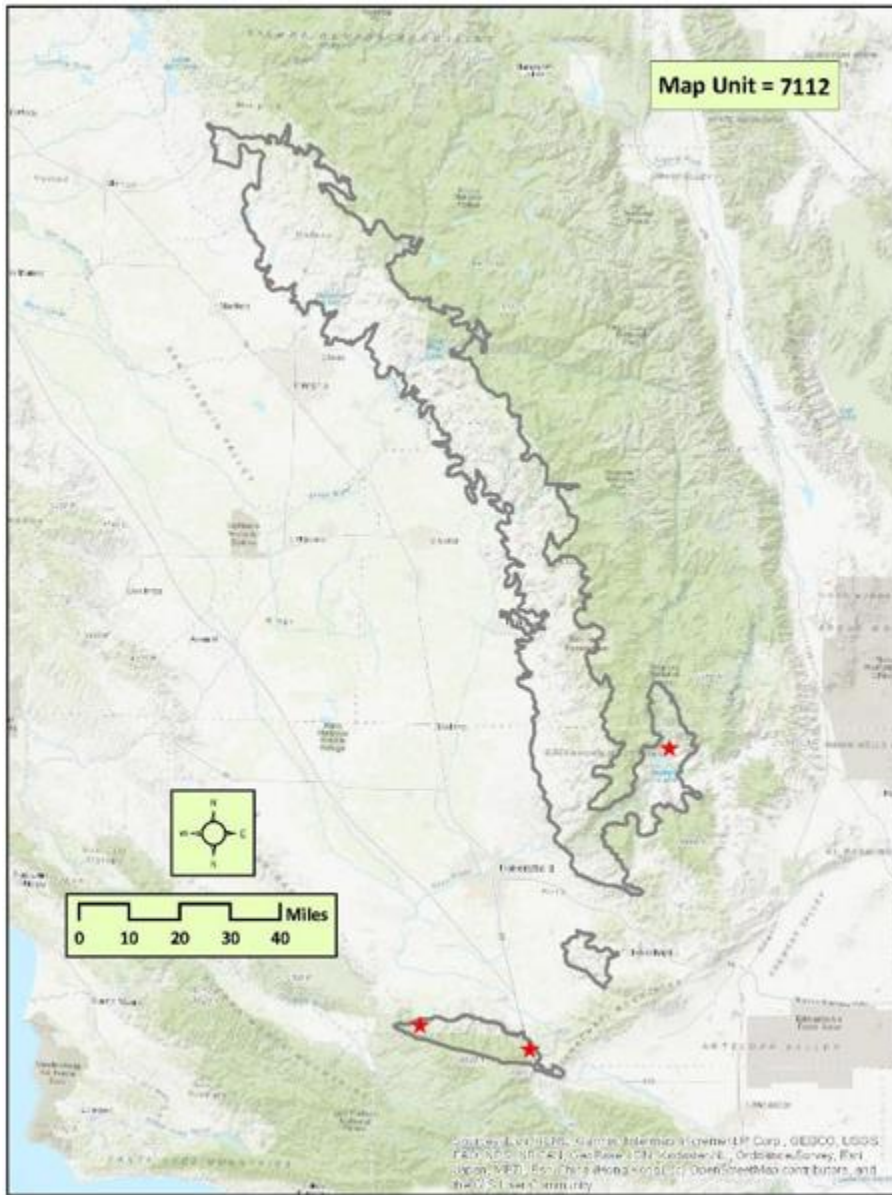
Ground view of sparse *Artemisia dracunculus* with other grasses and forbs.

***Artemisia dracunculus* Alliance (7112)**

DESCRIPTION: The perennial herb *Artemisia dracunculus* is dominant to co-dominant with an assortment of other annual and perennial herbs including *Achillea millefolium*, *Bromus diandrus*, *Clarkia cylindrica*, and *Claytonia perfoliata*. Stands are small and associated with sandy riparian terraces and alluvial benches along streams, rivers, and meadow edges.

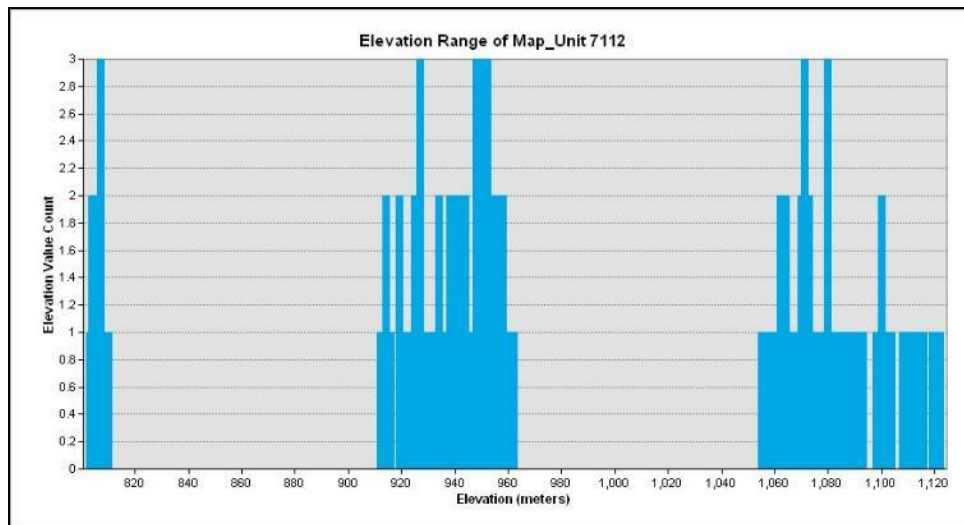
Stands of this alliance are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. One stand is mapped based on ground assessments north of Lake Isabella in the Southern Sierra Nevada Foothills Proper subarea. Two stands are mapped based on ground assessments near Johnson Canyon above the Grapevine Canyon, and another to the west near Santiago Creek, both in the San Emigdio Range subarea. No sites are mapped in the Horsethief Mountain subarea.

***Artemisia dracunculus* Alliance (7112)**



DISTRIBUTION: One stand is mapped based on ground assessments north of Lake Isabella in the Southern Sierra Nevada Foothills Proper subarea. Two stands are mapped based on ground assessments near Johnson Canyon above the Grapevine Canyon, and another to the west near Santiago Creek, both in the San Emigdio Range subarea. No sites are mapped in the Horsethief Mountain subarea.

Artemisia dracunculus Alliance (7112)



Avena spp. – *Bromus* spp. Herbaceous Semi-Natural Alliance (7191)
Wild oats and annual brome grasslands Alliance



Aerial view of a small stand of the non-native grass type *Avena* spp. – *Bromus* spp. surrounded by chaparral.



Ground view of a stand of *Avena* spp. – *Bromus* spp. in the foreground, on flat terrain adjacent to an oak woodland with chaparral on the hillside.

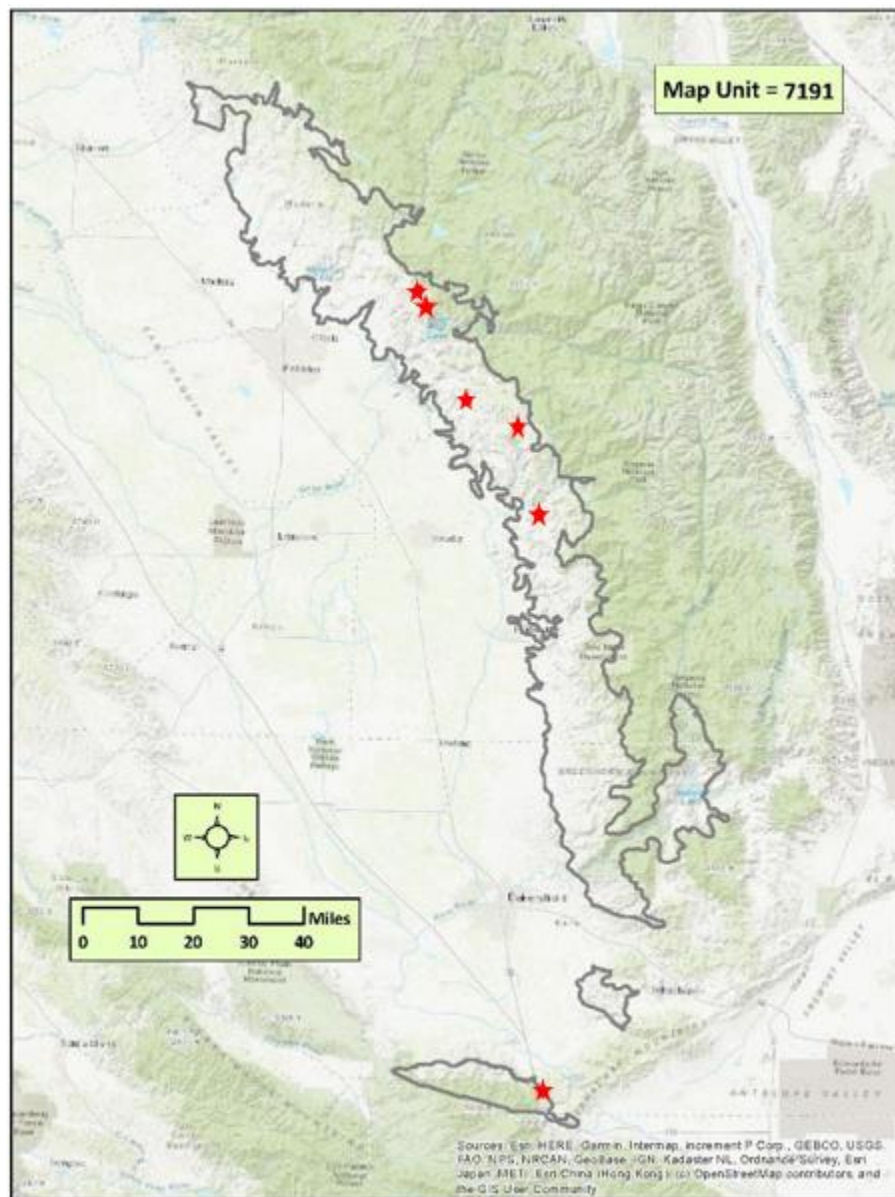
***Avena* spp. – *Bromus* spp. Herbaceous Semi-Natural Alliance (7191)**

DESCRIPTION: Stands, individually or in combination, are strongly dominated by non-native annual species of the following genera: *Avena*, *Brachypodium*, or *Bromus*, and/or by leafy herbs of the genus *Erodium*.

Although the alliance is common, environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. In the mapping, most occurrences of this type are subsumed within the Mediterranean California naturalized annual and perennial grassland Group (7101) or the California Annual and Perennial Grassland Macrogroup (7100).

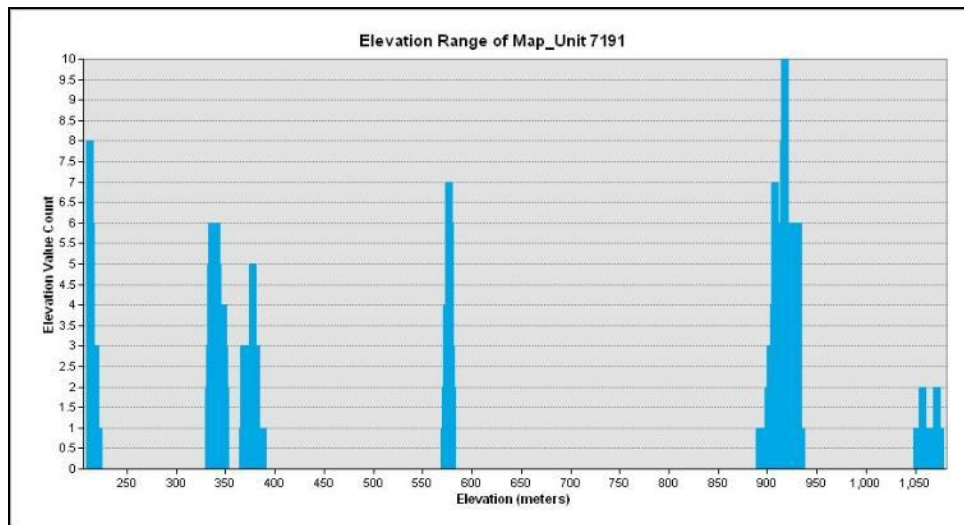
Stands of this alliance are infrequently mapped in the study area. Five small polygons are mapped from field data in the central Southern Sierra Nevada Foothills Proper subarea. One small polygon is mapped just above Old Fort Tejon in the San Emigdio Range subarea, and is identified to this alliance based on ground assessments. No sites are mapped in the Horsethief Mountain subarea.

***Avena* spp. – *Bromus* spp. Herbaceous Semi-Natural Alliance (7191)**



DISTRIBUTION: Five small polygons are mapped from field data in the central Southern Sierra Nevada Foothills Proper subarea. One small polygon is mapped just above Old Fort Tejon in the San Emigdio Range subarea, and is identified to this alliance based on ground assessments. No sites are mapped in the Horsethief Mountain subarea.

***Avena* spp. – *Bromus* spp. Herbaceous Semi-Natural Alliance (7191)**



Bromus tectorum – Taeniatherum caput-medusae Herbaceous Semi-Natural Alliance (7181)

Cheatgrass – medusahead grassland Semi-Natural Alliance



Aerial view of a stand of non-native *Bromus tectorum* with very sparse conifers on the toe slope of a thin-soil hillside.

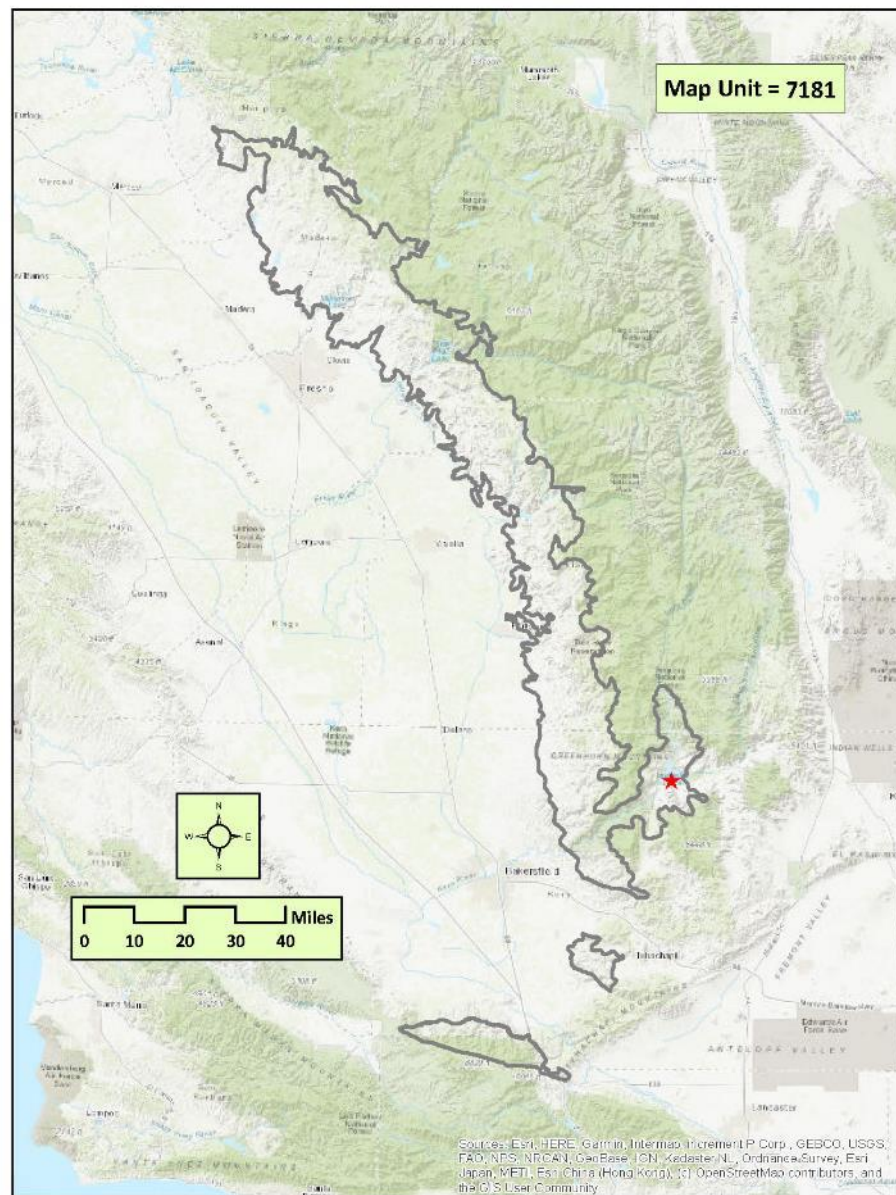
Ground photo is not available.

***Bromus tectorum* – *Taeniatherum caput-medusae* Herbaceous Semi-Natural Alliance (7181)**

DESCRIPTION: The non-native annual grasses *Bromus tectorum* and/or *Elymus caput-medusae*, strongly dominate stands. *B. tectorum* is an upland annual most frequently occurring above about 3000 feet in elevation on loamy to sandy soil. *E. caput-medusae* tolerates a wider range of temperatures, and a broader elevation range, but is most common on heavy soils. They are currently placed in the same alliance in the NVC. Most mappable stands will be of *B. tectorum*, in the southern Sierra Foothills study area. Most occurrences of this type are subsumed within the Mediterranean California naturalized annual and perennial grassland Group (7101) or the California Annual and Perennial Grassland Macrogroup (7100).

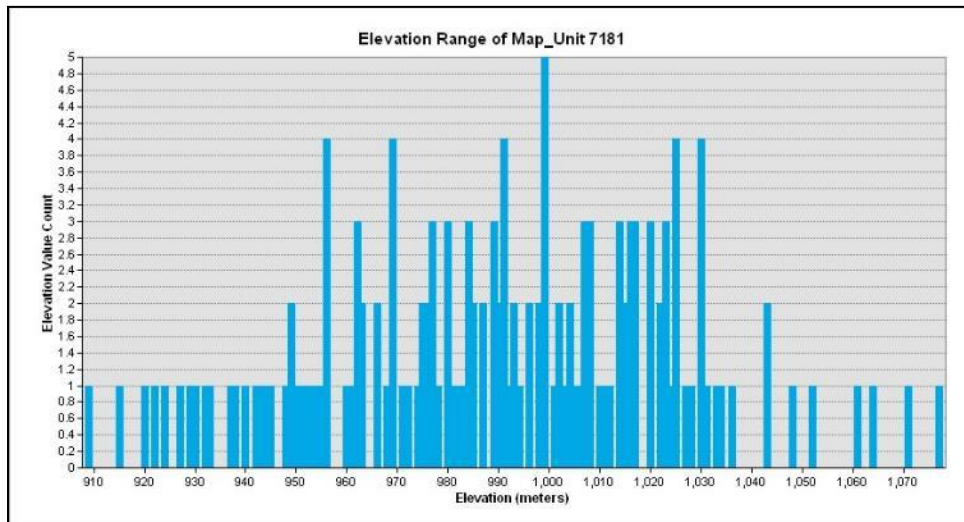
Stands of this alliance are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. Only one stand is mapped just south of Lake Isabella in the Southern Sierra Nevada Foothills Proper subarea, from field data. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

***Bromus tectorum* – *Taeniatherum caput-medusae* Herbaceous Semi-Natural Alliance (7181)**



DISTRIBUTION: Only one stand is mapped just south of Lake Isabella in the Southern Sierra Nevada Foothills Proper subarea, from field data. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

***Bromus tectorum* – *Taeniatherum caput-medusae* Herbaceous Semi-Natural Alliance (7181)**



California Annual and Perennial Grassland Macrogroup (7100)



Aerial view of a stand of California Annual and Perennial Grassland Macrogroup, composed of a mix of native and non-native grasses, on a gentle slope. Note the mottled signature and proximity to urbanization, indicating a higher level of non-natives.



Ground view of California Annual and Perennial Grassland Macrogroup on a gentle slope, next to a blue oak woodland.

California Annual and Perennial Grassland Macrogroup (7100)

DESCRIPTION: Stands characterized by a grasses and herbs. This type can include a mixture of native and non-native species that can range from strongly dominant non-native species to strongly dominant native species.

Photo interpreters are unable to distinguish native species from the non-native Mediterranean annuals and must model based on edaphic and topographical characteristics. Photo interpreters also evaluate concentrations of land use types and their proximity to herbaceous vegetation in deciding which Group to assign, if possible.

Note: stands that are assumed to contain native species especially without wildflower signatures have been mapped to this Macrogroup level.

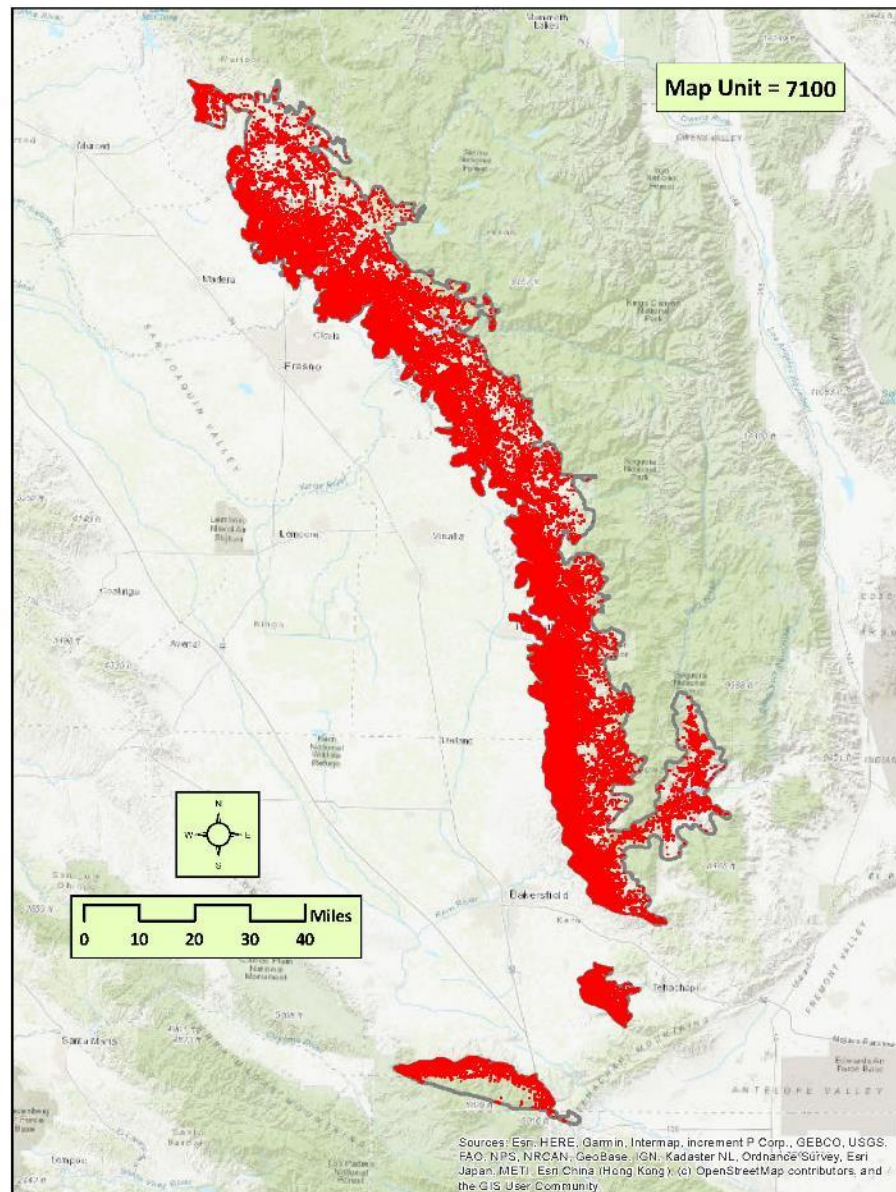
Herbaceous cover dominated by annual grasses are extensive and ubiquitous, and mapped throughout the Southern Sierra Nevada Foothills Proper, San Emigdio Range, and the Horsethief Mountain subareas, in all but the highest elevations. Stands are limited only along the summit ridgeline of the San Emigdio Mountains and to the south where *Pinus monophylla* occurs widespread downslope from the summit to the study area boundary.

PHOTO INTERPRETATION SIGNATURE: Grasslands of this type display varying colors of tawny to beige with a flat low-growing texture. Complexing of different grassland signatures and types create signature recognition difficulties, containing other species of herbaceous and forbs that are below the minimum mapping unit.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

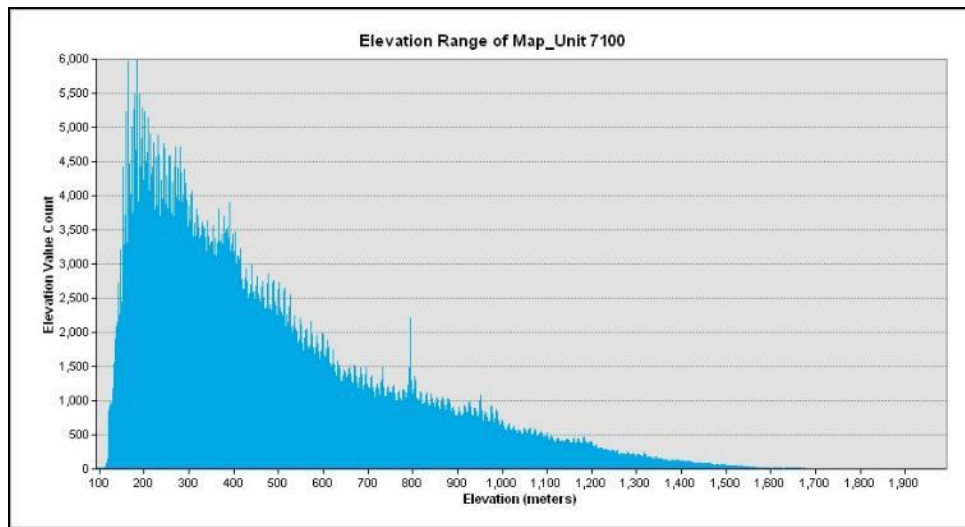
- California annual herb/grass Group (7110) – A typical annual grassland signature except for a co-dominant to dominant component containing signatures indicating native flowers in bloom are the criteria for photo interpreters to identify herbaceous cover to this group.

California Annual and Perennial Grassland Macrogroup (7100)

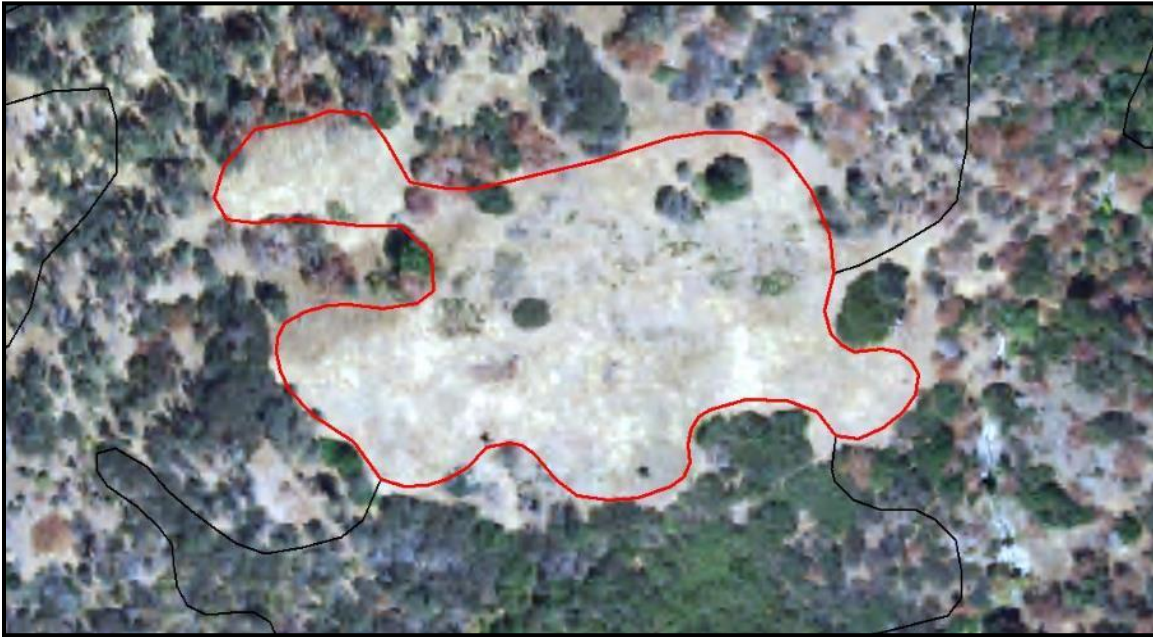


DISTRIBUTION: Herbaceous cover dominated by annual grasses are extensive and ubiquitous, and mapped throughout the Southern Sierra Nevada Foothills Proper, San Emigdio Range, and the Horsethief Mountain subareas, in all but the highest elevations. Stands are limited only along the summit ridgeline of the San Emigdio Mountains and to the south where *Pinus monophylla* occurs widespread downslope from the summit to the study area boundary.

California Annual and Perennial Grassland Macrogroup (7100)



California annual herb/grass Group (7110)



Aerial view of California annual herb/grass Group on a thin-soil slope. Typically, low cover of non-natives in such a stand.



Ground view of native-rich California annual herb/grass Group on a steep thin-soiled slope.

California annual herb/grass Group (7110)

DESCRIPTION: Stands dominated or characterized by mostly annual grasses and forbs. Native herbs are characteristic and evenly distributed across the herbaceous layer, though non-native forbs and grasses may be dominant. Cover and composition vary year to year, but indicators usually present in sufficient amounts to differentiate from non-native stands. Diagnostic species include *Amsinckia* spp., *Eschscholzia* spp., *Lupinus* sp., *Lasthenia* spp., *Plantago erecta* and *Vulpia microstachys*. Stands are variable from year to year depending upon timing and quantity of available moisture. Many stands are difficult to determine to finer floristic levels, except during peak phenology following adequate rainfall.

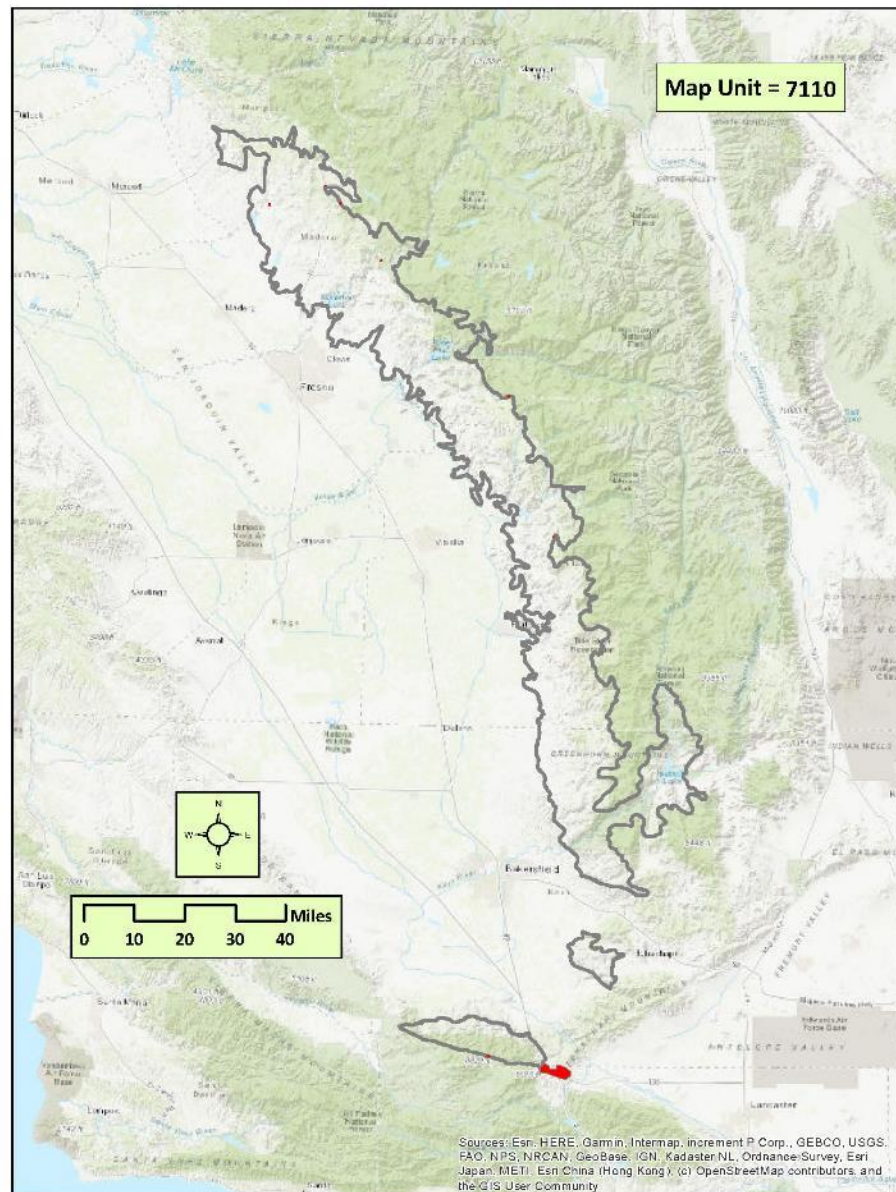
In the San Emigdio Range subarea, herbaceous vegetation is mapped to finer levels using this group based on multiple image datasets that show flower color dominating or co-dominating the stand. Mapped over a fairly extensive region on the southern edge of the Tehachapi Mountains on south-trending slopes above the town of Gorman. No sites are mapped in the Southern Sierra Nevada Foothills Proper and the Horsethief Mountain subareas.

PHOTO INTERPRETATION SIGNATURE: A typical annual grassland signature except for a co-dominant to dominant component containing signatures indicating native flowers in bloom are the criteria for photo interpreters to identify herbaceous cover to this group.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

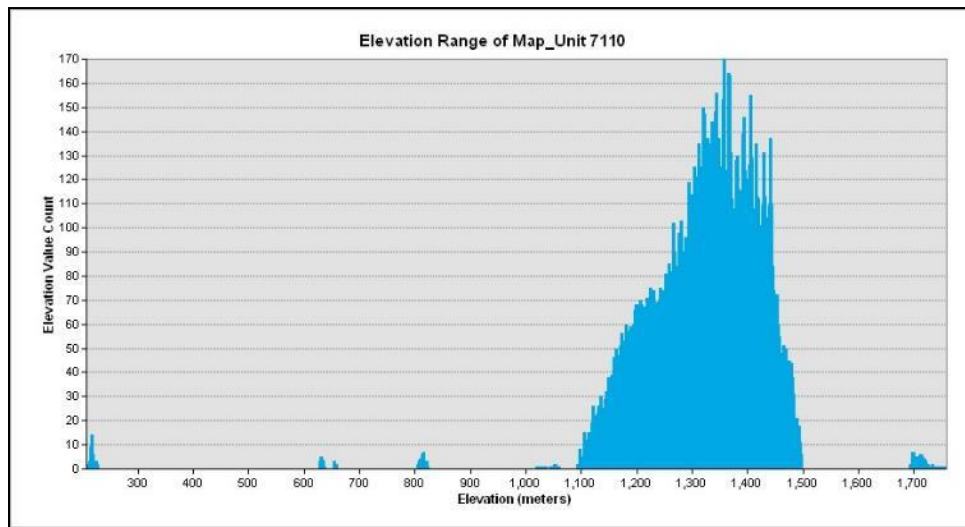
- California Annual and Perennial Grassland Macrogroup (7100) – Grasslands of this type display varying colors of tawny to beige with a flat low growing texture. Complexing of different grassland signatures and types create signature recognition difficulties, containing other species of herbaceous and forbs that are below the minimum mapping unit.

California annual herb/grass Group (7110)



DISTRIBUTION: Mapped over a fairly extensive region on the southern edge of the Tehachapi Mountains on south-trending slopes above the town of Gorman, in the San Emigdio Range subarea. No sites are mapped in the Southern Sierra Nevada Foothills Proper and the Horsethief Mountain subareas.

California annual herb/grass Group (7110)



Californian mixed annual/perennial freshwater vernal pool/swale
bottomland Group (7600)



Aerial view of a typical vernal pool signature of smooth light-colored soil on a flat.



Ground view of a vernal pool with moist soil supporting vernal pool species of grasses and forbs.

Californian mixed annual/perennial freshwater vernal pool/swale bottomland Group (7600)

DESCRIPTION: Vegetation characteristic of vernal moist or flooded swales, ponds, or pools; often underlain by a restrictive soil layer (e.g., claypan, hardpan, or volcanic flow). Characteristic species are native annuals, which sort ecologically by different tolerances to inundation and pool depth. Individual stands are often small and form narrow bands, hence, the group level is the most likely map unit throughout the study area.

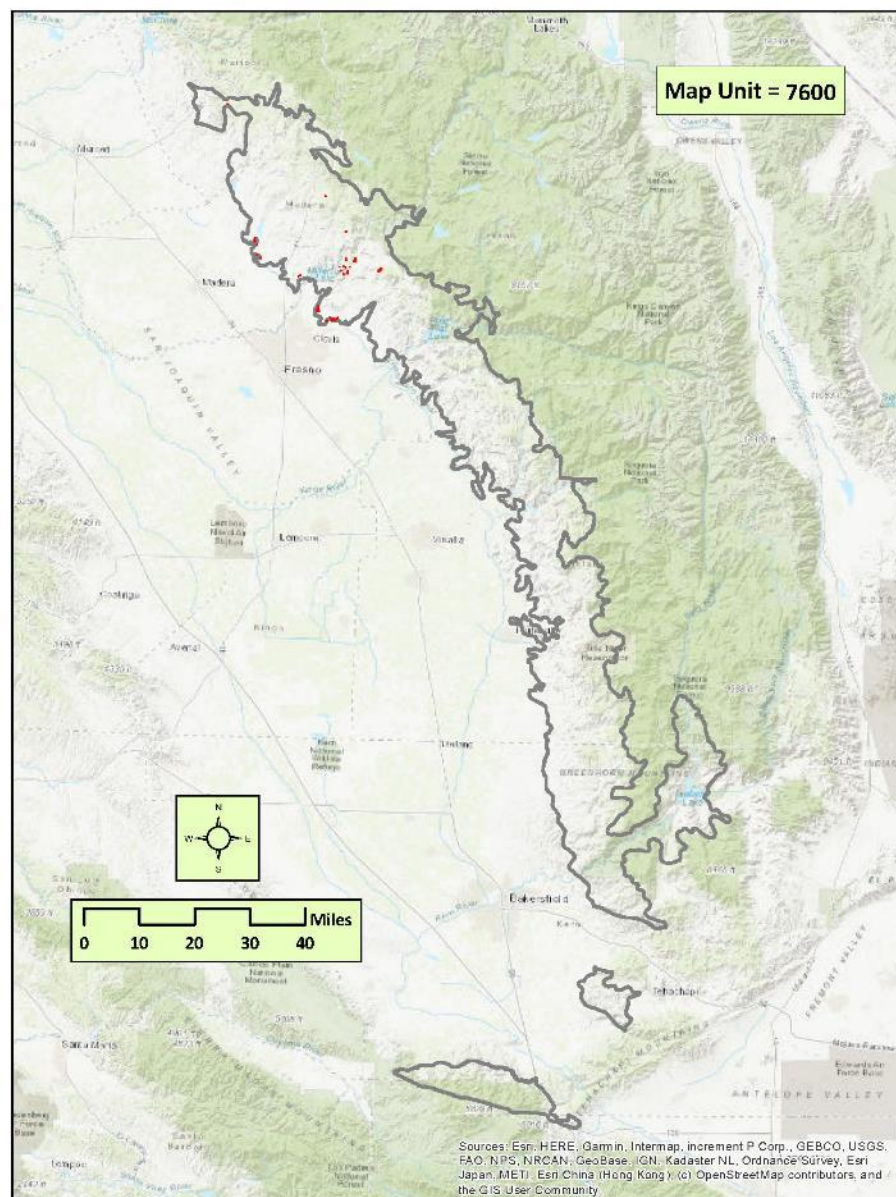
This Group represents individual vernal pools that are larger than the minimum mapping unit. Thirty-nine stands are mapped in the grasslands of the northern portion of the Southern Sierra Nevada Foothills Proper subarea. Fairly large vernal pools are found on volcanic table-top mountain plateaus that trap the water between the rock. Smaller pools are scattered in the lower elevation grasslands along the western edges of the project area. As an ancillary data source, a vernal pool map produced by Holland (provided by CDFW), was also referenced for finding vernal pool signatures. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: This type is identified by a distinctive lighter gray or whitish oval/linear ring, which is reflecting mineral deposits where the rain water pools. There is a starkly browner contrast to the surrounding grasslands outside the well-defined ring.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

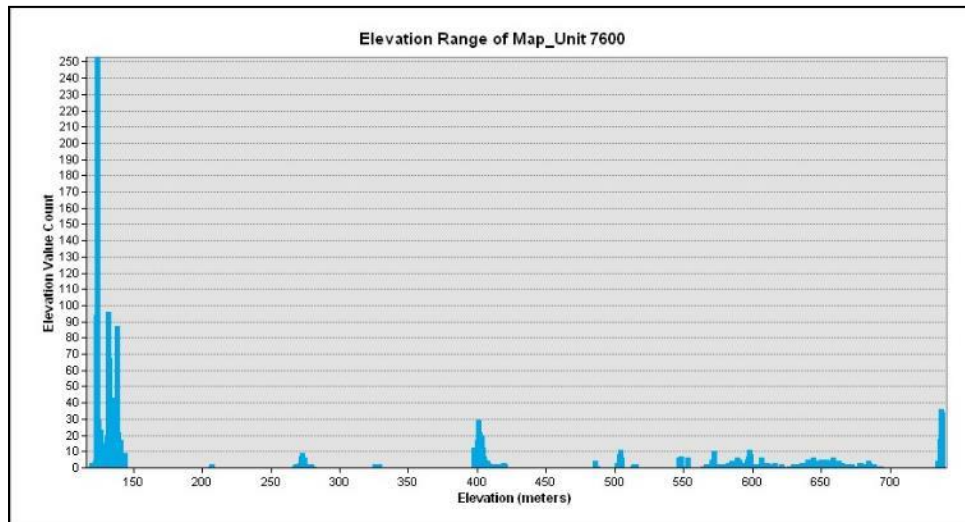
- Vernal Pool & Californian Annual and Perennial Grassland Matrix Mapping Unit (7400) – Area of upland grassland mixed with vernal pools over a large area. Mapped where photo interpreters can see topography that potentially yields floristics that are associated with vernal pools. This type represents a matrix of small (below the minimum mapping unit size) scattered vernal pools in broader grassland dominated stands. Large stands are mapped typically along the western grasslands on the edge of the study area, with a few exceptions that wade into the interior of *Quercus douglasii* savannahs. This alliance is also found on volcanic table-top mountain plateaus that trap the water between the rock. The Holland vernal pool map was also referenced for finding vernal pool signatures.

Californian mixed annual/perennial freshwater vernal pool/swale bottomland Group (7600)



DISTRIBUTION: Thirty-nine stands are mapped in the grasslands of the northern portion of the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

**Californian mixed annual/perennial freshwater vernal pool/swale bottomland
Group (7600)**



Californian warm temperate marsh/seep Group (7200)



Aerial view of a marsh area with the rich dark green tones of California warm temperate marsh/seep Group.



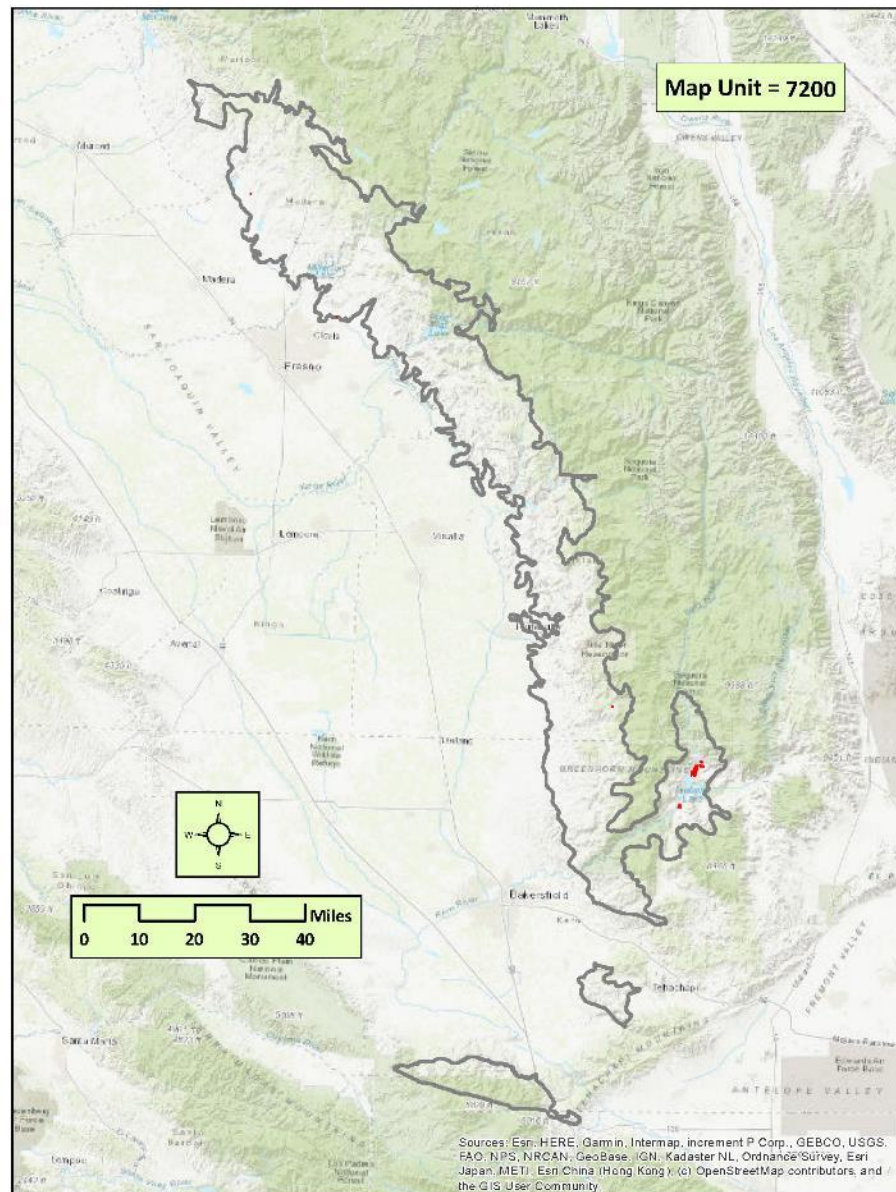
Ground view of an extensive marshy area with bright green-colored grasses and forbs of the California warm temperate marsh/seep Group.

Californian warm temperate marsh/seep Group (7200)

DESCRIPTION: Stands of wet to moist meadows, and riparian margins, typically seasonally flooded or saturated, and typically not of alkaline or saline areas. This type does not include small isolated or shallow pools.

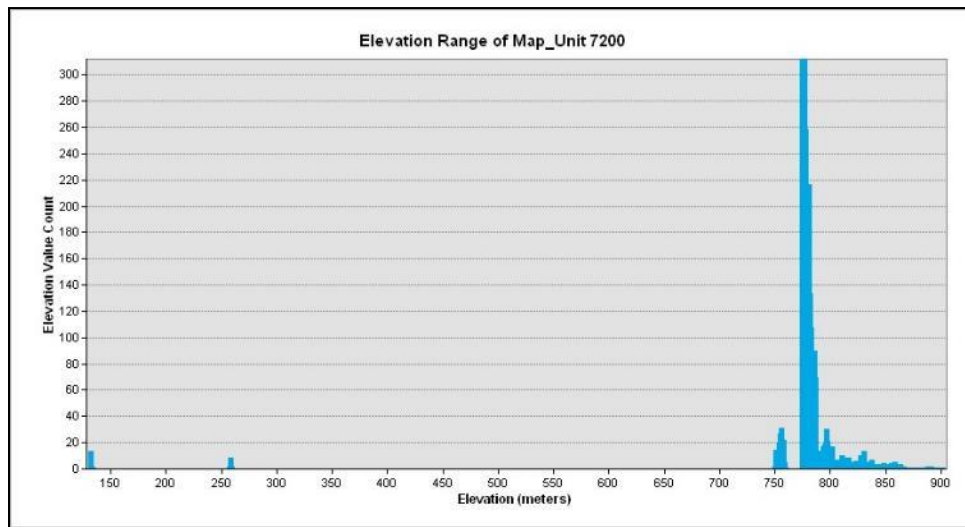
Stands of this Group are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. Field data is used by the photo interpreters to verify complexing stands of wetland species that make up this type. Thirty-four stands of this type are mapped in the Southern Sierra Nevada Foothills Proper subarea, with a majority of them occurring in the immediate areas upstream and downstream from Lake Isabella. No sites are mapped in the San Emigdio or Horsethief Mountain subareas.

Californian warm temperate marsh/seep Group (7200)



DISTRIBUTION: Thirty-four stands of this type are mapped in the Southern Sierra Nevada Foothills Proper subarea, with a majority of them occurring in the immediate areas upstream and downstream from Lake Isabella. A few isolated sites are mapped in the remainder of the subarea. No sites are mapped in the San Emigdio or Horsethief Mountain subareas.

Californian warm temperate marsh/seep Group (7200)



Corethrogyne filaginifolia – Eriogonum (elongatum, nudum) Alliance (7121)
Sand-aster and perennial buckwheat fields Alliance



Aerial view of post-burn stand with *Eriogonum nudum*, mapped from field data on thin-soiled hill slope.



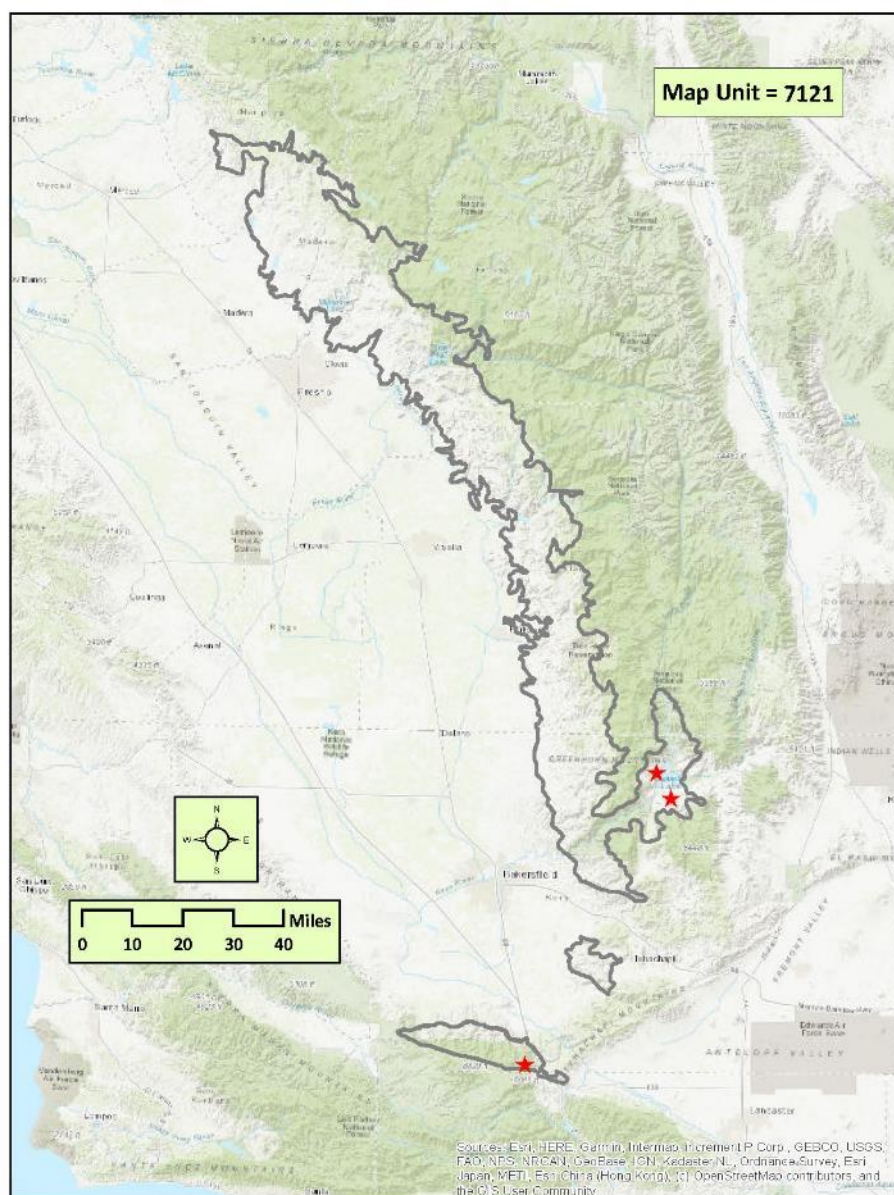
Ground view of stand of *Eriogonum nudum* in foreground on a moderately steep slope overlooking an oak woodland.

***Corethrogyne filaginifolia* – *Eriogonum (elongatum, nudum)* Alliance (7121)**

DESCRIPTION: Herbaceous perennial forbs such as *Corethrogyne filaginifolia*, *Eriogonum elongatum*, and/or *E. nudum* dominate or characterize the stands, which often occur on shallow soils in the interface between grasslands and shrublands.

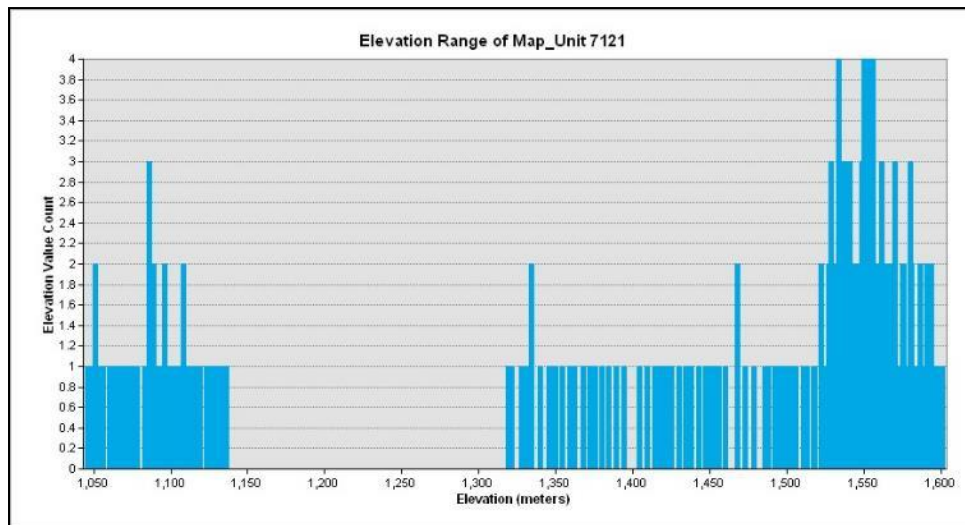
Stands of this alliance are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. Two polygons of *Eriogonum nudum* are mapped to this alliance from field data near Lake Isabella in the Southern Sierra Nevada Foothills Proper subarea. One polygon is mapped to this alliance based on a Relevé plot (containing *Corethrogyne*) located in a broad canyon above Frazier Park in the San Emigdio Range subarea.

***Corethrogyne filaginifolia* – *Eriogonum* (*elongatum*, *nudum*) Alliance (7121)**



DISTRIBUTION: Two polygons are mapped to this alliance from field data near Lake Isabella in the Southern Sierra Nevada Foothills Proper subarea. One polygon is mapped to this alliance based on a Relevé plot located in a broad canyon above Frazier Park in the San Emigdio Range subarea.

***Corethrogyne filaginifolia* – *Eriogonum (elongatum, nudum)* Alliance (7121)**



Distichlis spicata Alliance (8110)
Salt grass flats Alliance



Aerial view of a stand of *Distichlis spicata* in a localized saline or alkaline-rich environment.



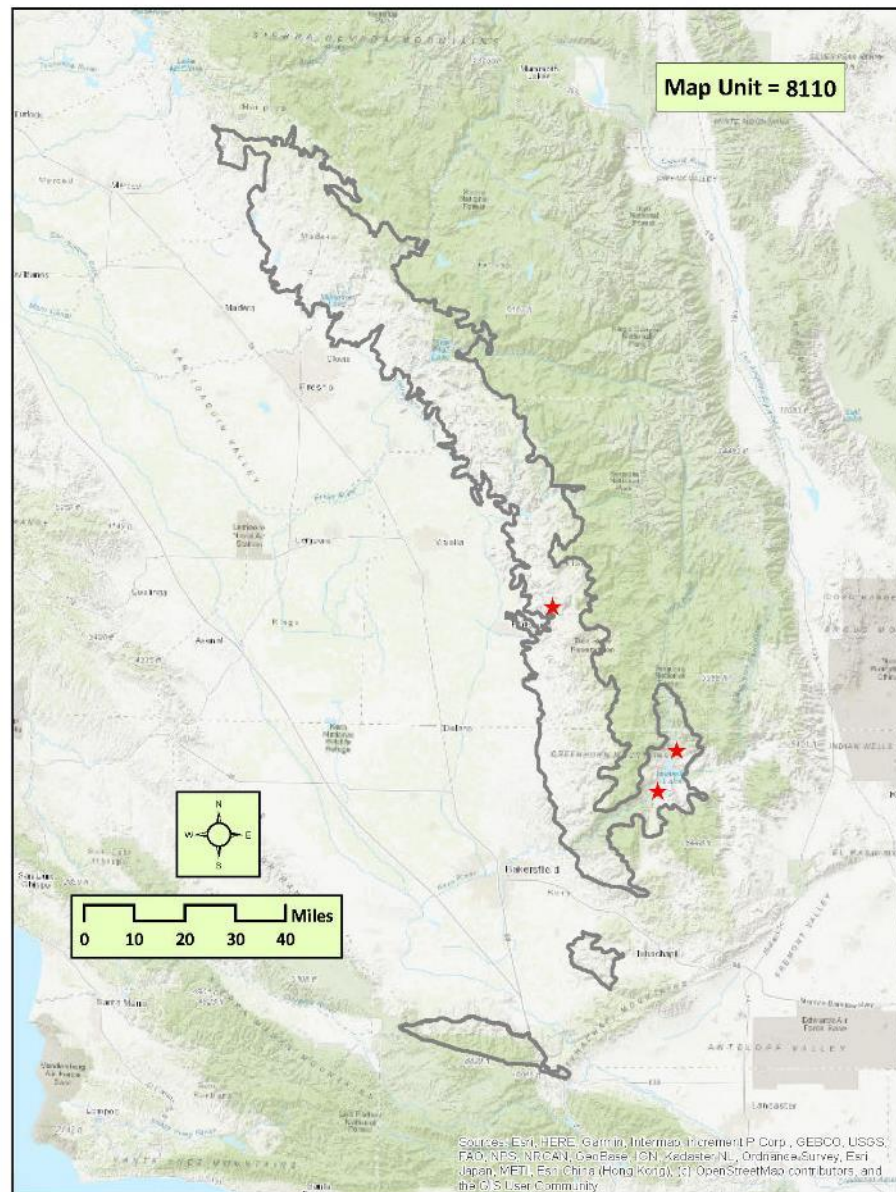
Ground view of a stand of the grass *Distichlis spicata* on a flat alkaline or saline meadow.

***Distichlis spicata* Alliance (8110)**

DESCRIPTION: Small stands dominated or co-dominated with *Distichlis spicata*. Occasionally associated with alkaline springs and seeps in the foothills.

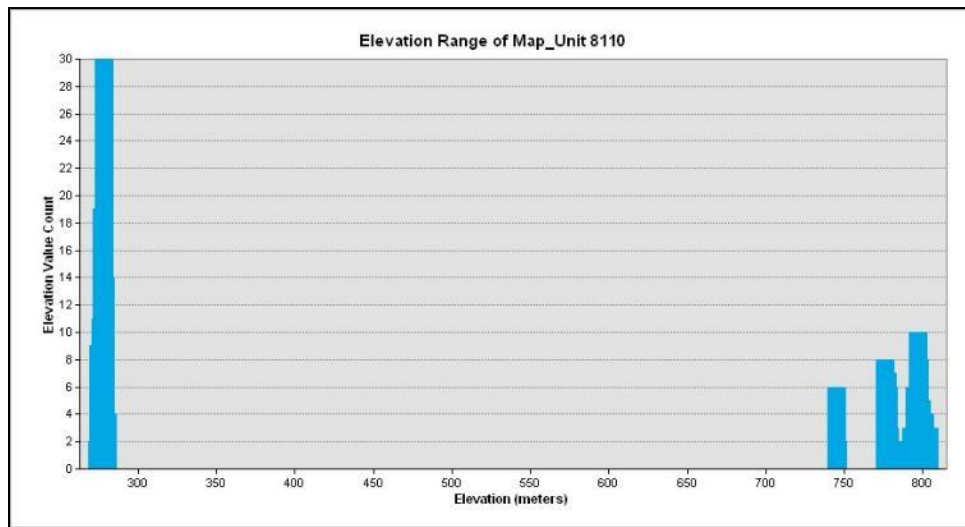
Stands of this alliance are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. Only 3 stands are mapped in the Southern Sierra Nevada Foothills Proper subarea from field data. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Distichlis spicata Alliance (8110)



DISTRIBUTION: Only 3 stands are mapped in the Southern Sierra Nevada Foothills Proper subarea from field data. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Distichlis spicata Alliance (8110)



Heterotheca (*oregona*, *sessiliflora*) Alliance (6221)
Goldenaster patches Alliance



Aerial view of stand of *Heterotheca* on a gentle slope, mapped from field data.



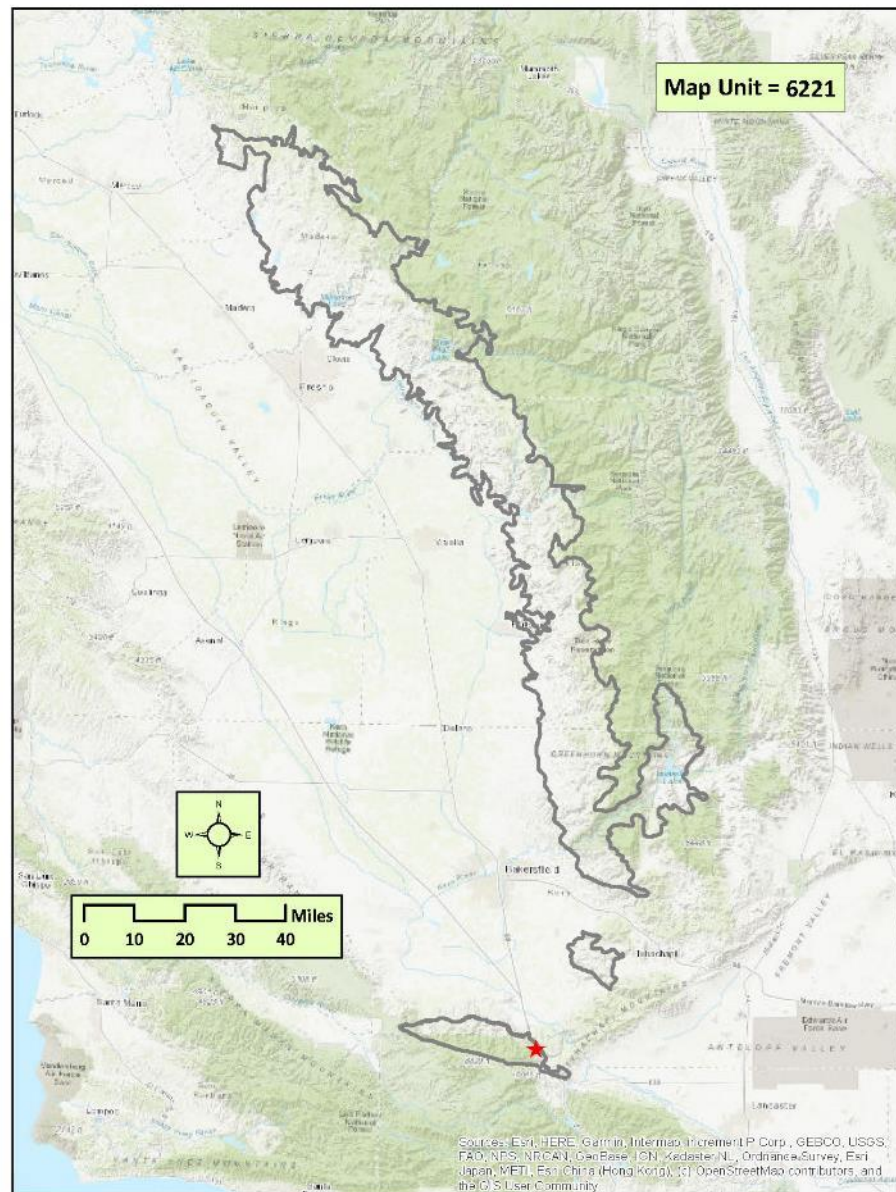
Ground view of an open stand of the blue-green forb *Heterotheca* on a gentle slope.

Heterotheca (oregona, sessiliflora) Alliance (6221)

DESCRIPTION: Stands dominated by *Heterotheca sessiliflora* in the herbaceous layer. Shrubs and trees may be present but at low cover.

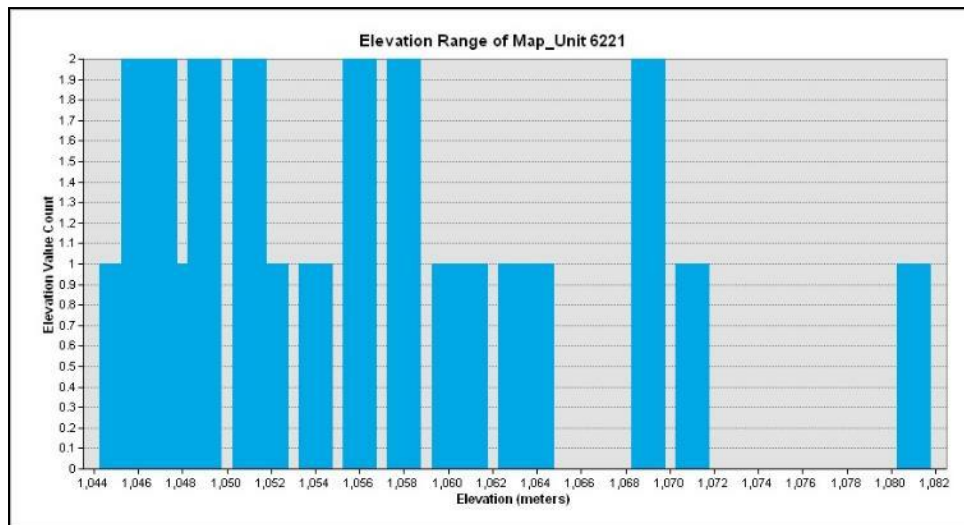
Stands of this alliance are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. One patch is mapped near Johnson Canyon in the San Emigdio Range subarea, based on ground assessments, adjacent to a stand of *Quercus chrysolepis*. No sites are mapped in the Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas.

Heterotheca (oregona, sessiliflora) Alliance (6221)



DISTRIBUTION: One patch is mapped near Johnson Canyon in the San Emigdio Range subarea, based on ground assessments. No sites are mapped in the Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas.

***Heterotheca (oregona, sessiliflora)* Alliance (6221)**



Holocarpha (heermannii, virgata) Alliance (7114)

Tarweed Alliance



Aerial view of a stand of *Holocarpha*, mapped from field data, on a gentle to moderately steep slope, surrounded by oak woodlands.



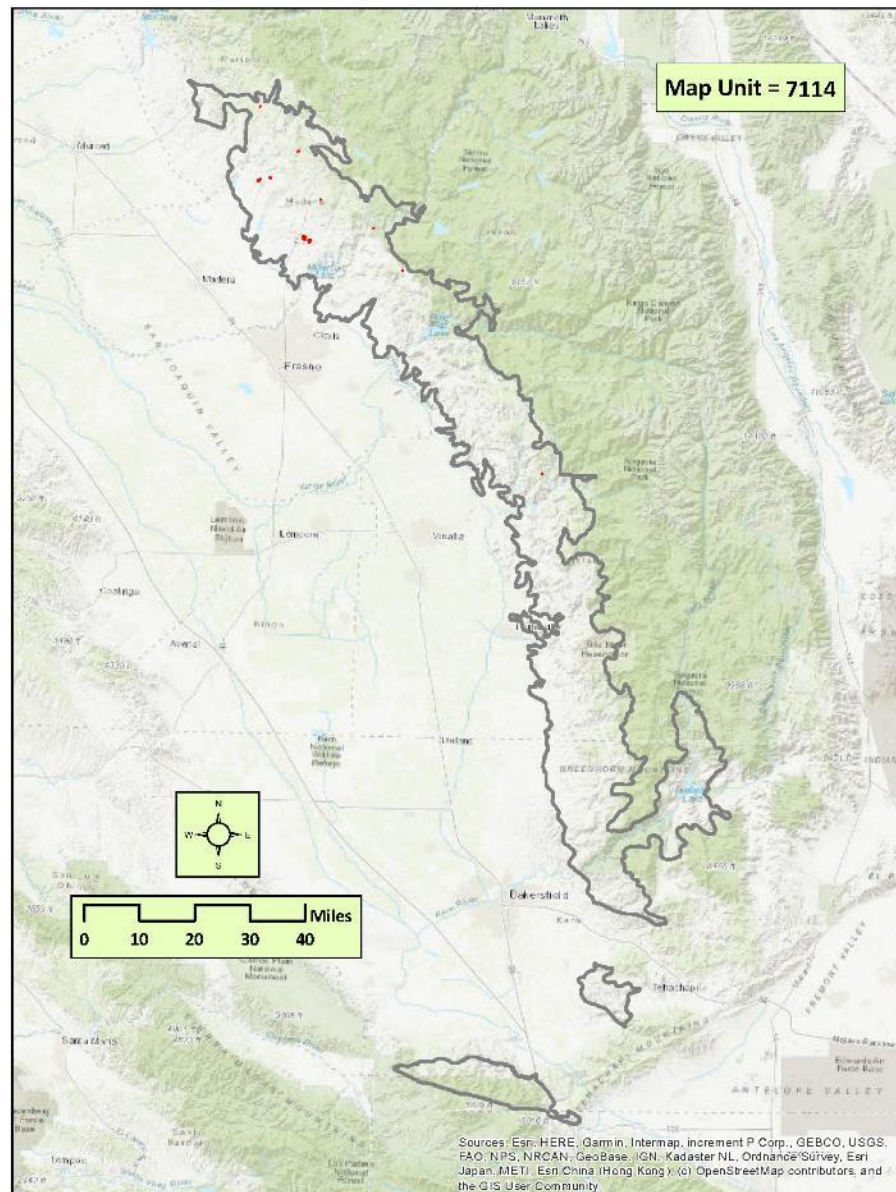
Ground view of an herbaceous stand containing yellow-flowered *Holocarpha* on a gentle to moderately steep slope.

Holocarpha (heermannii, virgata) Alliance (7114)

DESCRIPTION: *Holocarpha virgata* and/or *Holocarpha heermannii* is present and typically between 5 and 30% absolute cover and is co-dominant in the herbaceous layer. On occasion, *Holocarpha* spp. will be sub-dominant or even less than 1% when with non-native grasses and herbs or disturbance related natives such as *Bromus* spp., *Centaurea melitensis*, and *Croton setigerus*.

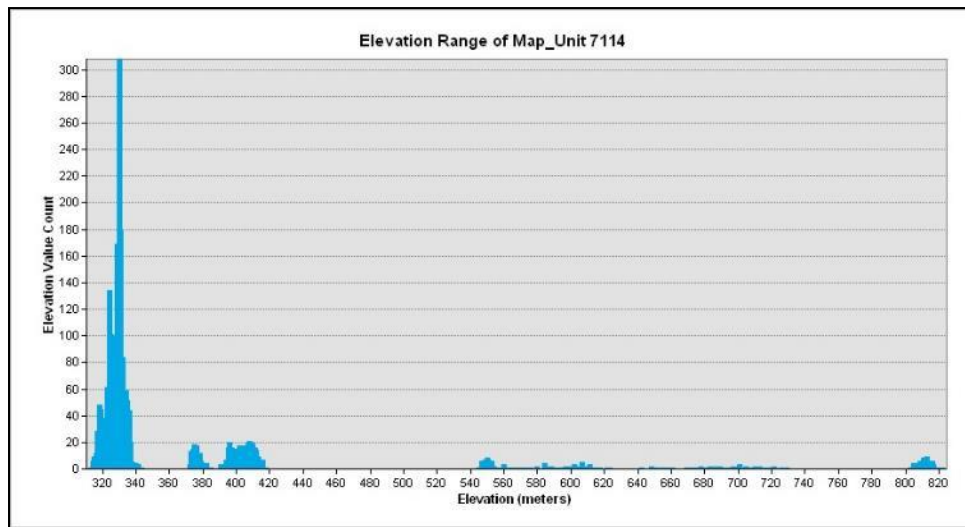
Stands of this alliance are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. Ten stands are mapped in the Southern Sierra Nevada Foothills Proper subarea from field data. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Holocarpha (heermannii, virgata) Alliance (7114)

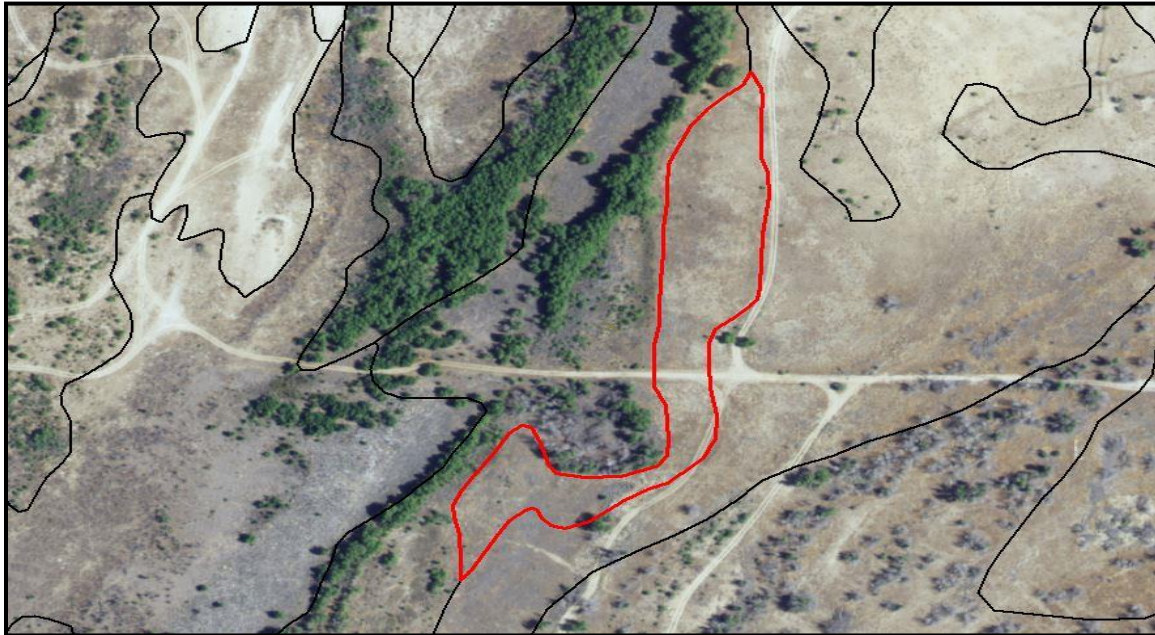


DISTRIBUTION: Ten stands are mapped, primarily in the northern part of the Southern Sierra Nevada Foothills Proper subarea, from field data. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

***Holocarpha (heermannii, virgata)* Alliance (7114)**



Juncus arcticus (var. *balticus*, *mexicanus*) Alliance (7216)
Baltic and Mexican rush marshes Alliance



Aerial view of a stand of *Juncus arcticus* in a rather dry meadow in a riparian zone.



Ground view of the bright dark green rush *Juncus arcticus* in a moist meadow.

***Juncus arcticus* (var. *balticus*, *mexicanus*) Alliance (7216)**

DESCRIPTION: Stands are usually moist meadows or edges of more permanently saturated meadow sites and are characterized by turfs of rhizomatous *Juncus* in the *Juncus arcticus* complex (including *J. balticus* and *J. mexicanus*).

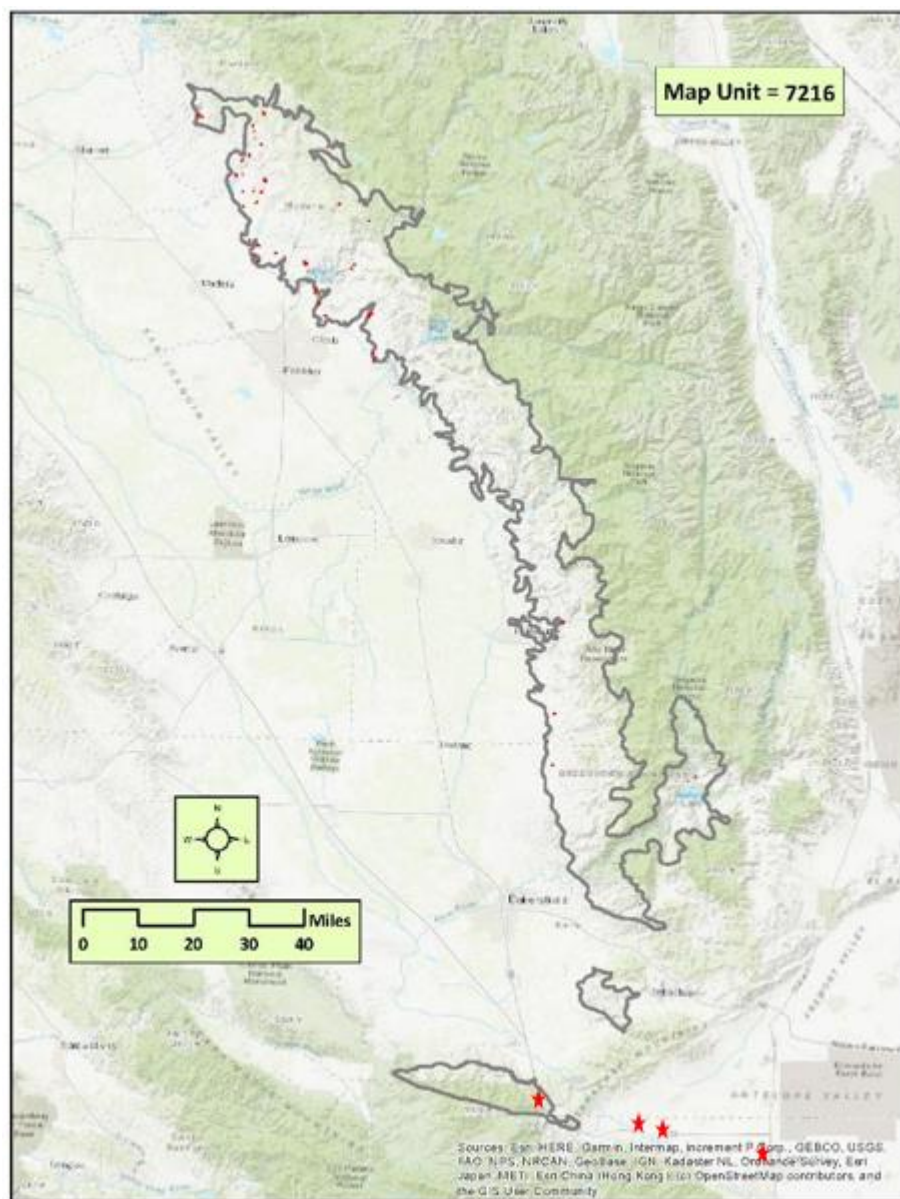
Fifty-nine stands are mapped in the Southern Sierra Nevada Foothills Proper subarea along moist drainages and swales. Two small stands are mapped in the San Emigdio Range subarea, one along the San Emigdio Creek north of the Pine Mountain Club, another in the easternmost end of the study in the upper reaches of Oso Canyon. No sites are mapped in the Horsethief Mountain subarea.

PHOTO INTERPRETATION SIGNATURE: The classical signature for this type is a smooth dark green with a low stature. Stand edges are not always distinct and many times grade into other wetland or annual grass types. Many stands contain small inclusions of other herbaceous types that are below the minimum mapping unit size.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

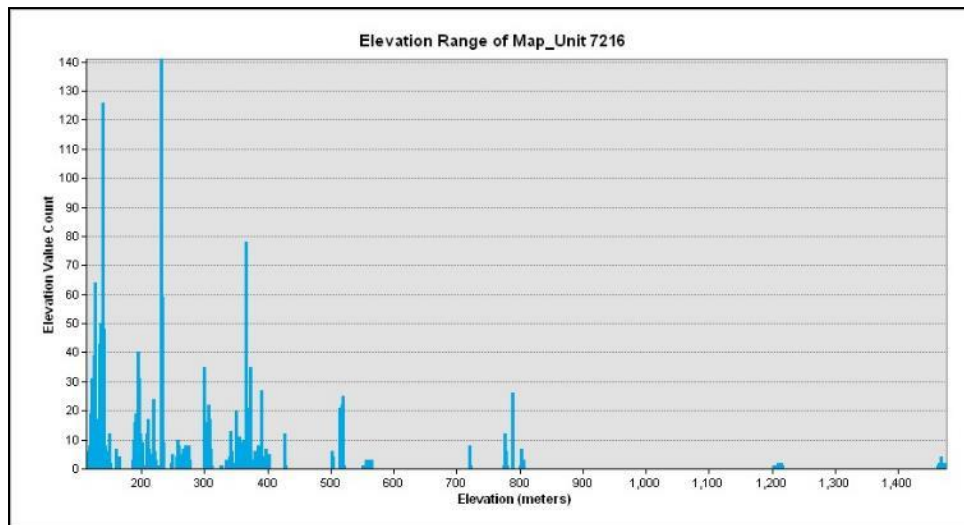
- None

***Juncus arcticus* (var. *balticus*, *mexicanus*) Alliance (7216)**



DISTRIBUTION: Fifty-nine stands are mapped in the Southern Sierra Nevada Foothills Proper subarea along moist drainages and swales, mostly in the northern quarter of the subarea. Two small stands are mapped in the San Emigdio Range subarea, one along the San Emigdio Creek north of the Pine Mountain Club, another in the easternmost end of the study in the upper reaches of Oso Canyon. No sites are mapped in the Horsethief Mountain subarea.

***Juncus arcticus* (var. *balticus*, *mexicanus*) Alliance (7216)**



Juncus (effusus – patens) – Carex (pansa-praeegracilis) Alliance (7830)

Soft rush – sand dune sedge marshes Alliance

DESCRIPTION: Stands characterized by *Juncus effusus*, *J. patens*, *Carex praeegracilis*, *C. pansa*, and/or *C. densa*.

This alliance is only mapped to the association level as the *Juncus effusus* Association. The association description follows.

Juncus effusus Association (7820) of the *Juncus* (*effusus* – *patens*) –
Carex (*pansa-praeegracilis*) Alliance
Soft rush marshes Alliance



Aerial view of a patch of *Juncus effusus* in standing water of a small reservoir.



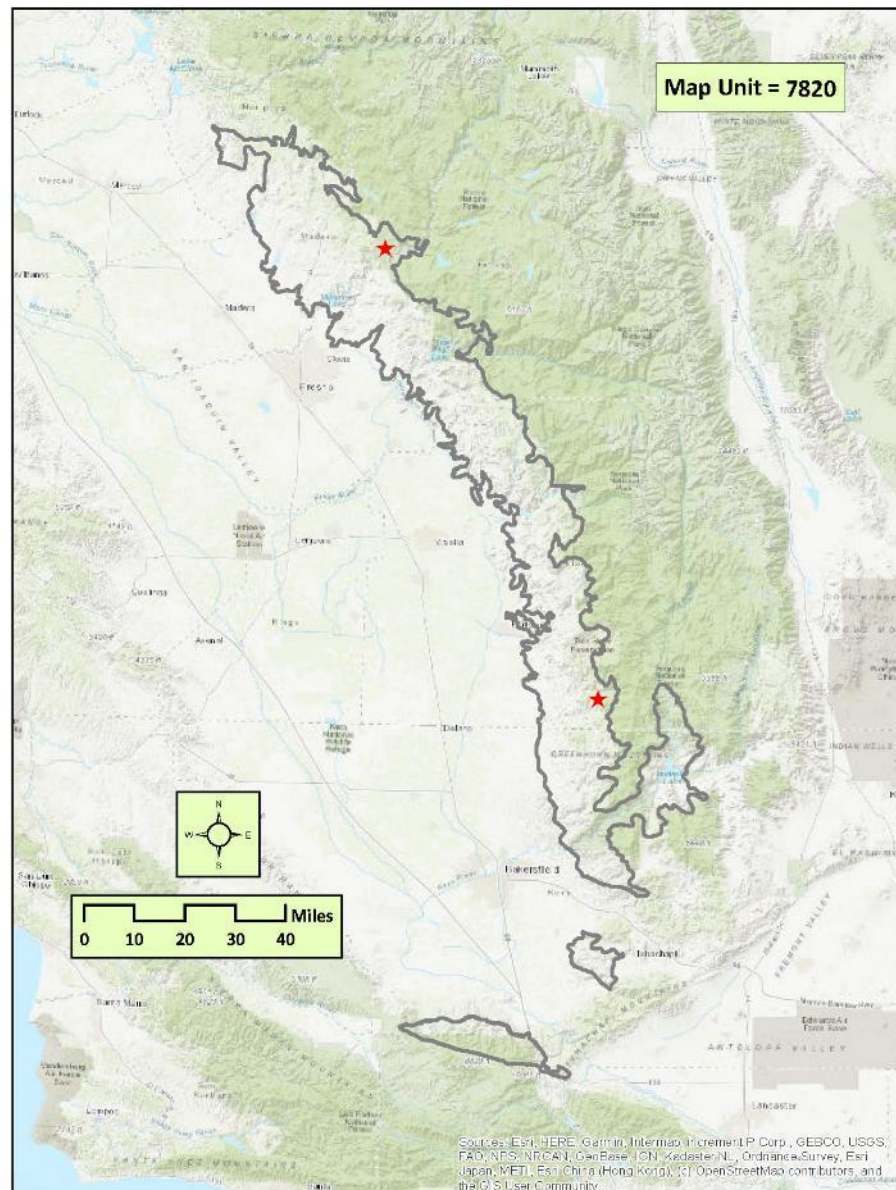
Ground view of a patch of bunches of *Juncus effusus* in a small shallow reservoir.

***Juncus effusus* Association (7820)**

DESCRIPTION: Stands dominated by the tufted large rush *Juncus effusus*, in moist to wet meadows and swales.

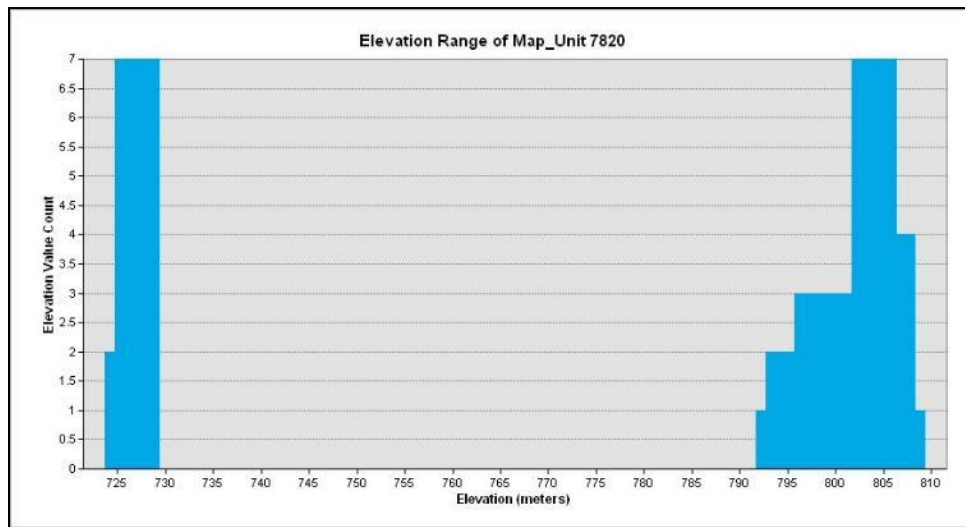
Stands of this type are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. Two stands are mapped in the Southern Sierra Nevada Foothills Proper subarea. One was adjacent to a dammed pond and the other near an irrigated pasture. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Juncus effusus Association (7820)



DISTRIBUTION: Two stands are mapped in the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Juncus effusus Association (7820)



***Lasthenia californica* – *Plantago erecta* – *Vulpia microstachys*
Alliance (7104)**

California goldfields – Dwarf plantain – Small fescue flower fields Alliance

DESCRIPTION: *Vulpia microstachys*, *Plantago erecta* *Lasthenia californica* and/or *L. gracilis* are characteristically present in stands and usually at least 10% relative in cover to other herbs. Other native species such as *Castilleja exserta*, *Lupinus*, and *Trifolium* species are often well-represented and sometimes co-dominant. Soils may be clayey, wet to moist in spring and dry by summer. Generally loamy soils compared to the *Monolopia (lanceolata)*-*Coreopsis (calliopsidea)* Alliance.

This alliance is only mapped to the association level as the *Vulpia microstachys* – *Selaginella hansenii* Association. The association description follows.

PHOTO INTERPRETATION SIGNATURE: Please refer to the association description for photo interpretation signature discussion.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES: Please refer to the association description for the discussion of similar types.

Vulpia microstachys – *Selaginella hansenii* Association (7115) of the
Lasthenia californica – *Plantago erecta* – *Vulpia microstachys* Alliance
Small fescue – Hansen's club moss mats Association



Aerial view of a very rocky stand of the *Vulpia microstachys*-*Selaginella hansenii* Association on a moderately steep slope.



Ground view of rocky stand of the *Vulpia microstachys*-*Selaginella hansenii* Association, in the foreground, on a moderately steep slope.

***Vulpia microstachys* – *Selaginella hansenii* Association (7115)**

DESCRIPTION: *Selaginella hansenii* and *Vulpia microstachys* occur on rocky volcanic substrate, intermixing with other native species such as *Plantago erecta*, *Lessingia virgata*, *Lupinus nanus*, *Lupinus spectabilis*, *Minuartia californica*, *Dichelostemma capitatum*, *Hypochaeris glabra*, and *Triphysaria eriantha*. *Sedella pumila* is typically absent or, when present, uncharacteristic and trace in cover. Generally, restricted to rocky substrates, including slate, metamorphic, ultramafic, or volcanic rock.

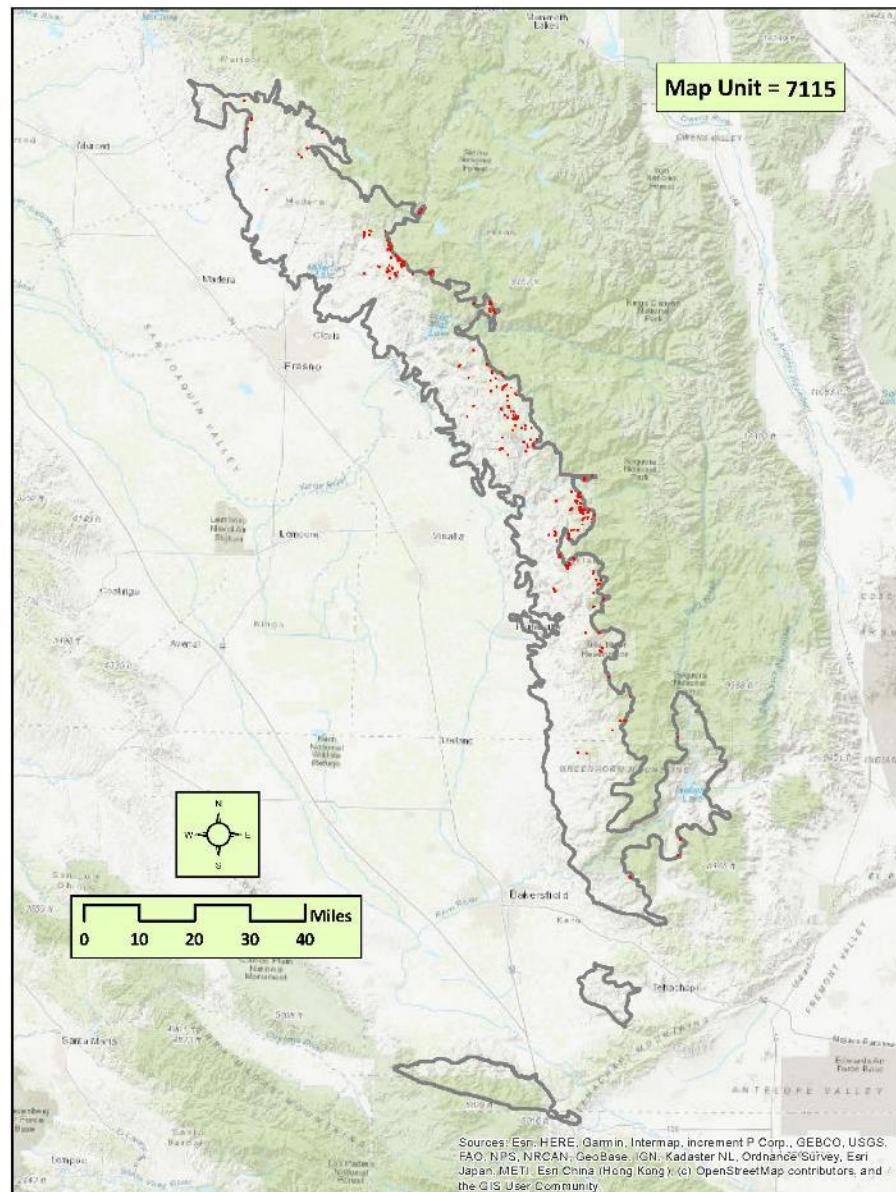
This type represents stands that have a presence of *Selaginella hansenii* within a matrix of rock and herbaceous patches. Stands occur throughout the Southern Sierra Nevada Foothills Proper subarea, but are rarely mapped in the lower elevation western grasslands or in the *Quercus douglasii* zone. Stands of this alliance are modelled on cooler rock escarpments with a mix of tawny grasses, sparse shrubs, and *Selaginella hansenii*. These areas are ecologically important because they host a relatively large number of plants. Sites are not mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: Signatures for this type typically contain a large component of smooth flat granite exposures that have a white to gray color. These rock exposures interface with grassy edges where there is a gray stained ring along the fringes of the rock that contrasts from the lighter tawny-colored annual grasses adjacent. *Selaginella hansenii* and mosses frequently occupy this grayer fringe of the rock outcropping.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

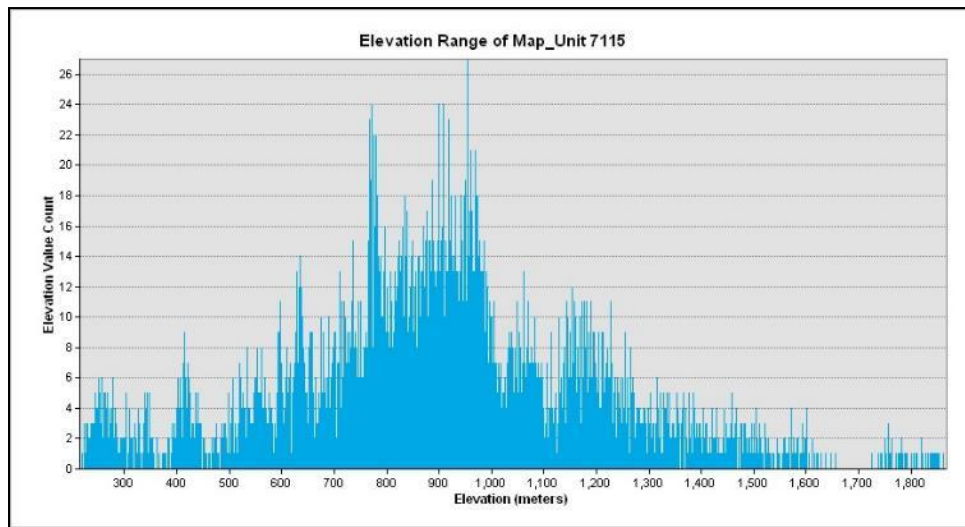
- Cliffs/Rock Outcrop Mapping Unit (9401) – Large boulders and rock outcroppings appear in striations of white to light gray to dark gray. Stands contain a very low cover of grasses and woody plants, but may contain a variety of endemic native forbs and herbaceous species which are undetectable from the imagery.

Vulpia microstachys – *Selaginella hansenii* Association (7115)



DISTRIBUTION: Stands occur throughout the Southern Sierra Nevada Foothills Proper subarea, but are rarely mapped in the lower elevation western grasslands or in the *Quercus douglasii* zone. Sites are not mapped in the Horsethief Mountain and San Emigdio Range subareas.

***Vulpia microstachys* – *Selaginella hansenii* Association (7115)**



Leymus cinereus – Leymus triticoides Alliance (8211)
Ashy ryegrass – Creeping ryegrass turfs Alliance



Aerial view of clonal *Leymus* on a flat to gently sloping meadow.



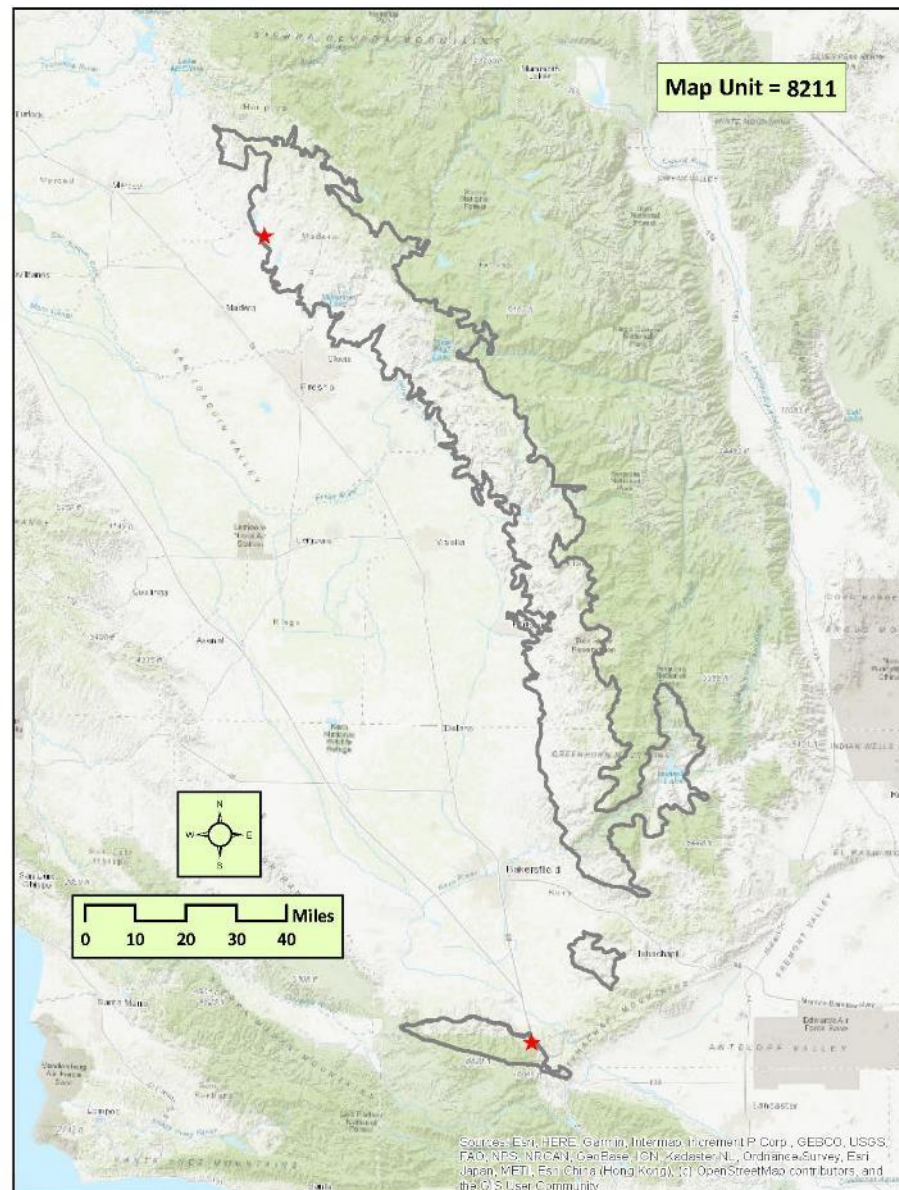
Ground view of a dense stand of *Leymus* on a gently sloping meadow.

***Leymus cinereus* – *Leymus triticoides* Alliance (8211)**

DESCRIPTION: Stands of medium to tall grasses either dominated by the rhizomatous *Leymus triticoides* or by the bunchgrass *L. cinereus*. *Leymus* spp. may be subdominant when with non-native annual grasses. Note: *L. cinereus* and *L. condensatus* are similar ecologically and morphologically and may hybridize. Stands are often associated with edges of seeps, marshes, and riparian terraces.

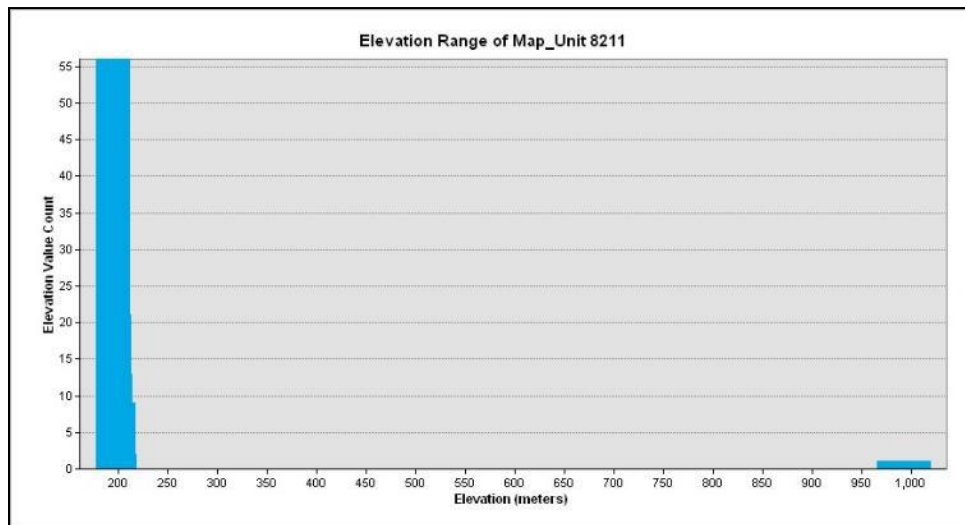
Stands of this alliance are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. One stand is mapped from field data at the northern part of the Southern Sierra Nevada Foothills Proper subarea, along Daulton Creek, southeast of Eastman Lake. One small stand is mapped above Grapevine Canyon just north of the Old Fort Tejon site in the San Emigdio Range subarea from field data. No sites are mapped in the Horsethief Mountain subarea.

Leymus cinereus – *Leymus triticoides* Alliance (8211)



DISTRIBUTION: One stand is mapped from field data at the northern part of the Southern Sierra Nevada Foothills Proper subarea, along Daulton Creek, southeast of Eastman Lake. One small stand is mapped above Grapevine Canyon just north of the Old Fort Tejon site in the San Emigdio Range subarea from field data. No sites are mapped in the Horsethief Mountain subarea.

***Leymus cinereus* – *Leymus triticoides* Alliance (8211)**



Leymus condensatus Alliance (7122)
Giant wild rye grassland Alliance



Aerial view of individual clumps of *Leymus condensatus* in a grassy matrix.



Ground view of open clumps of *Leymus condensatus* in a grassy matrix on a gentle slope.

***Leymus condensatus* Alliance (7122)**

DESCRIPTION: Small stands of the tall *Leymus condensatus* in mesic sites in the southern ecological subsections between Tehachapi and San Emigdio Mountains. Some individuals appear to be closely related to the *Leymus cinereus*.

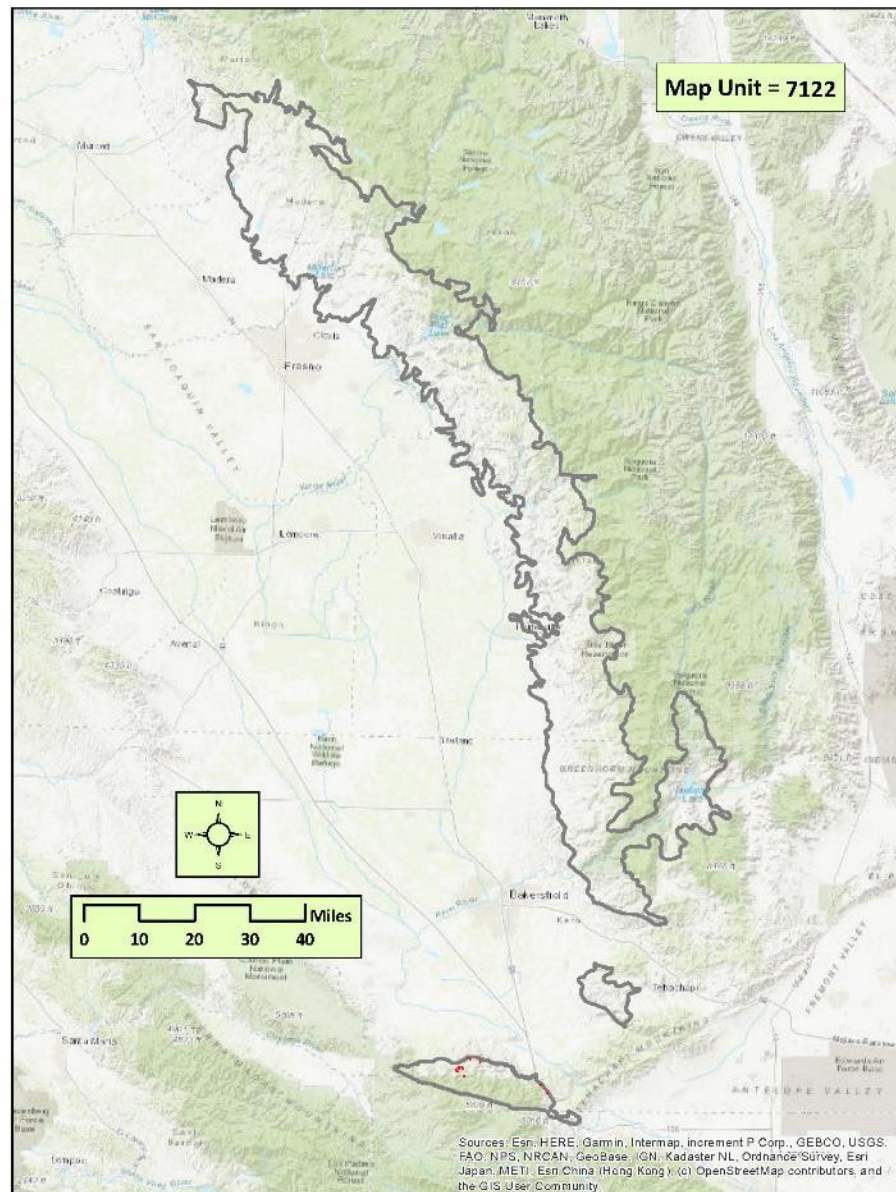
This alliance is mapped primarily in a small region above San Emigdio Canyon within an extensive non-native grassland in the foothills of the San Emigdio Range subarea. Only 13 stands are mapped, partially based on ground assessments. No sites are mapped in the Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas.

PHOTO INTERPRETATION SIGNATURE: These tall grasses occur in small clonal shaped patches that contrast with the adjacent annuals. The grass clones have distinct edges, most are in peak phenology and yield a medium green to greenish brown signature color.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

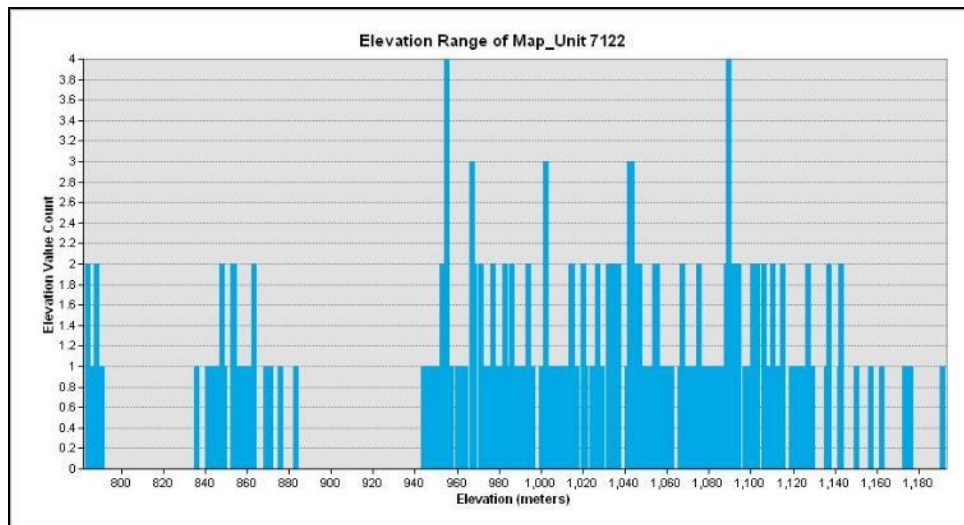
- *Leymus cinereus* – *Leymus triticoides* Alliance (8211): There are not enough examples of either type to reliably differentiate these two alliances. However, there may be more visible cloning patterns on the taller *L. condensatus* stands.

Leymus condensatus Alliance (7122)



DISTRIBUTION: This alliance is mapped in two areas on the north side of the San Emigdio Range subarea. Only 13 stands are mapped, partially based on ground assessments. No sites are mapped in the Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas.

Leymus condensatus Alliance (7122)



Lotus unifoliolatus Alliance (7116)

Spanish clover fields Alliance



Aerial view of a stand of *Lotus unifoliolatus*, as mapped from field data.

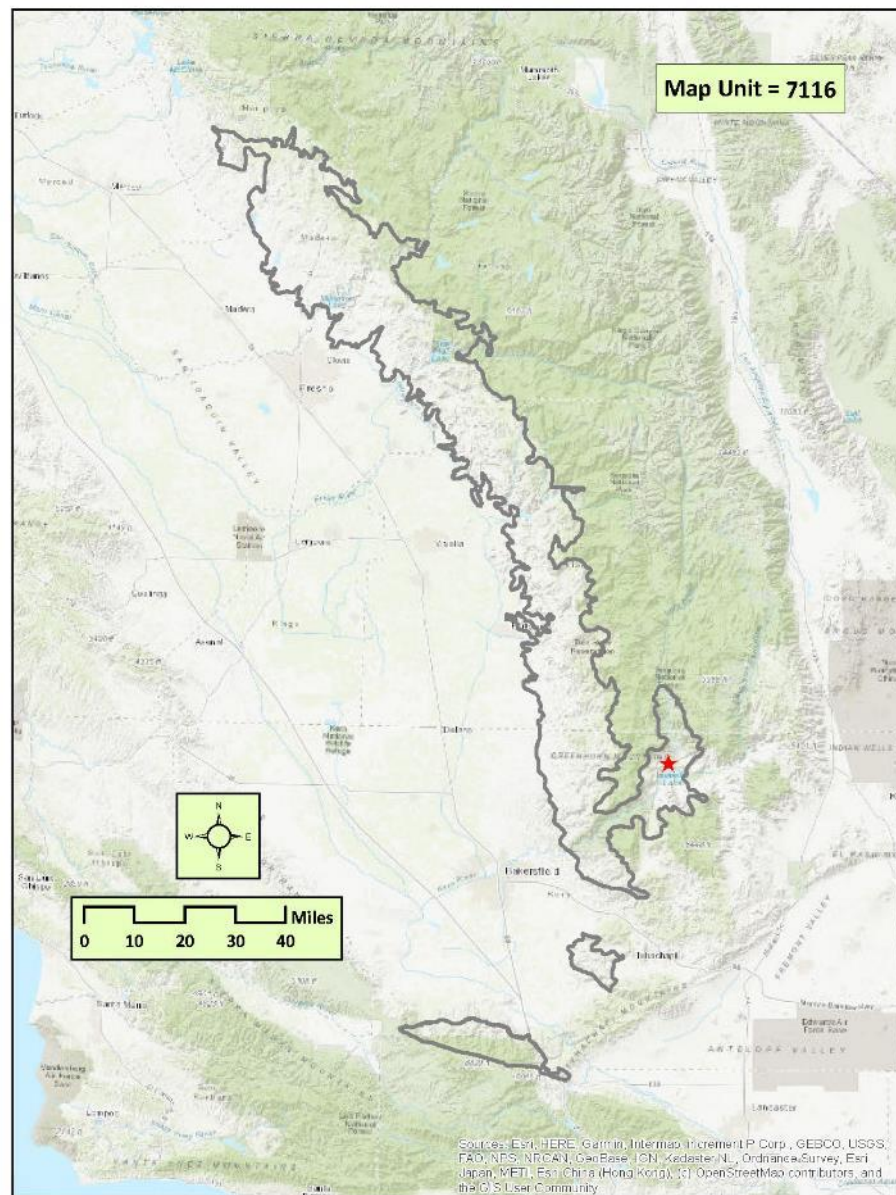
Ground photo is not available.

***Lotus unifoliolatus* Alliance (7116)**

DESCRIPTION: The annual pink-flowered herb *Lotus unifoliolatus* dominates vernal moist sites with shallow rocky soils as along edges of seeps and small streams. Stands are generally less than 1 acre in size.

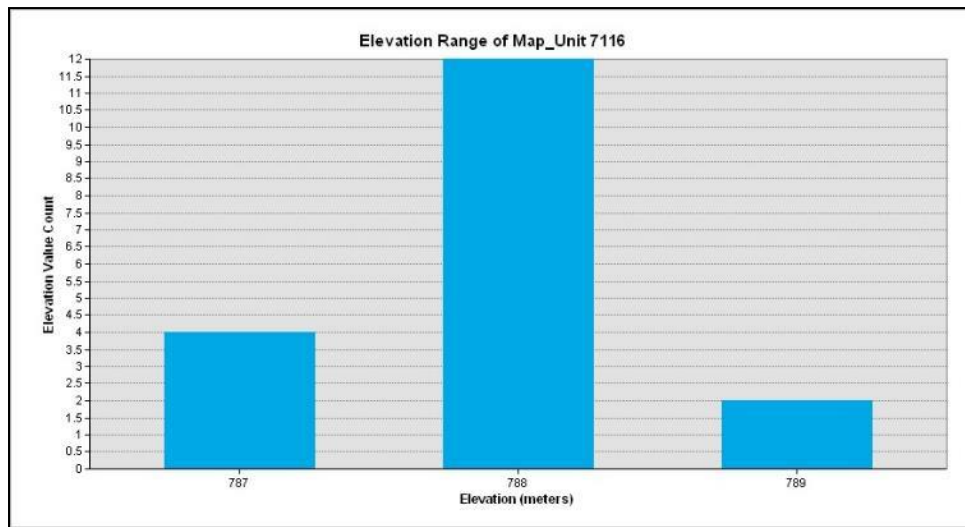
Stands of this alliance are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. One stand is mapped from field data within the fluctuating high water zone along the banks of Lake Isabella in the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Lotus unifoliolatus Alliance (7116)



DISTRIBUTION: One stand is mapped from field data within the fluctuating high water zone along the banks of Lake Isabella in the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Lotus unifoliolatus Alliance (7116)



Mediterranean California naturalized annual and perennial grassland Group
(7101)



Aerial view of non-native Mediterranean California naturalized annual and perennial grassland Group. Note proximity to urbanization.

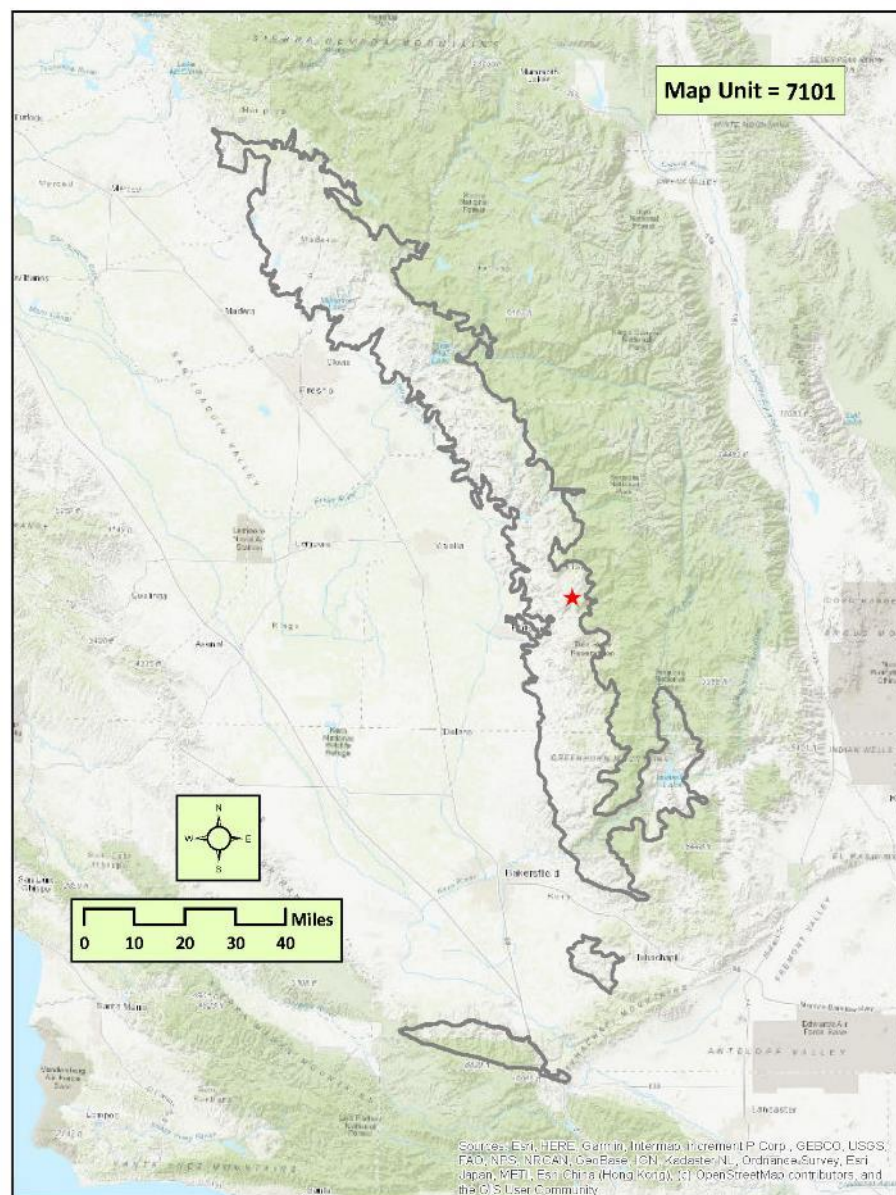
Ground photo is not available.

Mediterranean California naturalized annual and perennial grassland Group (7101)

DESCRIPTION: Herbaceous vegetation strongly dominated by non-native grasses and forbs such as *Avena*, *Brachypodium*, *Brassica*, *Briza*, *Bromus*, *Centaurea*, *Cynosurus*, *Erodium*, *Festuca perennis*, *Nassella*, and *Raphanus*. Native herbaceous species have insignificant cover in these stands (generally less than 10% relative cover), especially during the active growing season. Stands occur in foothills, rangelands, fallow fields, woodland openings, riparian areas, and disturbed settings. Most non-native grasslands are subsumed into the California Annual and Perennial Grassland Macrogroup (7100).

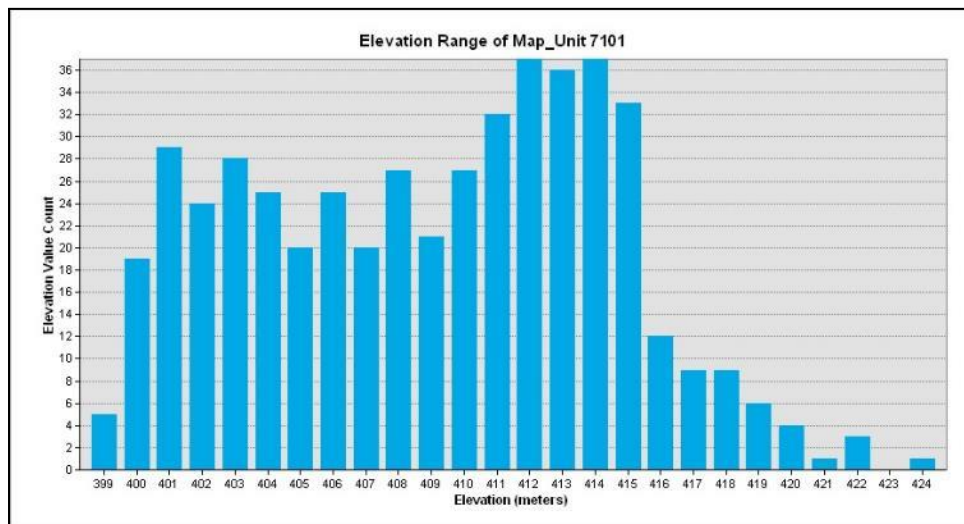
Stands of this Group are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. Most non-native grasslands are subsumed into the California Annual and Perennial Grassland Macrogroup (7100). One stand is mapped, in the Southern Sierra Nevada Foothills Proper subarea, from field data on a grazed grassland with a homestead nearby. No stands are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Mediterranean California naturalized annual and perennial grassland Group (7101)

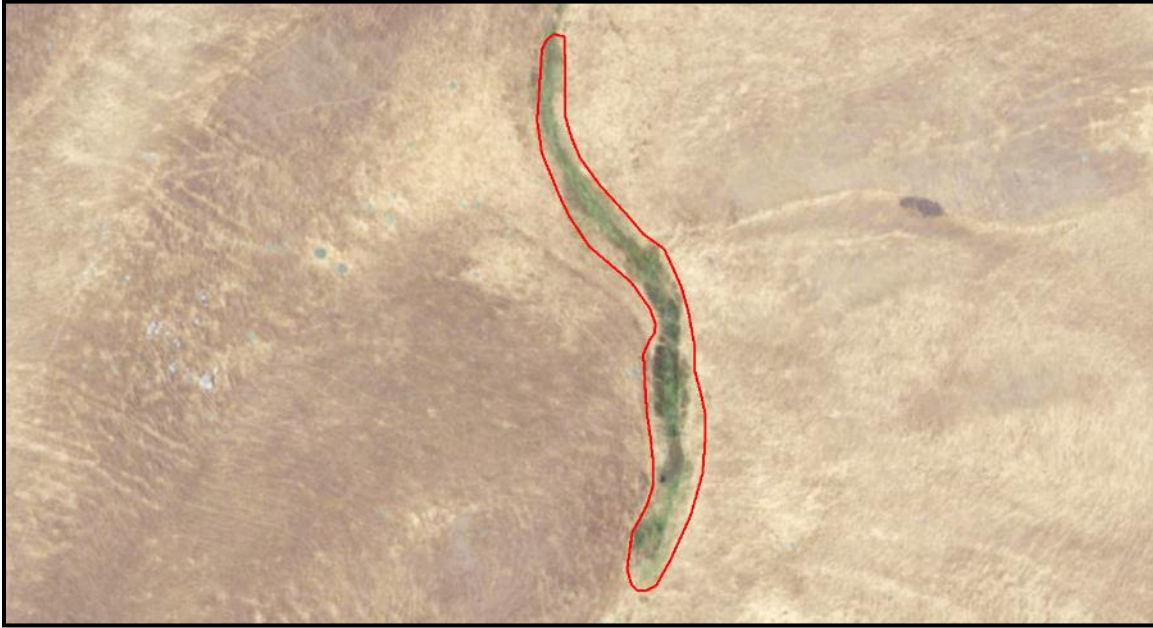


DISTRIBUTION: One stand is mapped, in the Southern Sierra Nevada Foothills Proper subarea, from field data on a grazed grassland with a homestead nearby. No stands are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Mediterranean California naturalized annual and perennial grassland Group (7101)



Naturalized warm-temperate riparian and wetland Group (7500)



Aerial view of non-native Naturalized warm-temperate riparian and wetland Group, dominated by *Lepidium latifolium*, as mapped from field data.

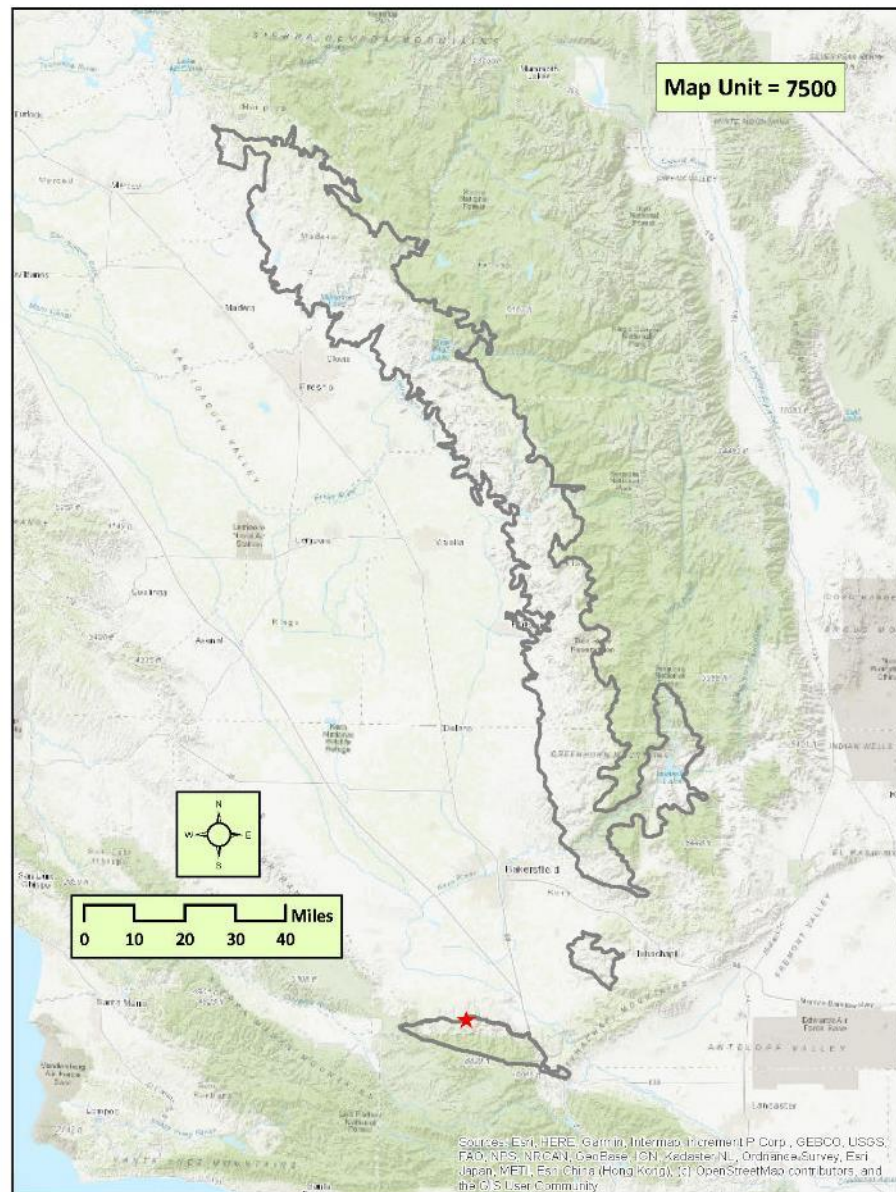
Ground photo is not available.

Naturalized warm-temperate riparian and wetland Group (7500)

DESCRIPTION: Stands are characterized by strong dominance of non-native ruderal grasses often in human-disturbed sites.

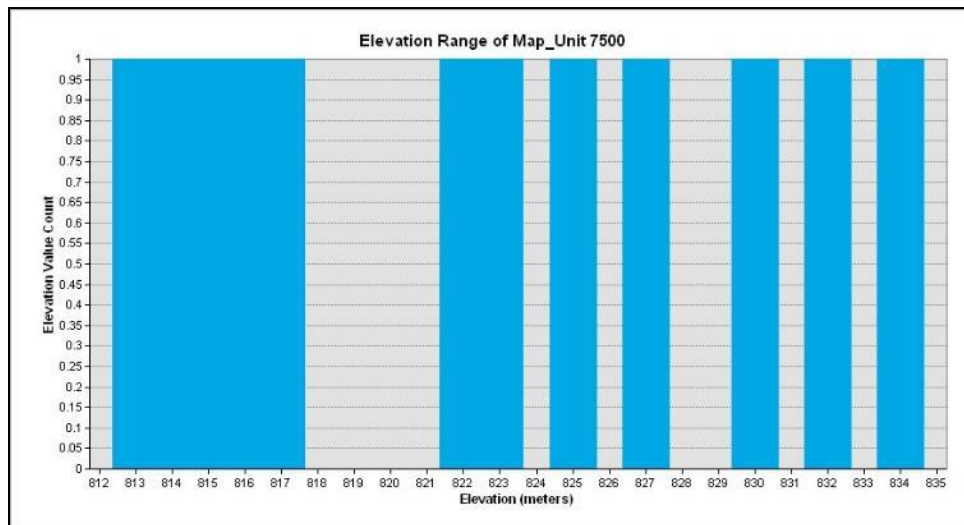
Stands of this Group are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. One stand is mapped from field data by a spring next to Pleitito Creek within the San Emigdio Range subarea. No sites are mapped in the Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas.

Naturalized warm-temperate riparian and wetland Group (7500)



DISTRIBUTION: One stand is mapped from field data by a spring next to Pleitito Creek within the San Emigdio Range subarea. No sites are mapped in the Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas.

Naturalized warm-temperate riparian and wetland Group (7500)



Schoenoplectus (acutus, californicus) Alliance (7320)
Hardstem and California bulrush marshes Alliance



Aerial view of a stand of *Schoenoplectus* in a wetland along a drainage.



Ground view of the dull blue-green bulrush *Schoenoplectus*.

***Schoenoplectus (acutus, californicus)* Alliance (7320)**

DESCRIPTION: *Schoenoplectus acutus* and/or *Schoenoplectus californicus* is dominant in the herbaceous layer or co-dominant when with *Typha* spp.

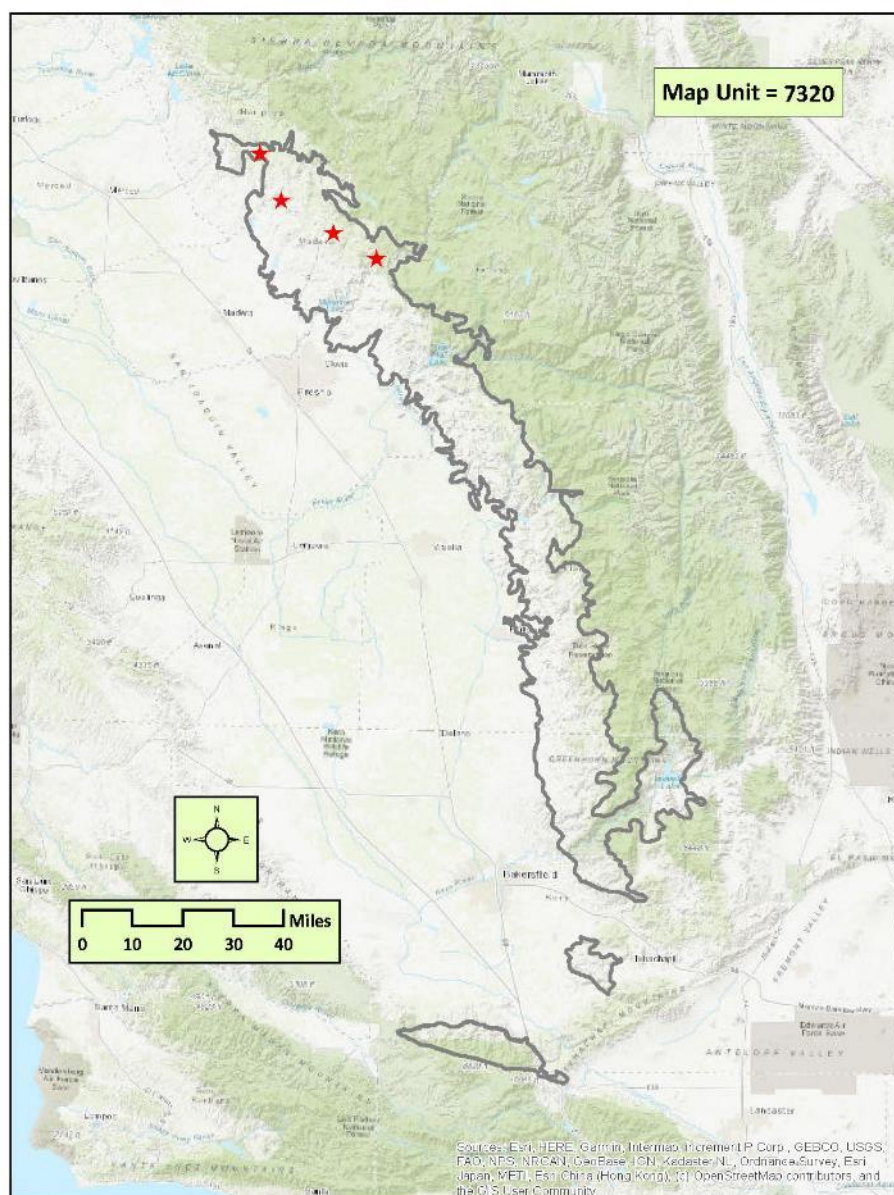
Four stands of *Schoenoplectus* spp. are mapped in the northern portion of the Southern Sierra Nevada Foothills Proper subarea, along saturated creeks, dammed ponds, and reservoirs/lakes. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: Stands occur along the fringes of dark-colored water bodies or saturated streams. Vigorous stands of *Schoenoplectus* spp. appear dark brown with fine upright stipples clustered together along the water's edge. In winter settings, dormant stems appear brown with a flatter, matted texture.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

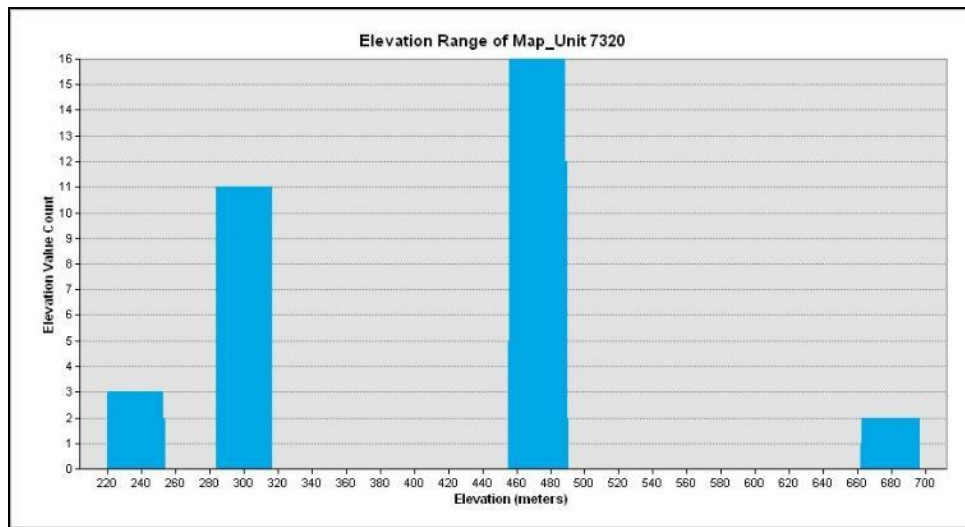
- *Typha (angustifolia, domingensis, latifolia)* Alliance (7310) – Can occur in similar and same locations as *Schoenoplectus*. Signature color characteristics vary widely on imagery from dark green to gray to beige, depending on water availability and vigor throughout the year. Textures can be dense and smooth, to discontinuous patches next to dark water, or a linear matted texture of browns and beige.

Schoenoplectus (acutus, californicus) Alliance (7320)



DISTRIBUTION: Four stands of *Schoenoplectus* spp. are mapped in the northern portion of the Southern Sierra Nevada Foothills Proper subarea, along saturated creeks, dammed ponds, and reservoirs/lakes. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

***Schoenoplectus (acutus, californicus)* Alliance (7320)**



Schoenoplectus americanus Alliance (8212)

American bulrush marsh Alliance



Aerial view of a stand of *Schoenoplectus americanus* in a wetland flat adjacent to a drainage.



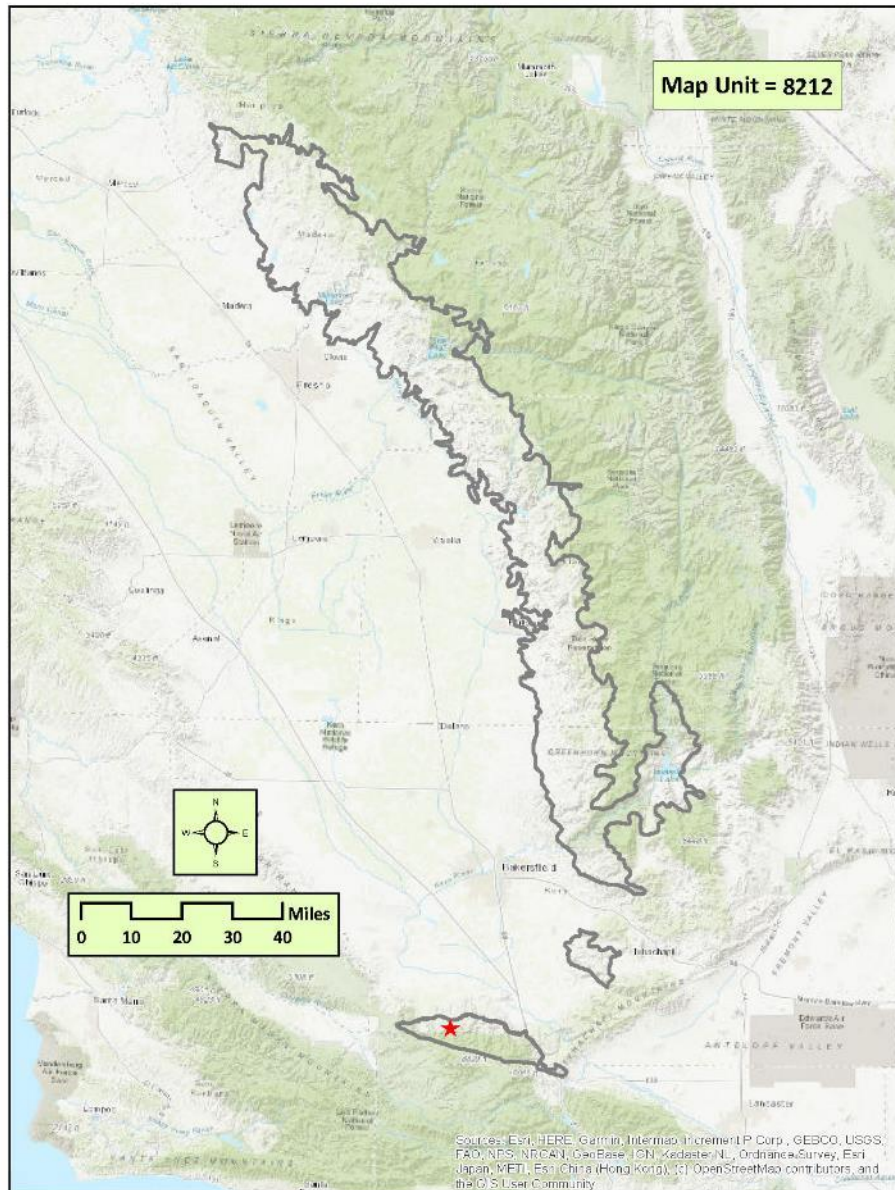
Ground view of dark yellow-green *Schoenoplectus americanus* in a large wetland.

***Schoenoplectus americanus* Alliance (8212)**

DESCRIPTION: Stands dominated by the moderately tall emergent *Schoenoplectus americanus*. Usually of brackish marshes which remain flooded or saturated through the growing season.

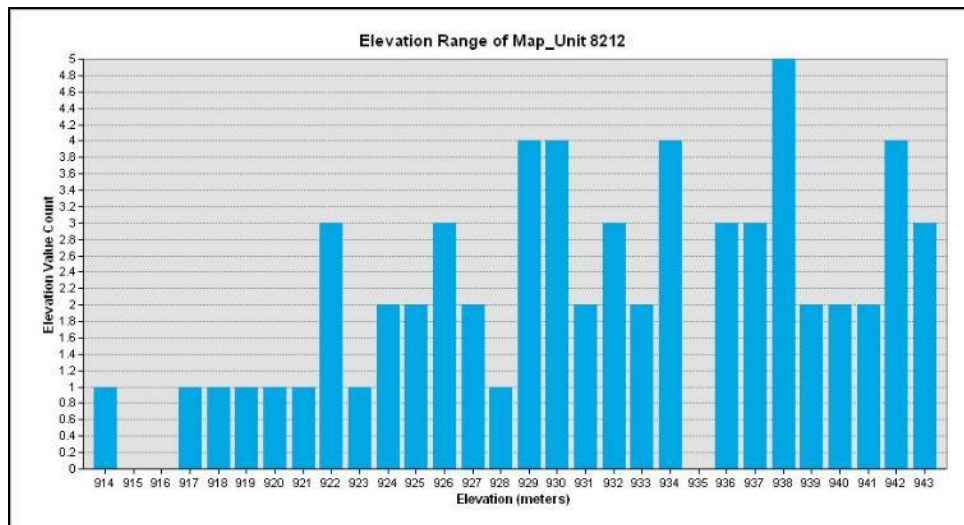
Stands of this alliance are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. One stand is mapped from field data in the foothills of the San Emigdio Range subarea, along Doc Williams Canyon. No sites are mapped in the Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas.

***Schoenoplectus americanus* Alliance (8212)**



DISTRIBUTION: One stand is mapped from field data in the foothills of the San Emigdio Range subarea, along Doc Williams Canyon. No sites are mapped in the Southern Sierra Nevada Foothills Proper and Horsethief Mountain subareas.

Schoenoplectus americanus Alliance (8212)



Southwestern North American alkali marsh/seep vegetation Group (8200)



Aerial view of a stand of wetland Southwestern North American alkali marsh/seep vegetation Group, composed of *Sporobolus airoides*, as mapped from field data.



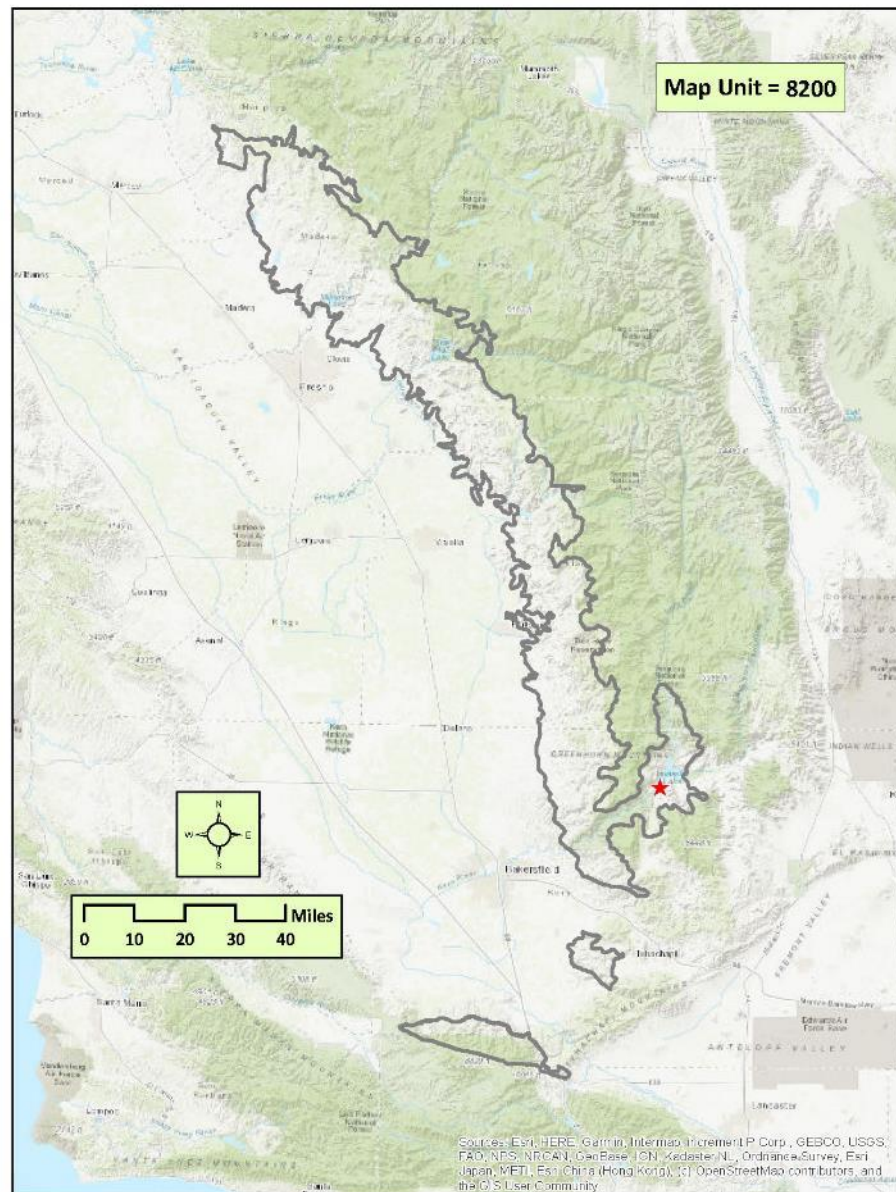
Ground view of extensive stand of alkaline wetland containing *Sporobolus airoides*, as mapped from field data.

Southwestern North American alkali marsh/seep vegetation Group (8200)

DESCRIPTION: Alkaline or brackish marsh and meadow stands characterized by non-fleshy-leaved herbs and graminoids.

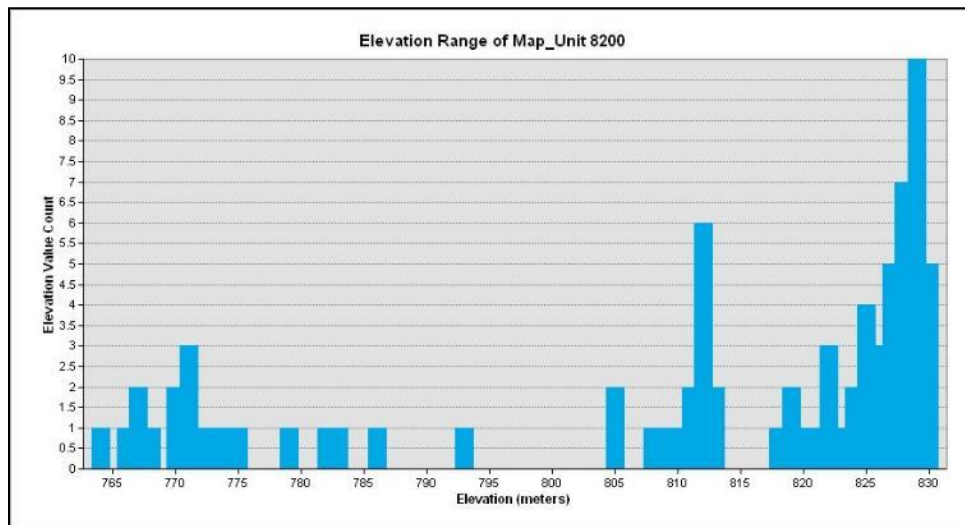
Stands of this Group are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. One stand is mapped from field data in a disturbed wetland south of Lake Isabella in the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Southwestern North American alkali marsh/seep vegetation Group (8200)



DISTRIBUTION: One stand is mapped from field data in a disturbed wetland south of Lake Isabella in the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Southwestern North American alkali marsh/seep vegetation Group (8200)



Typha (*angustifolia*, *domingensis*, *latifolia*) Alliance (7310)
Cattail marshes Alliance



Aerial view of a stand of *Typha* in a dammed pond wetland.



Ground view of a stand of *Typha* in a dammed pond wetland.

Typha (angustifolia, domingensis, latifolia) Alliance (7310)

DESCRIPTION: *Typha domingensis* and/or *T. latifolia* dominant in the herbaceous layer. If *Schoenoplectus acutus* is present it is subdominant.

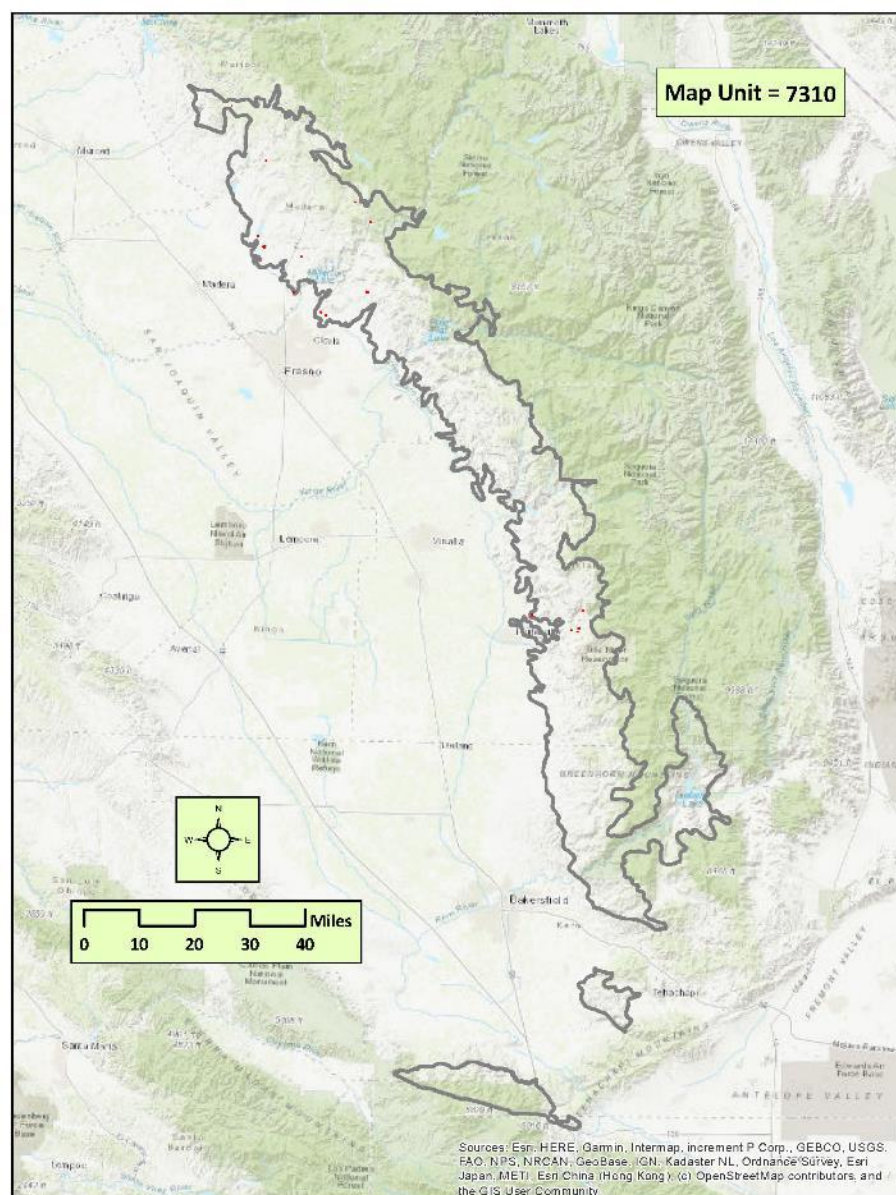
Typha spp. is infrequently mapped in northern and central portion of the Southern Sierra Nevada Foothills Proper subarea, along saturated creeks, dammed ponds, and reservoirs/lakes. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: Signature color characteristics vary widely on imagery from dark green to gray to beige, depending on water availability and vigor throughout the year. Textures can be dense and smooth, to discontinuous patches next to dark water, or a linear matted texture of browns and beige.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

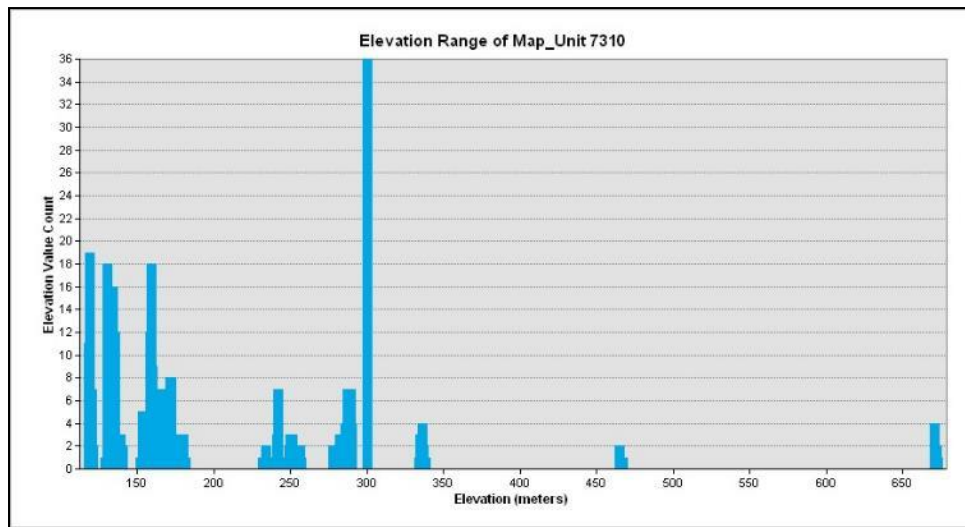
- *Schoenoplectus (acutus, californicus)* Alliance (7320) – Can occur in similar and same locations as *Typha*. Stands occur along the fringes of dark-colored water bodies or saturated streams. Vigorous stands of *Schoenoplectus* spp. appear dark brown with fine upright stipples clustered together along the water's edge. In winter settings, dormant stems appear brown with a flatter, matted texture.

Typha (angustifolia, domingensis, latifolia) Alliance (7310)



DISTRIBUTION: *Typha* spp. is infrequently mapped in northern and central portion of the Southern Sierra Nevada Foothills Proper subarea. When found it was mapped along saturated creeks, dammed ponds, and reservoirs/lakes. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Typha (angustifolia, domingensis, latifolia) Alliance (7310)



Vancouverian and Rocky Mountain naturalized perennial grassland Group
(7102) (irrigated pasture)



Aerial view of an irrigated pasture as identified from field data.



Ground view of an irrigated pasture with a conifer forest in the background.

Vancouverian and Rocky Mountain naturalized perennial grassland Group (7102) (irrigated pasture)

DESCRIPTION: Stands are characterized by strong dominance of non-native ruderal perennial grasses often in human-disturbed sites. Most stands in the foothills are adjacent to moist, often irrigated pasturelands or meadows that have been grazed regularly by livestock. This type is mapped by photo interpreters in irrigated pasture settings and at times down slope from flumes and irrigation ditches.

This Group is more common in the Northern Sierra Nevada Foothills region. Here, grasslands are strongly dominated by non-native perennial grasses of the genera: *Anthraxanthum*, *Festuca*, *Holcus*, or *Phalaris*. However, these species are not common in the Southern Sierra Nevada Foothills region. Instead, the *Cynodon dactylon* – *Crypsis* spp. – *Paspalum* spp. Alliance, of the Naturalized warm-temperate riparian and wetland Group (7500), is more common in the Southern Sierra Foothills in similar settings, but were mapped as part of the Vancouverian Group. In the future the two groups will be merged into a single group in the new floristic classification hierarchy.

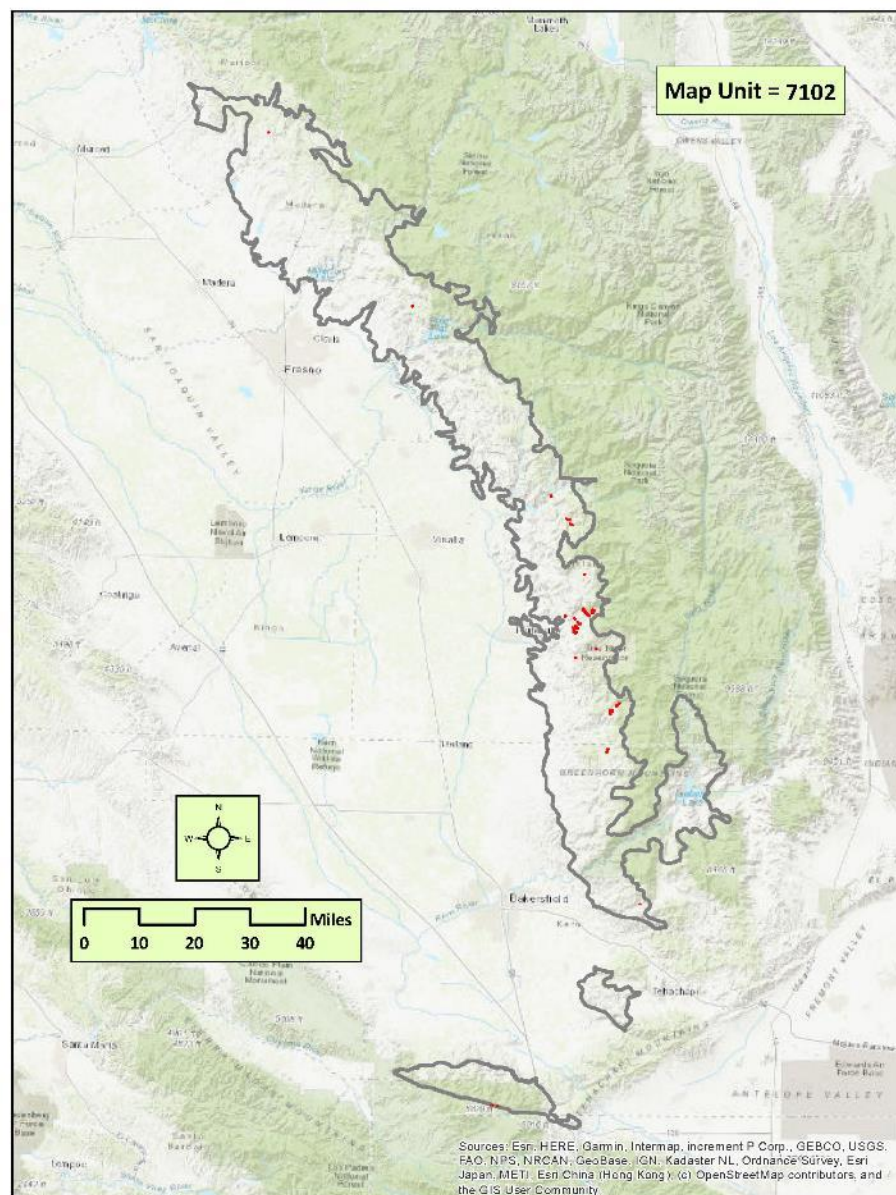
This Group is sporadically mapped throughout the Southern Sierra Nevada Foothills Proper subarea, nearer to homesteads, flumes, and dammed ponds. Mapped in irrigated pasture settings south of the highway in the Cuddy Valley near Pinyon Pine Estates, in the San Emigdio Range subarea. No sites are mapped in the Horsethief Mountain subarea.

PHOTO INTERPRETATION SIGNATURE: Irrigated pastures yield a highly reflective, medium to dark green signature, at times trending toward a yellow-green. Texture is very smooth even when viewed at fine scales on most imagery. There is little or no break in the patterning, something which is more often found in row and orchard crops. Typically, a linear flume and/or a dammed pond is visible in the vicinity where the grasses are very green and saturated. Variability in the signature brightness and color occurs along the margins of the irrigation where flooding is less frequent.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

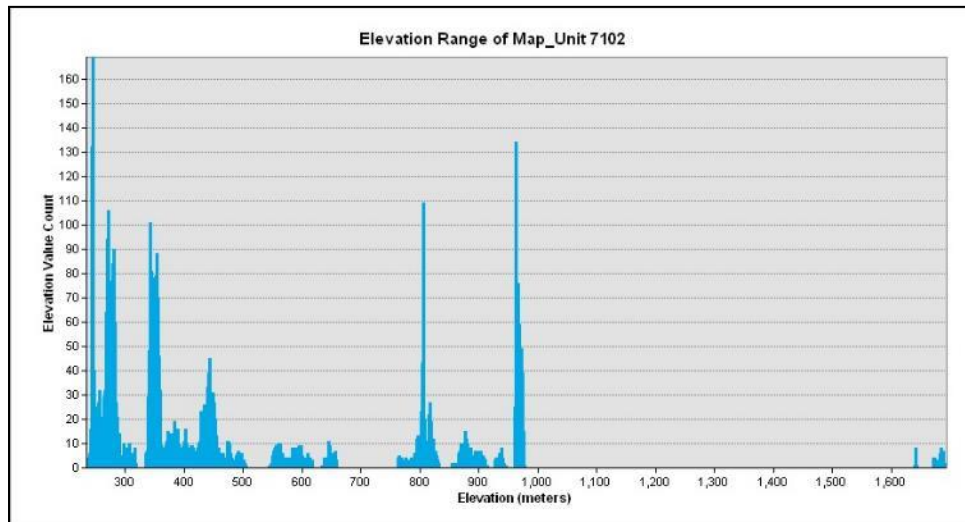
- None

Vancouverian and Rocky Mountain naturalized perennial grassland Group (7102)
(irrigated pasture)



DISTRIBUTION: This alliance is sporadically mapped throughout the Southern Sierra Nevada Foothills Proper subarea, nearer to homesteads, flumes, and dammed ponds. Mapped in irrigated pasture settings south of the highway in the Cuddy Valley near Pinyon Pine Estates, in the San Emigdio Range subarea. No sites are mapped in the Horsethief Mountain subarea.

**Vancouverian and Rocky Mountain naturalized perennial grassland Group (7102)
(irrigated pasture)**



Vancouverian coastal/tidal marsh and meadow Group (7800)



Aerial view of a wetland Vancouverian coastal/tidal marsh and meadow Group.



Ground view of Vancouverian coastal/tidal marsh and meadow Group with a bunchgrass *Juncus* spp.

Vancouverian coastal/tidal marsh and meadow Group (7800)

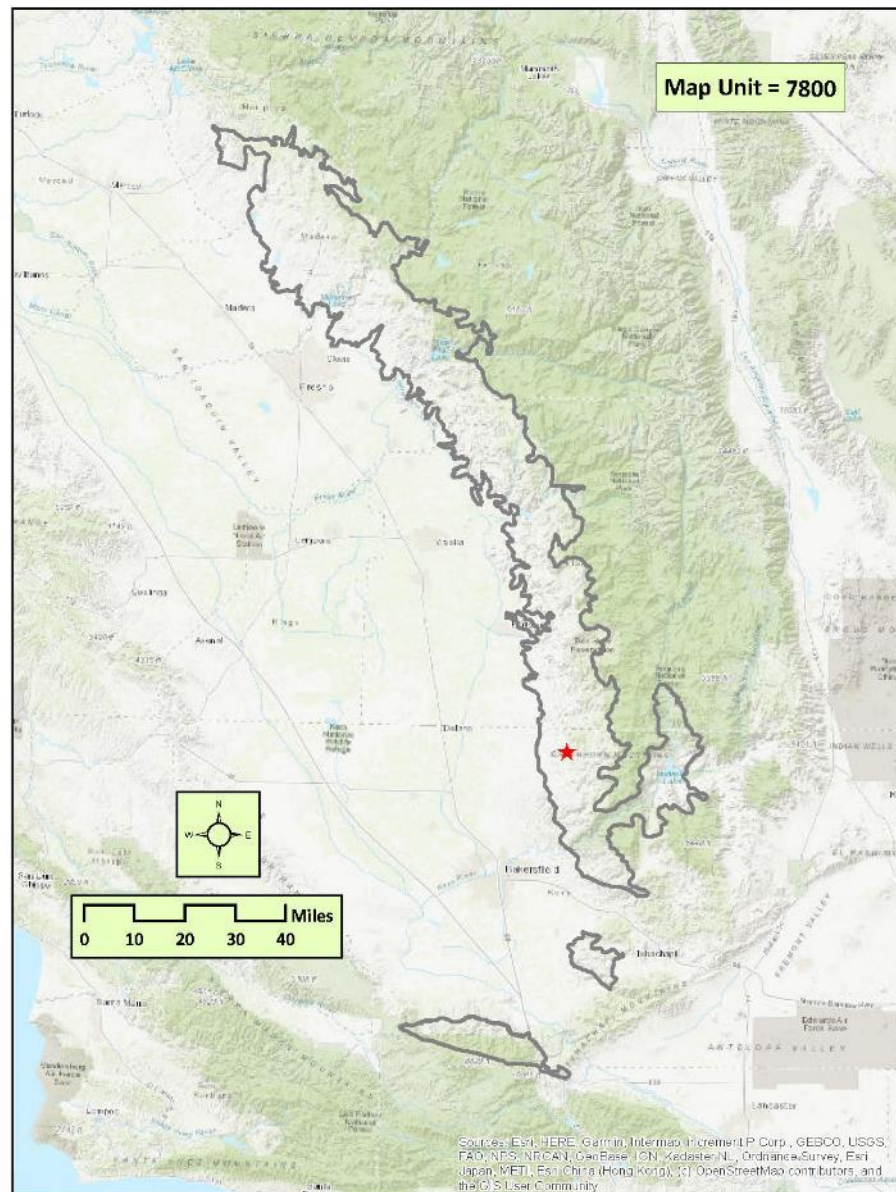
DESCRIPTION: Stands of this Group are infrequently mapped in the study area. Environmental correlates and/or photo interpretation signature attributes cannot be reliably established for this project. One stand of a tall bunch grass *Juncus* spp. is mapped from field data along Blue Mountain Road in the southern portion of the Southern Sierra Nevada Foothills Proper subarea. Upon review from CDFW it was suggested to call as this Group. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: Stands appear as small bumpy gray individuals evenly scattered over other smoother grasses and forbs.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

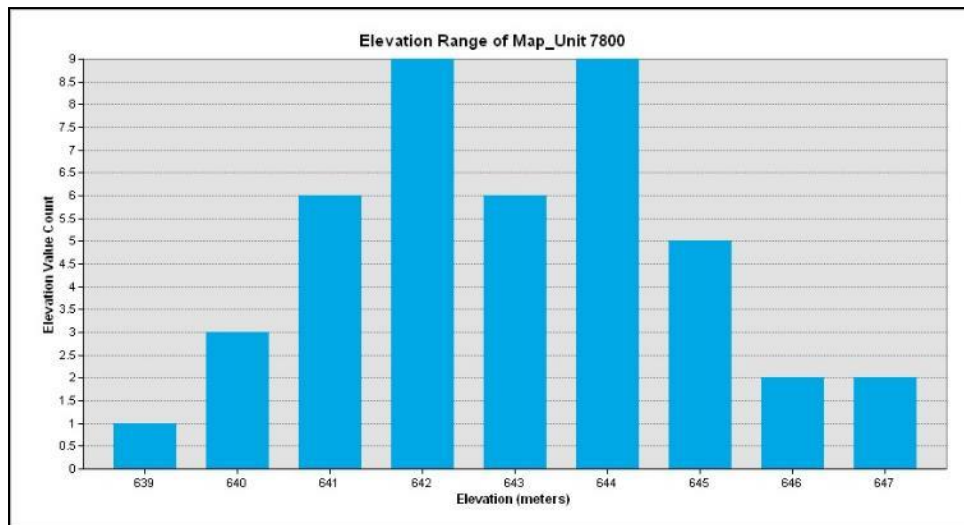
- None

Vancouverian coastal/tidal marsh and meadow Group (7800)



DISTRIBUTION: One stand is mapped from field data along Blue Mountain Road in the southern portion of the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Vancouverian coastal/tidal marsh and meadow Group (7800)



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



Aerial view of a basalt tabletop mesa with Vernal Pool & Annual and Perennial Grassland Matrix Mapping Unit. Note series of small vernal pools within the polygon.



Ground view of vernal pool herbs and grasses in the Vernal Pool & Annual and Perennial Grassland Matrix Mapping Unit.

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

DESCRIPTION: Area of upland grassland mixed with vernal pools over a large area. Mapped where photo interpreters can see topography that potentially yields floristics that are associated with vernal pools. These micro-topographic highs and lows (sometimes called hog wallows) form pool/upland grassland complexes, which are aggregated at times into extremely large polygons that cover many acres of herbaceous dominated vegetation. Users should be cautioned that these edaphic & topographic conditions have not in all cases been classified on accuracy assessment evaluations as containing vernal pool floristics.

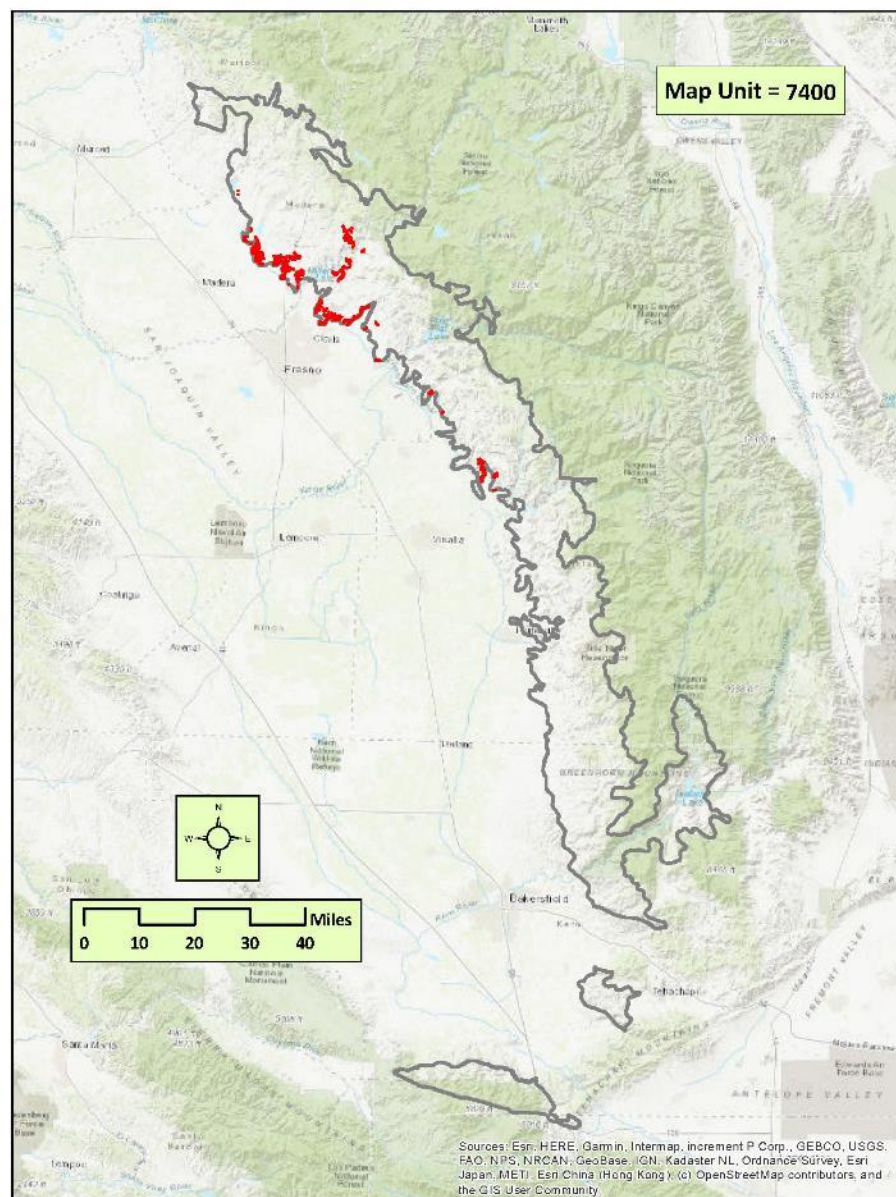
This type represents a matrix of small (below the minimum mapping unit size) scattered vernal pools in broader grassland dominated stands. Large stands are mapped typically along the western grasslands on the edge of the Southern Sierra Nevada Foothills Proper subarea, with a few exceptions that wade into the interior of *Quercus douglasii* savannahs. This alliance is also found on volcanic table-top mountain plateaus that trap the water between the rock. As an ancillary data source, a vernal pool map produced by Holland (provided by CDFW), was also referenced for finding vernal pool signatures. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: Individual vernal pools are identified by a distinctive lighter gray or whitish oval/linear ring, which is reflecting mineral deposits where the rain water pools and evaporates. There is a starkly browner contrast to the surrounding grasslands outside the well-defined ring, which is the predominant signature relative to the vernal pools.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

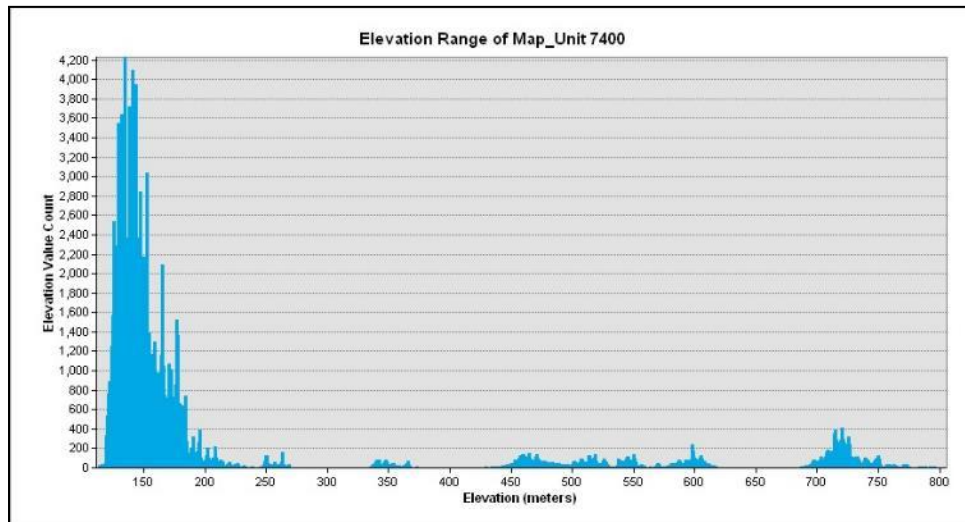
- Californian mixed annual/perennial freshwater vernal pool/swale bottomland Group (7600) – This type represents individual vernal pools that are larger than the minimum mapping unit size, rather than the matrix of definitive and potential vernal pool sites within a larger grassland.

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



DISTRIBUTION: Large stands are mapped typically along the western grasslands on the edge of the Southern Sierra Nevada Foothills Proper subarea, with a few exceptions that waded into the interior of *Quercus douglasii* savannahs. This alliance is also found on volcanic table-top mountain plateaus. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

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



Miscellaneous Classes

- Agriculture Mapping Unit (9200) (without fallow annual grasses dominating)
- Built-Up & Urban Disturbance Mapping Unit (9300) (includes development, mines and borrow pits)
- Areas of Little or No Vegetation Mapping Unit (9400)
 - Cliffs/Rock Outcrop Mapping Unit (9401)
 - River and Lacustrine Flats & Streambeds Mapping Unit (9402)
 - Undefined Areas with Little or No Vegetation Mapping Unit (Anthropogenic clearing) (9403)
 - Sparsely Vegetated Recently Burned Areas Mapping Unit (9404)
- Exotic Trees and Planted Trees Mapping Unit (9500)
 - Eucalyptus spp. – Ailanthus altissima – Robinia pseudoacacia Semi-Natural Alliance (9501)
- Standing Dead Trees High Cover Mapping Unit (9600)
- Water Mapping Unit (9800)
 - Perennial Stream Channel Mapping Unit (9801)
 - Reservoirs Mapping Unit (9802)
 - Small Earthen Dam Ponds & Natural Lakes Mapping Unit (9803)
 - Major Canals and Aqueducts Mapping Unit (9804)

Agriculture (9200) Mapping Unit



Aerial view of an agricultural complex of vineyards.



Ground view of a vineyard.

Agriculture Mapping Unit (9200)

DESCRIPTION: Includes irrigated row crops, orchards, and vineyards and in some cases, intensive dry land farming of planted grains. Agriculture is further defined as planted and maintained, and not fallow for longer than a five-year period. Fallow land which has not been altered for more than a complete growing season generally will have a component of annual grasses. Therefore, if different sets of imagery show no activity within the 5-year period the stand will be mapped to an herbaceous type, most likely the Mediterranean California naturalized annual and perennial grassland Group (7101) or the California Annual and Perennial Grassland Macrogroup (7100). Open pasture lands (irrigated and dry) are not included in this category and mapped to floristic types as described above. Structures associated with agriculture are mapped as Built-up & Urban Disturbance.

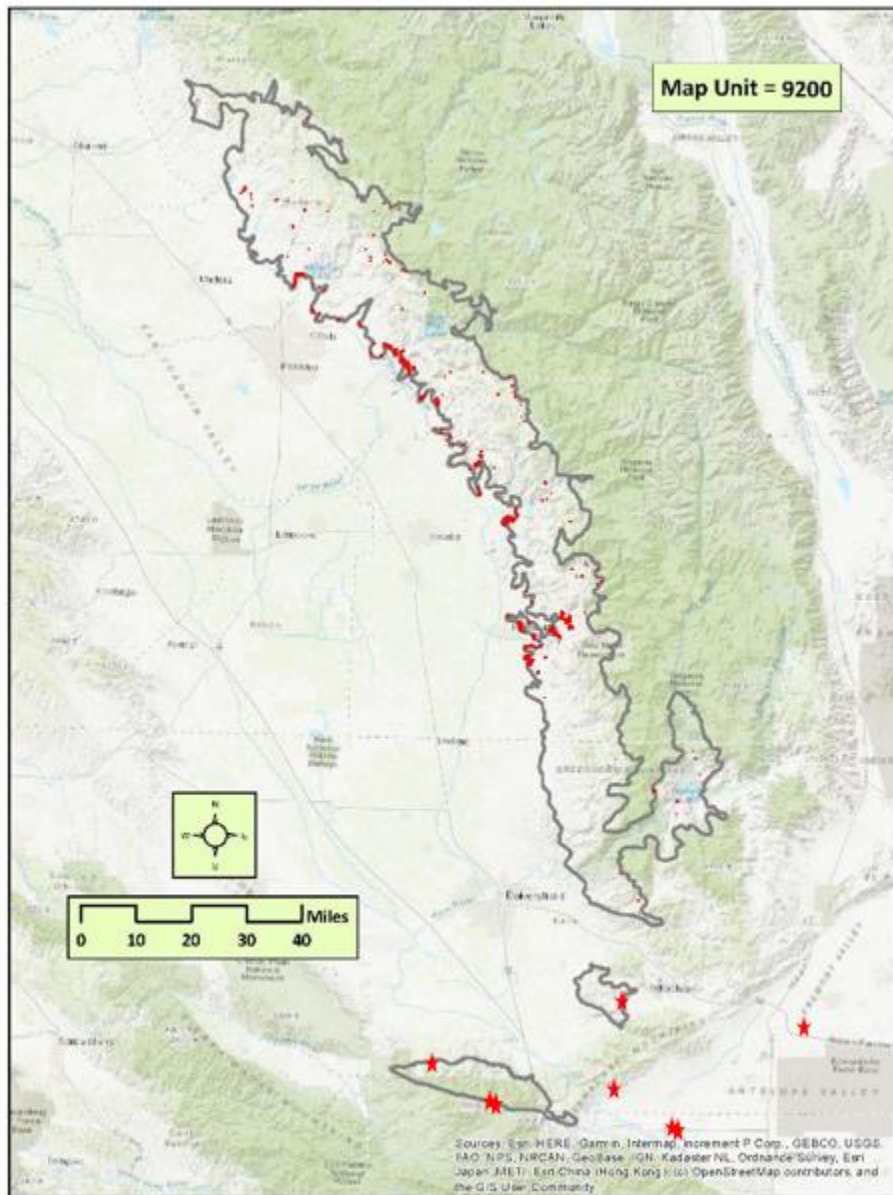
The Agriculture Mapping Unit is mapped in all the subareas.

PHOTO INTERPRETATION SIGNATURE: Most image datasets evaluated in the mapping effort depict woody agriculture in leaf-on conditions and therefore contrast considerably from the adjacent non-irrigated natural vegetation. Younger stands require closer scrutiny to differentiate them from annual field and row crops. Orchard trees are typically aligned in a grid pattern, with crowns appearing to abut each other. Bush crops are similar to orchards, but may be configured in rows rather than a grid, and appear to be much shorter in height. The orchard and vineyard areas tend to be neat and uniform. Vineyards usually are aligned in evenly spaced rows about five to ten feet apart. With the exception of vineyards, which rarely occur within the mapping area, linear patterning is not accentuated in woody agriculture as significantly as in annual row crops. Row and field crops are non-woody. Croplands include cultivated, in crop, harvested, fallow, or temporarily idle land. Croplands idle for more than five years are designated with a natural vegetation class. Nurseries appear similar to row crops in configuration, but the rows are often not uniform due to the numerous types of plants grown there. They may contain staging areas that can include equipment and supplies. Greenhouse structures may be present. Impounded water sources may also be located in or near the nurseries.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

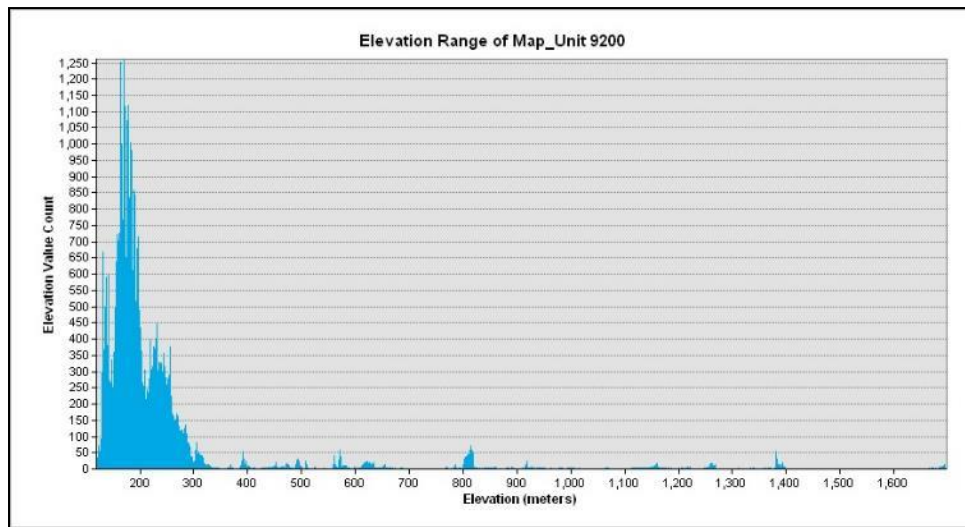
- None

Agriculture Mapping Unit (9200)



DISTRIBUTION: Mapped throughout the Southern Sierra Nevada Foothills Proper subarea. A few isolated occurrences mapped in the San Emigdio Range subarea. One site is mapped in the Horsethief Mountain subarea.

Agriculture Mapping Unit (9200)



Built-Up & Urban Disturbance Mapping Unit (9300)



Aerial view of a rural residential area and associated disturbed property.



Ground view of a large parcel of residential property that makes up a portion of the Built-up and Urban Disturbance Mapping Unit.

Built-Up & Urban Disturbance Mapping Unit (9300)

DESCRIPTION: Built-up areas include permanent and semi-permanent structures that are occupied/used or abandoned. Built-up areas can include residential, commercial and services, industrial, and transportation uses, as well as their associated disturbed lands. Areas under construction are also included. Associated impervious surfaces such as parking lots and playgrounds are normally included in the built-up area. Small areas of naturally occurring vegetation may be included in the built-up area. Major four-lane divided highways and freeways are included in this mapping type and are delineated to the approximate fenced right-of-way.

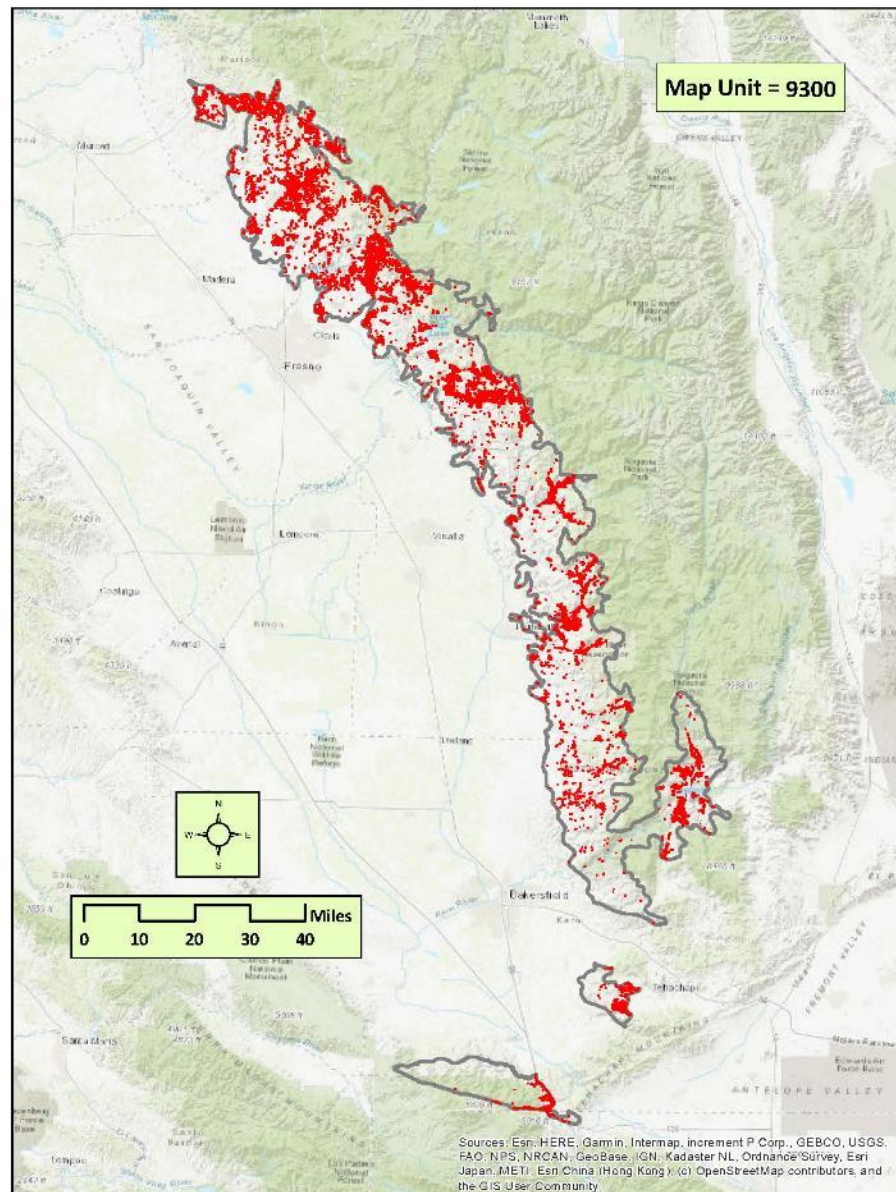
The Built-Up and Urban Disturbance Mapping Unit is ubiquitous and mapped throughout all subareas.

PHOTO INTERPRETATION SIGNATURE: Built-up areas consist of structures and the surrounding associated cleared and/or impervious surface. The boundaries often follow road centerlines and/or fence property lines. Vegetation within the polygon is limited to small naturally occurring components of adjacent stands crossing into the built-up area, and exotic plantings associated with the land use such as lawns, gardens, hedgerows, and trees.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

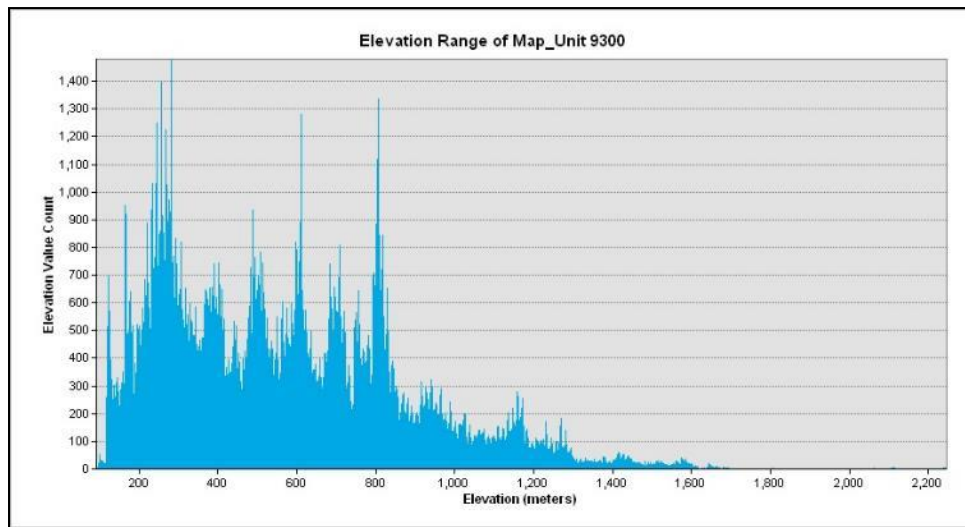
- None

Built-Up & Urban Disturbance Mapping Unit (9300)



DISTRIBUTION: Mapped throughout the Southern Sierra Nevada Foothills Proper subarea. Mapped occurrences prevalent on the eastern third of the Horsethief Mountain subarea at Bear Valley and Stallion Springs. Also prevalent on the eastern third of the San Emigdio Range subarea along the I-5 corridor of Fort Tejon, Lebec, Frazier Park, and Gorman.

Built-Up & Urban Disturbance Mapping Unit (9300)



Areas of Little or No Vegetation Mapping Unit (9400)



Aerial view of a very sparsely vegetated to non-vegetated rocky edge above the high-water line along Lake Isabella.

Ground photo is not available

Areas of Little or No Vegetation Mapping Unit (9400)

DESCRIPTION: Areas of Little or No Vegetation containing less than 2% vegetative cover. These areas can be temporal in nature and are based on the project imagery acquisition timing. Surfaces are generally permeable and can either be covered by fill dirt from another source or contain the original soil and/or substrate layer. This class is used for upland (not associated with fluvial activity) settings where the photo interpreter is uncertain whether the unvegetated substrate is naturally occurring versus a human disturbed clearing.

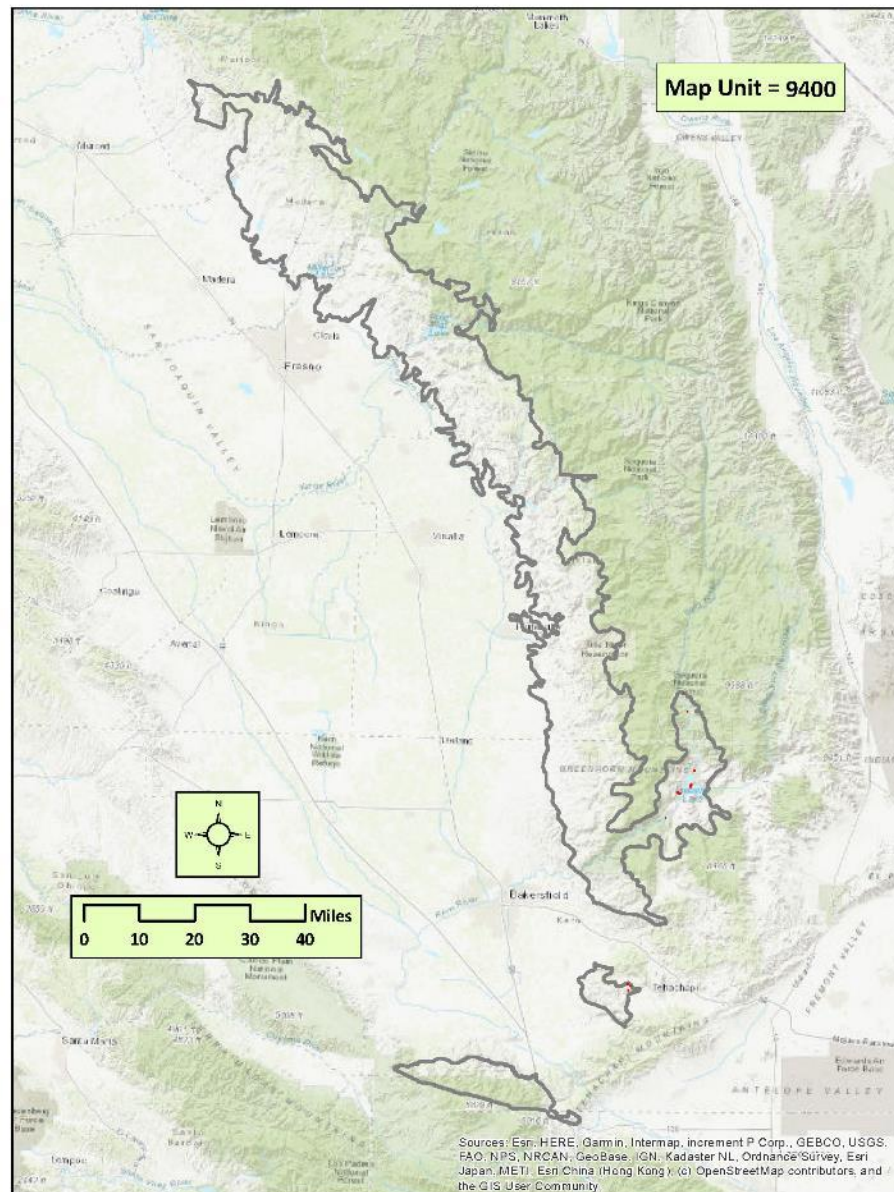
This type is mapped as two polygons along the edge of the high-water line of Lake Isabella in the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: Areas of Little or No Vegetation appear as unvegetated to sparsely vegetated or cleared land. They normally have a smooth texture and generally reflect the color of the substrate surface formed by its parent material. There is usually a distinct boundary where the vegetation ends and the sparse area begins. Unvegetated edges follow angular or straight lines which do not normally occur along the boundaries between vegetation types. These and anthropogenic areas are difficult to distinguish when adjacent natural vegetation is under 5% cover.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

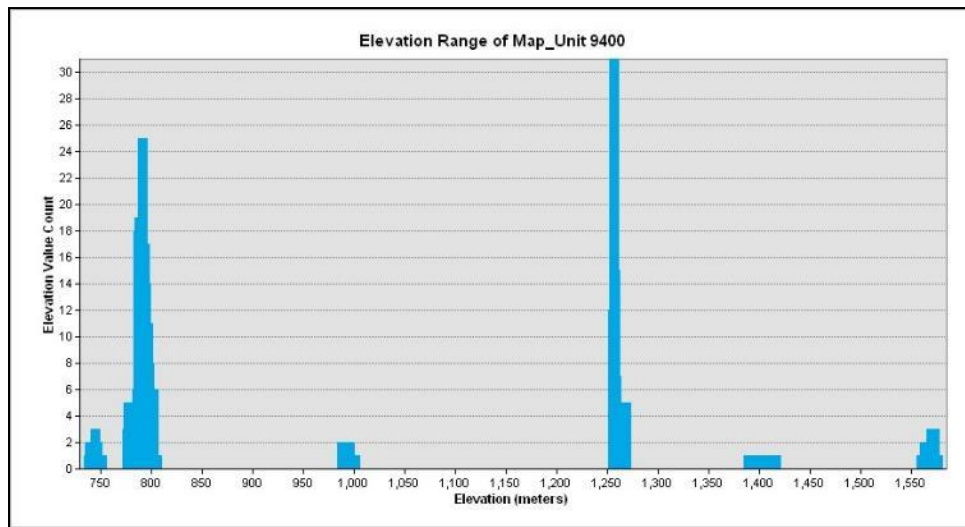
- Undefined Areas with Little or No Vegetation (9403) (Anthropogenic clearing) – Areas cleared by human impact. Examples include areas which have recently been cleared for construction or demolition sites which have most of their impervious surface removed.

Areas of Little or No Vegetation Mapping Unit (9400)

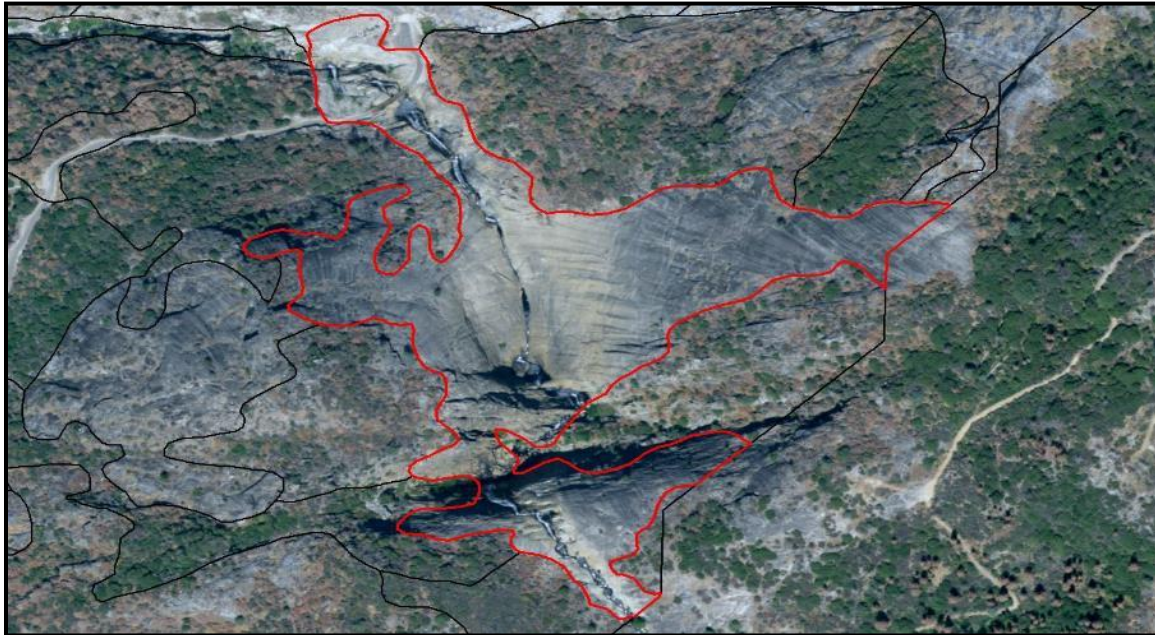


DISTRIBUTION: This type is mapped in two polygons along the edge of the high-water line of Lake Isabella in the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

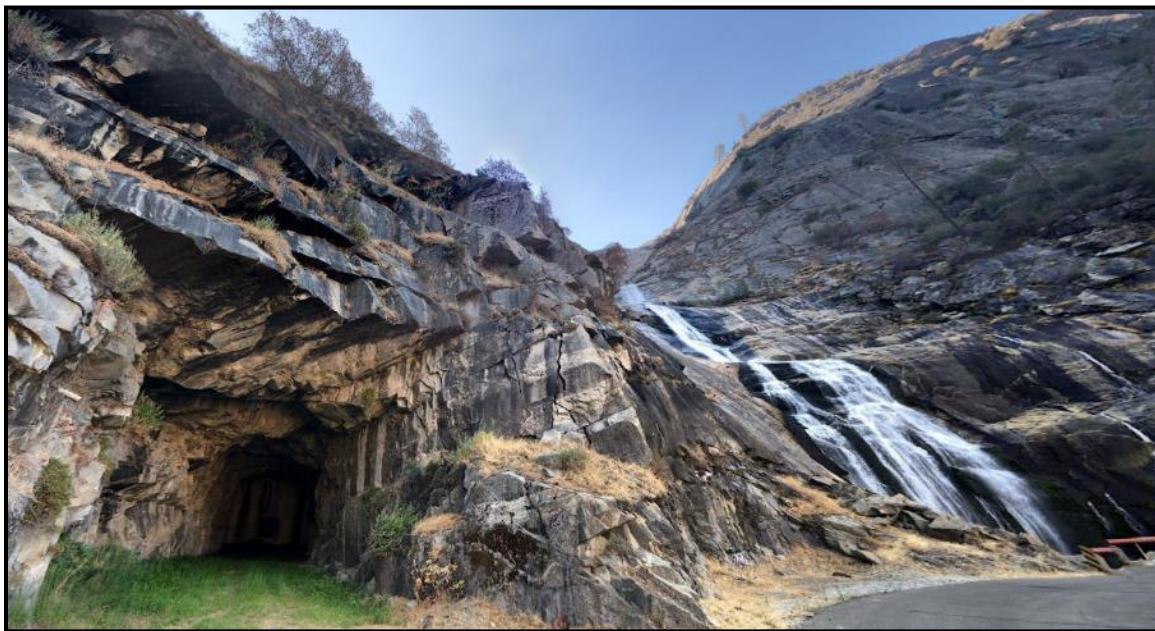
Areas of Little or No Vegetation Mapping Unit (9400)



Cliffs/Rock Outcrop Mapping Unit (9401)



Aerial view of a steep very sparsely vegetated rock outcrop.



Ground view of a very sparsely vegetated rock outcrop with a cascading stream.

Cliffs/Rock Outcrop Mapping Unit (9401)

DESCRIPTION: Mapped as natural features in the landscape with little or no vegetation (generally below 5-10% total cover) on rocky substrates. Includes sparsely vegetated stands occurring on steep boulder-covered slopes or on steep canyon slopes. In a few instances *Ericameria cuneata* is dominant or co-dominant with *Toxicodendron diversilobum*, *Diplacus aurantiacus*, or *Eriodictyon californicum*. A high cover of lichen, moss and/or *Selaginella* spp. is usually present. Can be equivalent to or include the floristic hierarchy as the Californian Cliff, Scree & Rock Vegetation Group.

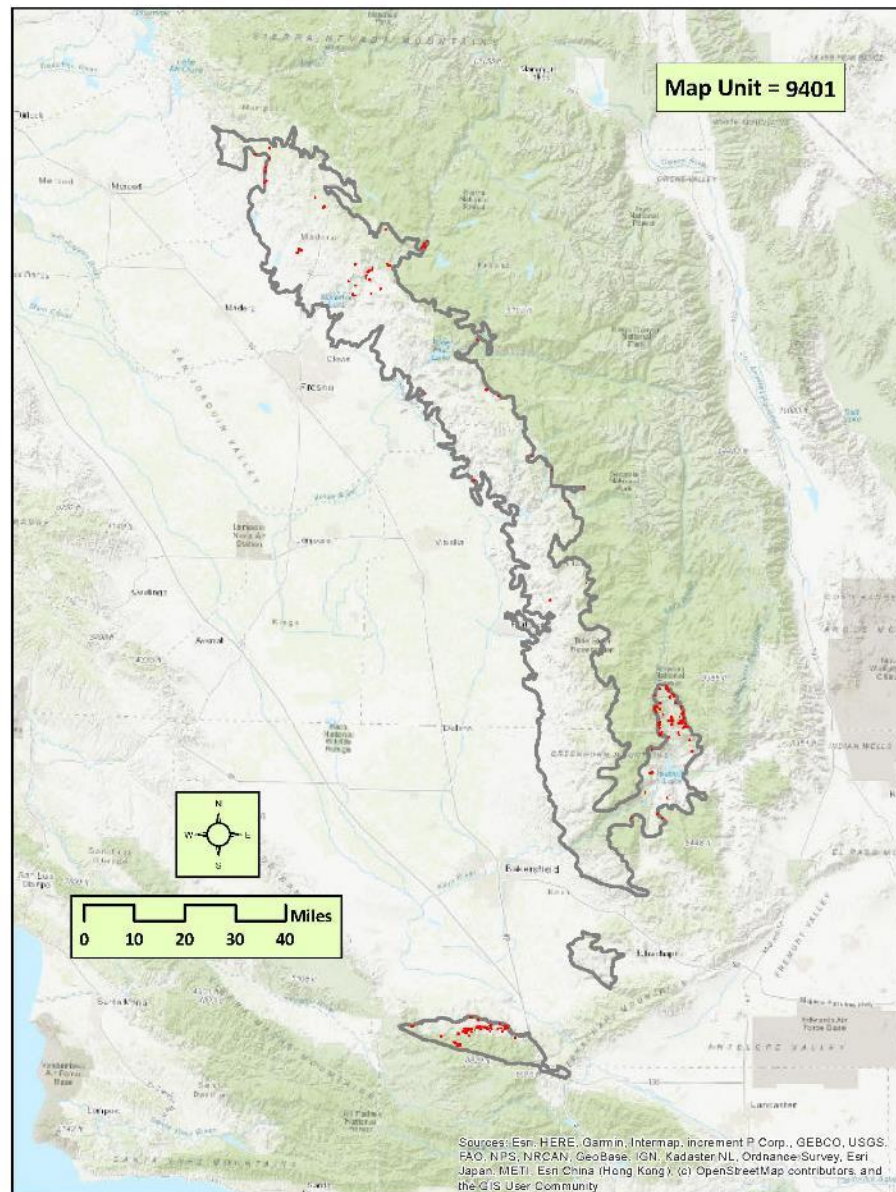
Stands of this type are mapped throughout the Southern Sierra Nevada Foothills Proper and San Emigdio subareas on granite outcroppings without much vegetation. This type includes large granite escarpments, non-riparian boulder fields, and talus slopes. No sites are mapped in the Horsethief Mountain subarea.

PHOTO INTERPRETATION SIGNATURE: Large boulders and rock outcroppings appear in striations of white to light gray to dark gray. Stands contain a very low cover of grasses and woody plants, but may contain a variety of endemic native forbs and herbaceous species which are undetectable from the imagery.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

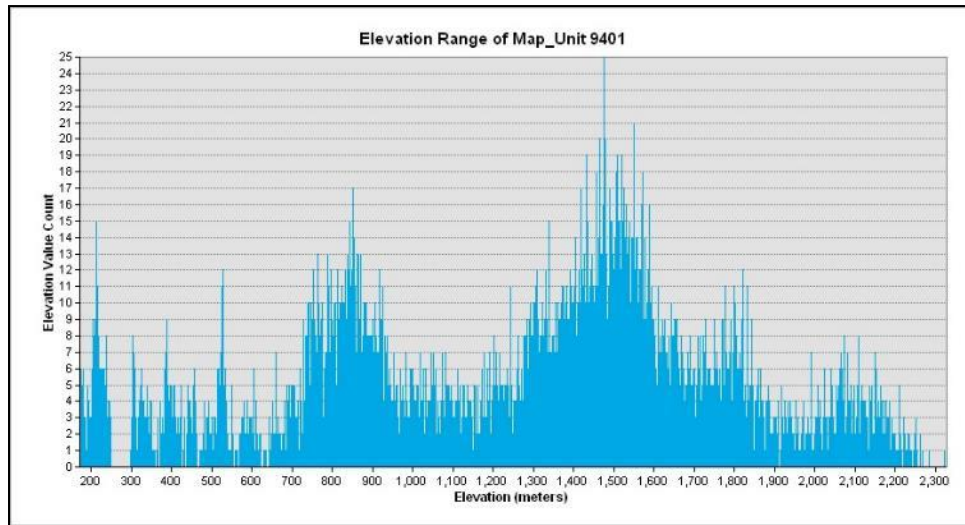
- *Vulpia microstachys* – *Selaginella hansenii* Association (7115) – This type represents stands that have a presence of *Selaginella hansenii* within a matrix of rock and herbaceous patches. Stands of this alliance are modelled on cooler rock escarpments with a mix of tawny grasses, sparse shrubs, and *Selaginella hansenii*. Signatures for this type typically contain a large component of smooth flat granite exposures that have a white to gray color. These rock exposures interface with grassy edges where there is a gray stained ring along the fringes of the rock that contrasts from the adjacent lighter tawny-colored annual grasses. *Selaginella hansenii* and mosses frequently occupy this grayer fringe of the rock outcropping.

Cliffs/Rock Outcrop Mapping Unit (9401)



DISTRIBUTION: Stands of this type are mapped throughout the Southern Sierra Nevada Foothills Proper and San Emigdio subareas. No sites are mapped in the Horsethief Mountain subarea.

Cliffs/Rock Outcrop Mapping Unit (9401)



River and Lacustrine Flats & Streambeds Mapping Unit (9402)



Aerial view of a very sparsely vegetated cobbly stream flat adjacent to the flowing river streambed.



Ground view of a very sparsely vegetated cobbly stream bed and flat.

River and Lacustrine Flats & Streambeds Mapping Unit (9402)

DESCRIPTION: Mapped as natural features in the landscape with little or no vegetation (generally below 5-10% total cover). Note: Baseline interpretation date is late spring to early summer 2018, using NAIP 1-meter imagery. Changes in vegetation or flooding regimes either seasonally or on a year-to-year basis will occur with this mapping category.

This mapping unit is mapped in the Southern Sierra Nevada Foothills Proper and San Emigdio Range subareas, in stream channels, riverine flats, and other unvegetated riparian settings. No sites are mapped in the Horsethief Mountain subarea.

PHOTO INTERPRETATION SIGNATURE: Signature substrates reflect a white to light gray color on the imagery, sometimes with a linear dark channel of water cutting through the mapped unit. The areas usually take on a linear shape following the unvegetated active channel. Sparse shrubs and herbs may be seen but are low in cover.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

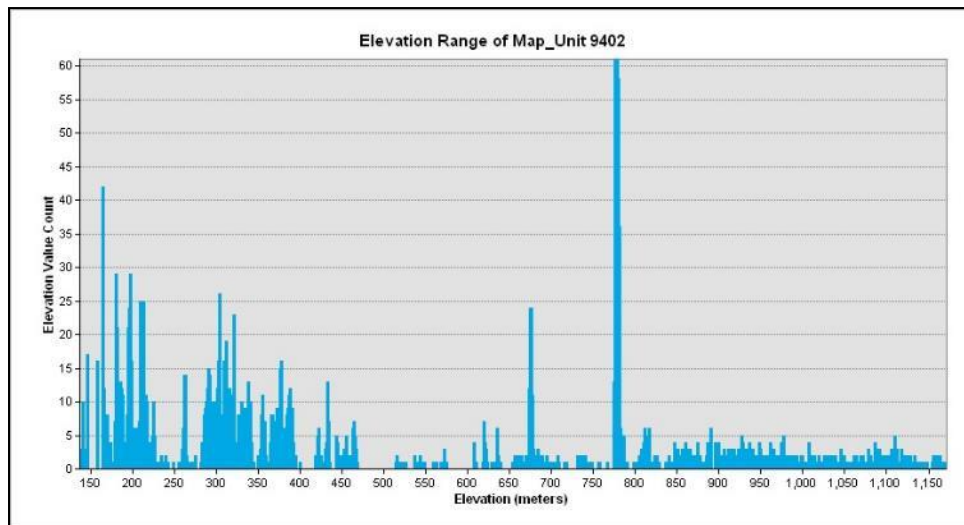
- None

Appendix B



DISTRIBUTION: This mapping unit is mapped in the Southern Sierra Nevada Foothills Proper and San Emigdio Range subareas, in stream channels, riverine flats, and other unvegetated riparian settings. No sites are mapped in the Horsethief Mountain subarea.

River and Lacustrine Flats & Streambeds Mapping Unit (9402)



Undefined Areas with Little or No Vegetation Mapping Unit (9403)
(Anthropogenic clearing)



Aerial view of a flat man-made cleared area by a road.



Ground view of a flat man-made cleared area adjacent to a road.

Undefined Areas with Little or No Vegetation Mapping Unit (9403) (Anthropogenic clearing)

DESCRIPTION: Anthropogenically cleared areas containing less than 2% vegetative cover and have been cleared by human impact. These areas can be temporal in nature and are based on the project imagery acquisition timing. Surfaces are generally permeable and can either be covered by fill dirt from another source or contain the original soil and/or substrate layer. Small remnant impervious pavement surfaces can make up a portion of the site. Examples include areas which have recently been cleared for construction or demolition sites which have most of their impervious surface removed.

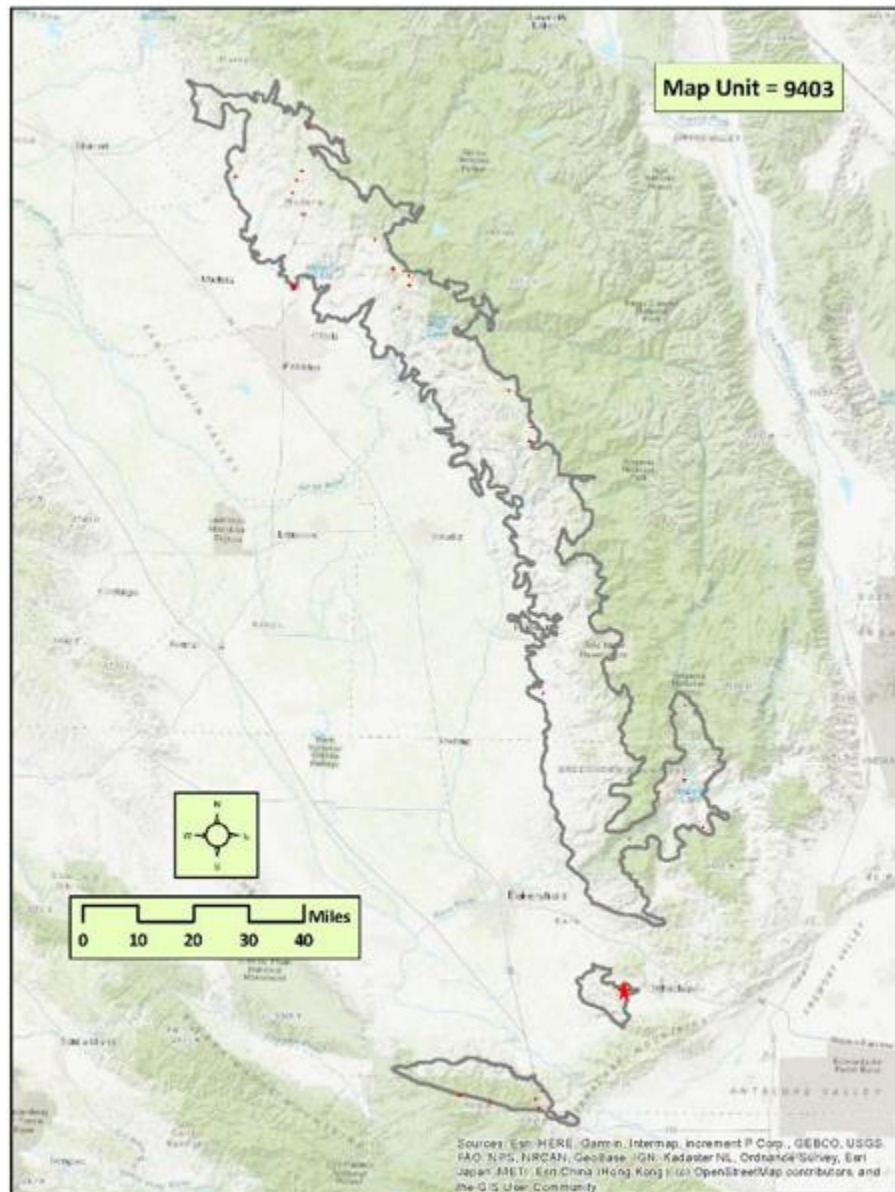
This type is sparsely mapped in all subareas.

PHOTO INTERPRETATION SIGNATURE: Polygons mapped as this type typically appear as a smooth white or beige surface, usually nearby to land use or agricultural structures. Sometimes linear scraping and/or piles of debris can be seen on the imagery.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

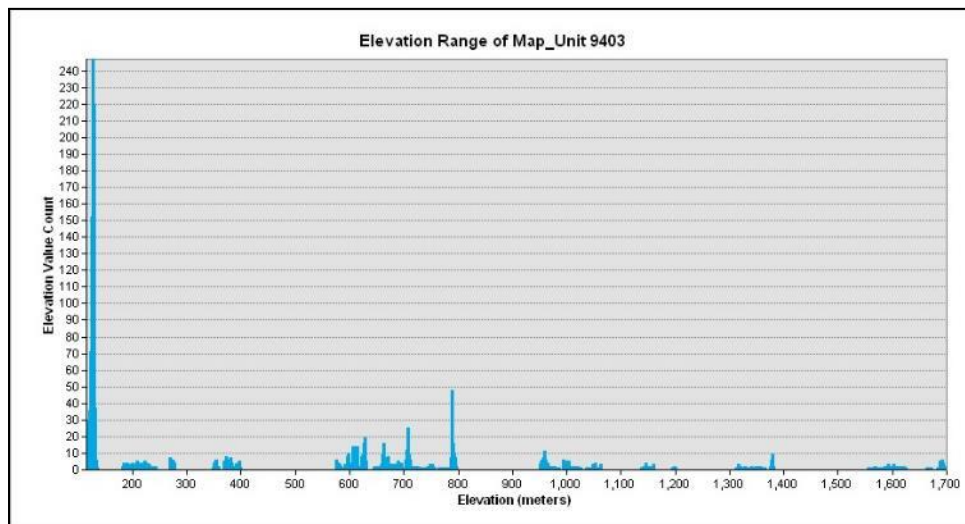
- Areas of Little or No Vegetation Mapping Unit (9400) – This class is used for upland (not associated with fluvial activity) settings where the photo interpreter is uncertain whether the unvegetated substrate is naturally occurring versus a human disturbed clearing.

Undefined Areas with Little or No Vegetation Mapping Unit (9403) (Anthropogenic clearing)



DISTRIBUTION: This type is sparsely mapped in all subareas.

Undefined Areas with Little or No Vegetation Mapping Unit (9403) (Anthropogenic clearing)



Sparsely Vegetated Recently Burned Areas Mapping Unit (9404)



Aerial view of a recently burned very sparsely vegetated area, with a black ashy signature. Note the partially burned trees and shrubs in the adjacent polygons.

Ground photo is not available.

Sparsely Vegetated Recently Burned Areas Mapping Unit (9404)

DESCRIPTION: Sparsely Vegetated Recently Burned Areas Mapping Unit is mapped where a recent fire (within 2 years prior to the imagery) has reduced vegetation to ash or sometime burnt skeletal remnants of the plants, with subsequent recovery being very minimal, making photo interpretation of vegetation unreliable.

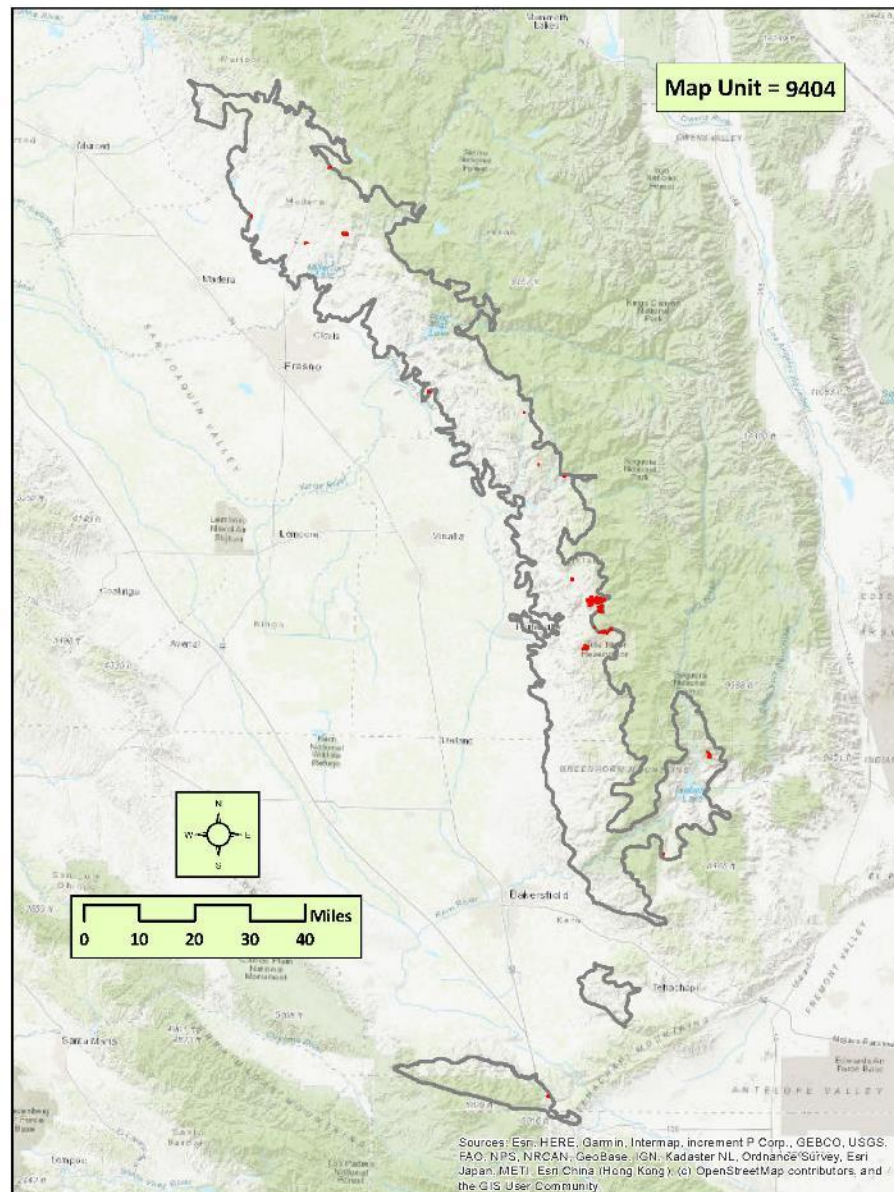
Several sites are mapped in the Southern Sierra Nevada Foothills Proper subarea. One site is mapped in the San Emigdio Range subarea. No sites are mapped in the Horsethief Mountain subarea.

PHOTO INTERPRETATION SIGNATURE: Depending on what vegetation was present prior to the fire, signature may display light gray/black to brown tree and shrub snags and/or a blackened understory of ash.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

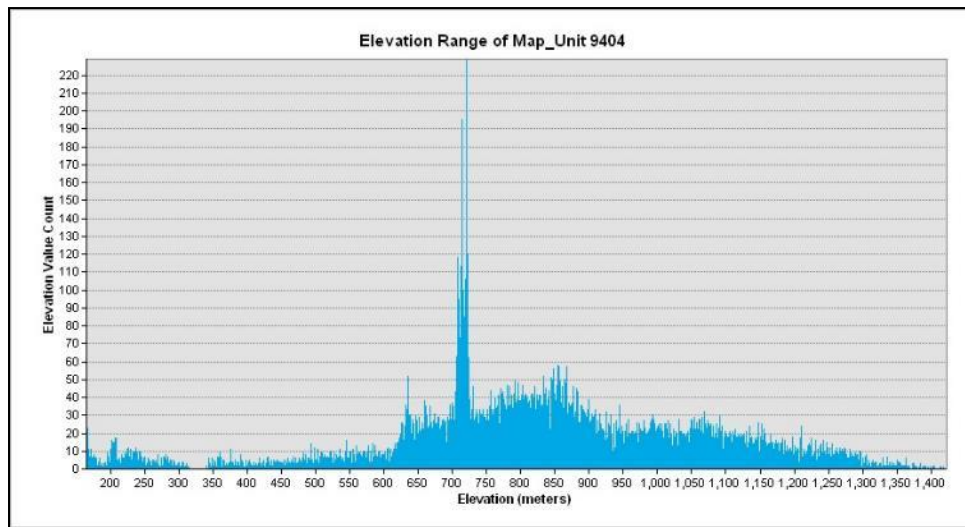
- None

Sparsely Vegetated Recently Burned Areas Mapping Unit (9404)



DISTRIBUTION: Several sites are mapped in the Southern Sierra Nevada Foothills Proper subarea. One site is mapped in the San Emigdio Range subarea. No sites are mapped in the Horsethief Mountain subarea.

Sparsely Vegetated Recently Burned Areas Mapping Unit (9404)



Exotic Trees and Planted Trees Mapping Unit (9500)



Aerial view of exotic trees at a former campground below the Pine Flat Reservoir Dam on the Kings River.



Planted mix of exotic trees, well-spaced within an old campground.

Exotic Trees and Planted Trees Mapping Unit (9500)

DESCRIPTION: Mapped where photo interpreters can separate out non-native trees or planted trees that are not associated with built-up areas.

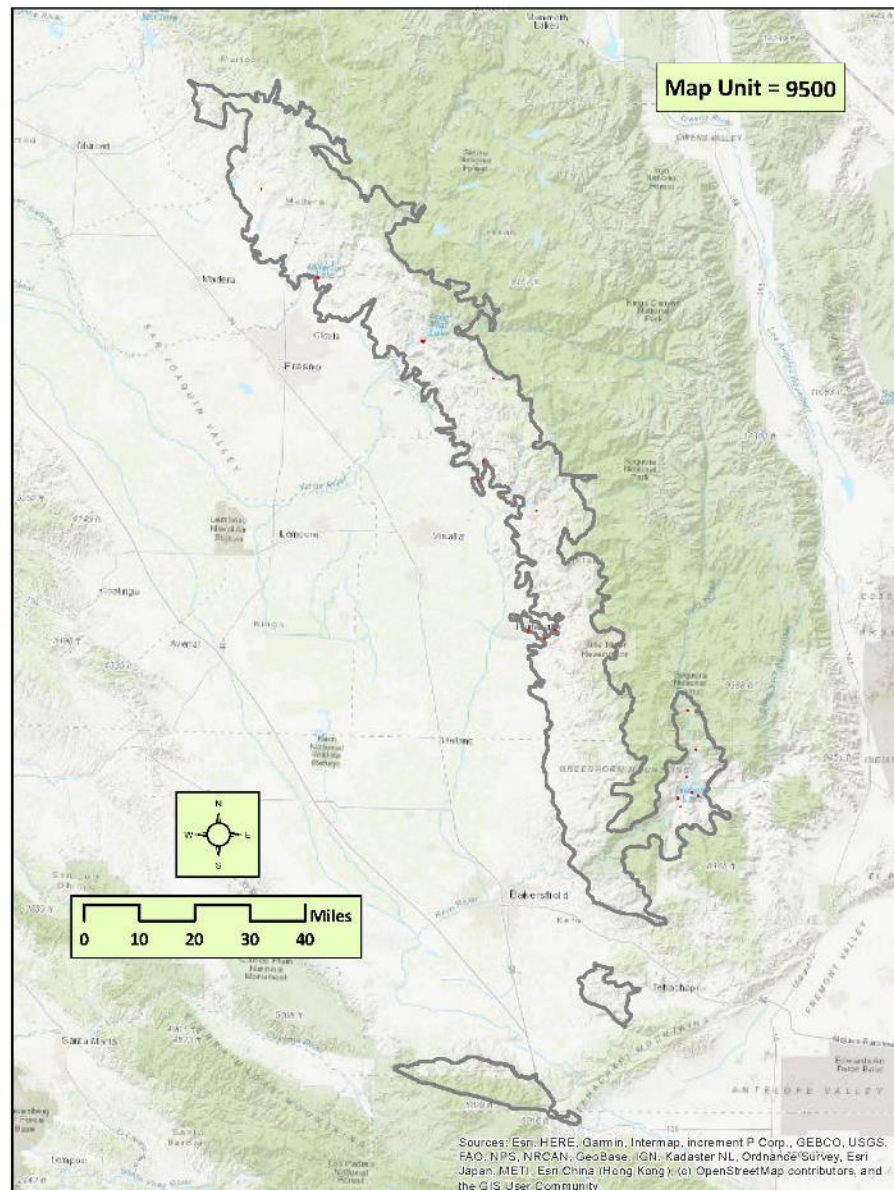
Sparsely mapped throughout the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: Signatures vary widely depending on what species of exotics are being mapped.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

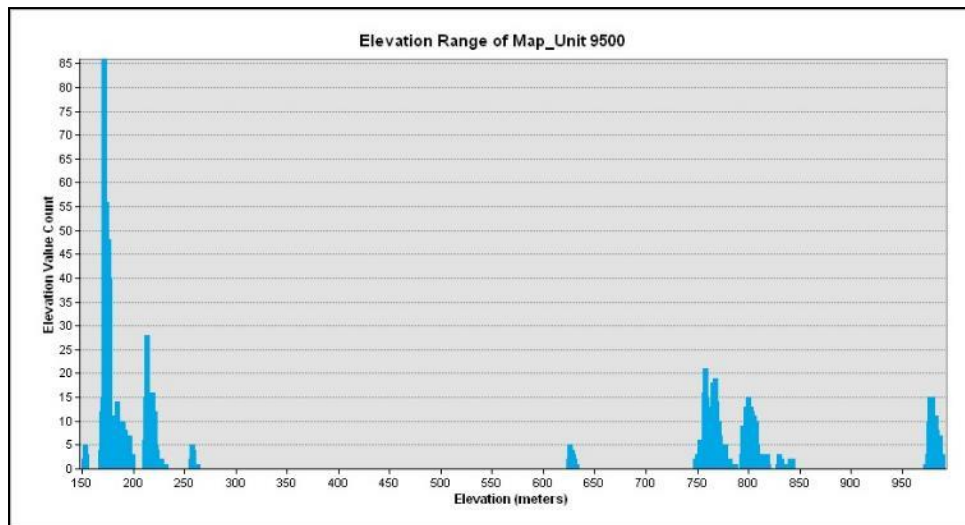
- *Eucalyptus* spp. – *Ailanthus altissima* – *Robinia pseudoacacia* Semi-Natural Alliance (9501) – Mapped where photo interpreters are able to separate out species of *Eucalyptus* and *Ailanthus altissima* not associated with built-up areas.

Exotic Trees and Planted Trees Mapping Unit (9500)



DISTRIBUTION: Sparsely mapped throughout the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Exotic Trees and Planted Trees Mapping Unit (9500)



Eucalyptus spp. – *Ailanthus altissima* – *Robinia pseudoacacia* Semi-Natural Alliance (9501)



Aerial view of planted and clonal generating exotic *Ailanthus altissima* (Tree of Heaven).



Ground view of a variable-aged stand of exotic *Ailanthus altissima* (Tree of Heaven) along a dirt road.

***Eucalyptus* spp. – *Ailanthus altissima* – *Robinia pseudoacacia* Semi-Natural Alliance (9501)**

DESCRIPTION: Mapped where photo interpreters are able to separate out species of *Eucalyptus* and *Ailanthus altissima* not associated with built-up areas.

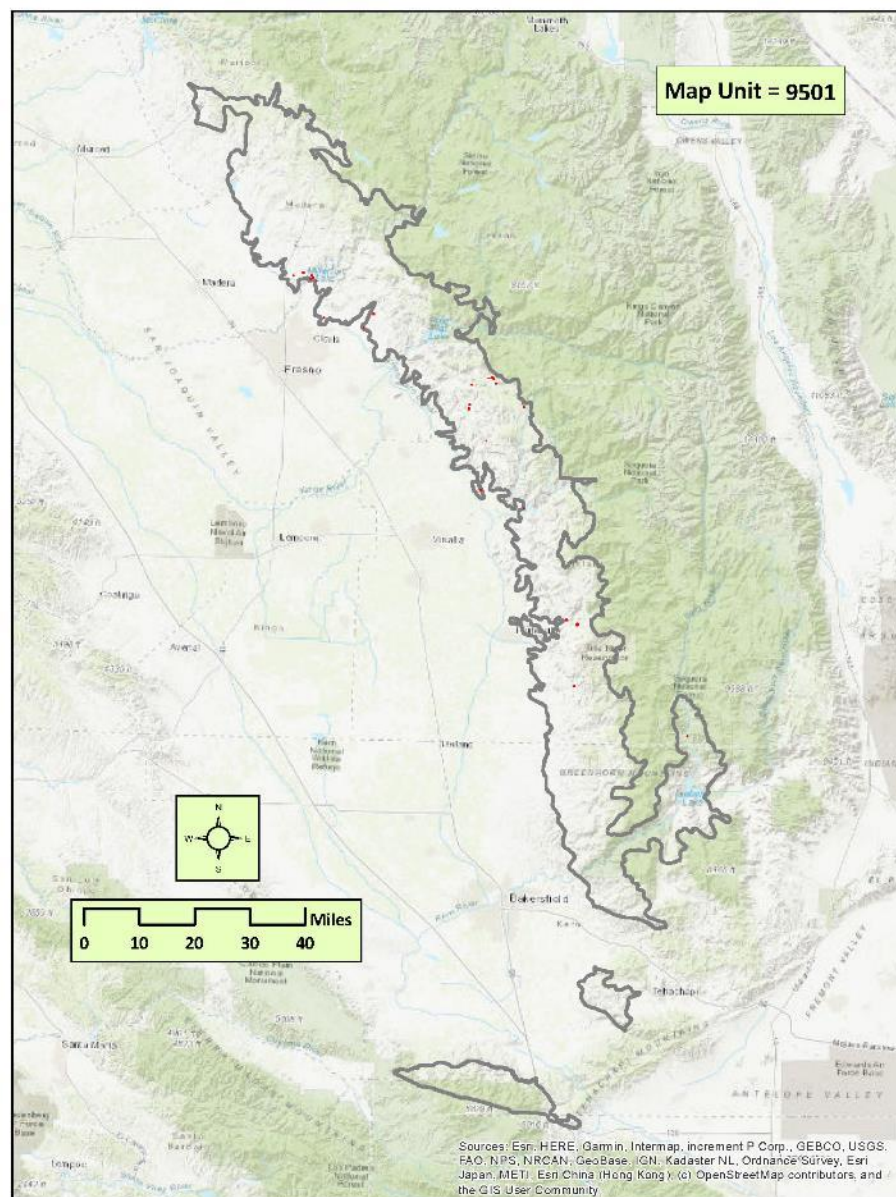
Sparsely mapped throughout the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: *Eucalyptus* spp. stands appear as very tall brown trees with a sprawling crown. Usually, they appear in linear planted rows or clusters, towering over adjacent vegetation. *Ailanthus altissima* stands can vary widely in height and are vigorously clonal. They are seen on the imagery as dark green clusters of short to medium-sized trees with distinctive and irregularly shaped stand margin. Crowns appear consistent and slightly bumpy.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

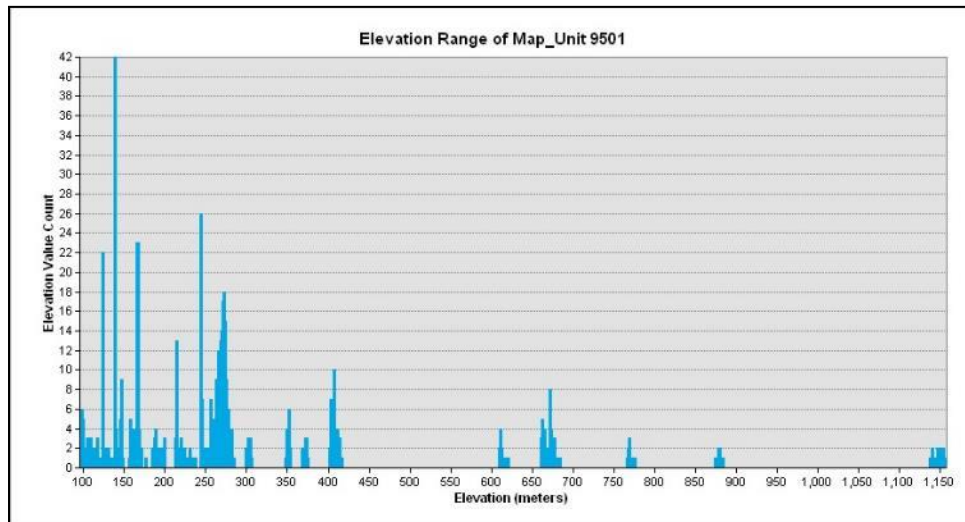
- Exotic Trees and Planted Trees Mapping Unit (9500) – Mapped where photo interpreters can separate out non-native trees or planted trees, other than *Eucalyptus* and *Ailanthus*, that are not associated with built-up areas.

***Eucalyptus* spp. – *Ailanthus altissima* – *Robinia pseudoacacia* Semi-Natural Alliance (9501)**

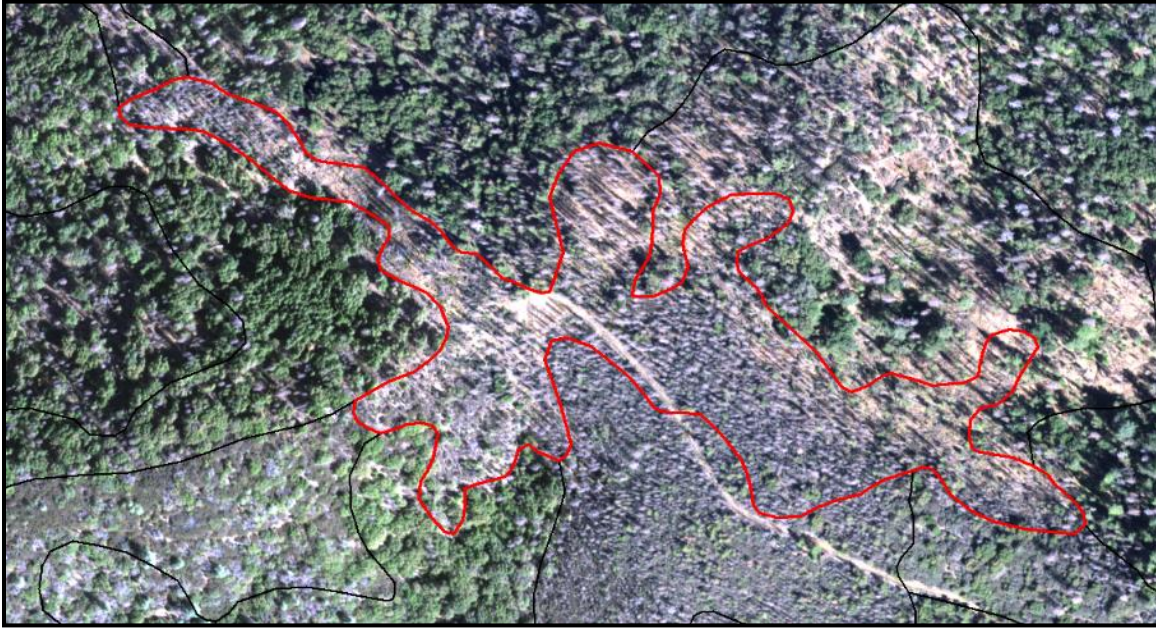


DISTRIBUTION: Sparsely mapped throughout the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

***Eucalyptus* spp. – *Ailanthus altissima* – *Robinia pseudoacacia* Semi-Natural Alliance (9501)**



Standing Dead Trees High Cover Mapping Unit (9600)



Aerial view of fairly dense stand of Standing Dead conifers. Note contrast of gray dead snags against surrounding green leafy live conifers and hardwoods.



Note dead leafless branches and standing dead conifers with yellow-brown dead needles still hanging on branches. Understory of live shrubs.

Standing Dead Trees High Cover Mapping Unit (9600)

DESCRIPTION: Fairly dense stands of standing dead snags of *Pinus ponderosa* and *Calocedrus decurrens* where the understory is obscured, hindering photo interpretation of the understory for alliance.

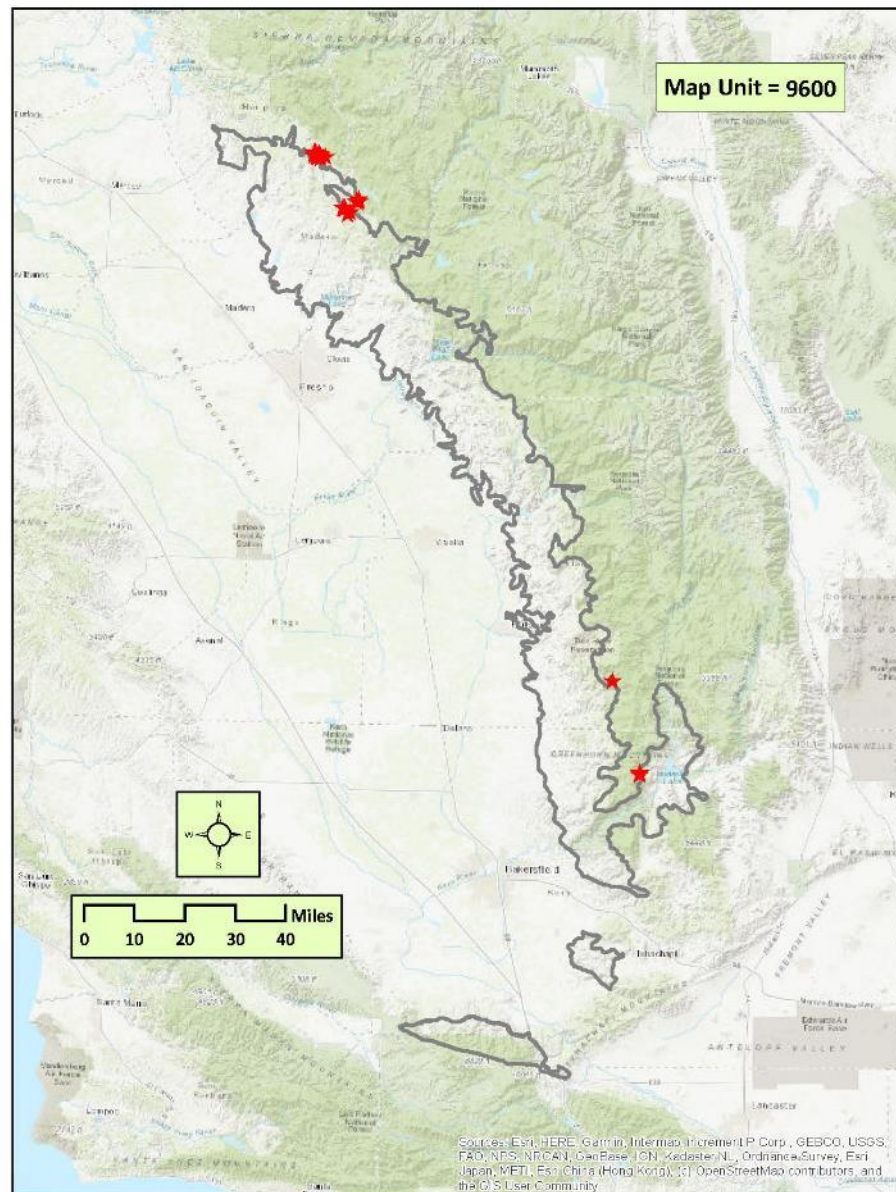
Mapped at selected sites at high elevations in the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: Dense white to gray to light brown snags are seen on the imagery in higher elevation settings.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

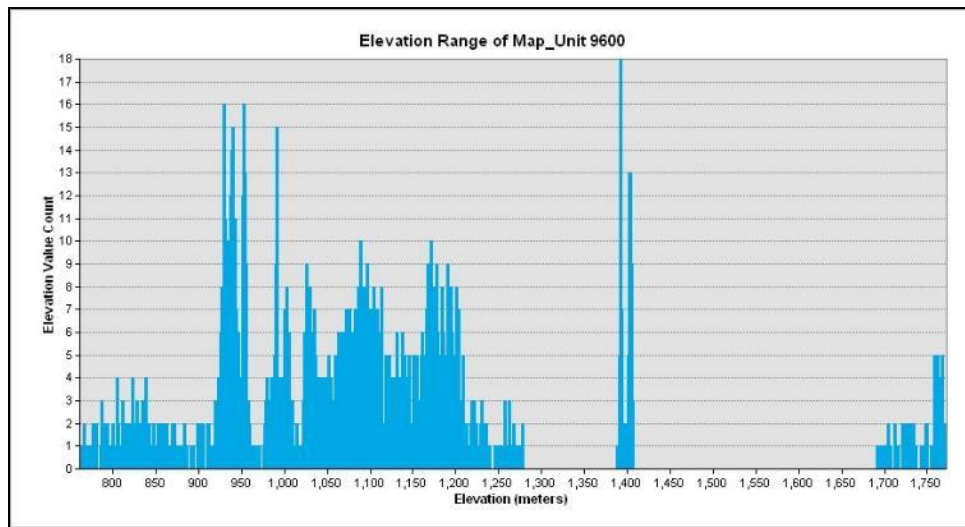
- None

Standing Dead Trees High Cover Mapping Unit (9600)



DISTRIBUTION: Mapped at selected sites at high elevations in the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Standing Dead Trees High Cover Mapping Unit (9600)



Water Mapping Unit (9800)



Aerial view of a man-made Water Body within a golf course in a developed area.



Ground view of a partially hidden man-made Water Body within manicured lawn area behind tree. Note fountains shooting up from water.

Water Mapping Unit (9800)

DESCRIPTION: Baseline interpretation date is late spring to early summer 2018, using NAIP 1-meter imagery. Changes in vegetation or flooding regimes either seasonally or on a year-to-year basis occurs with water features, especially along lake & reservoir margins and flowing water in larger streams and rivers. Features coded as this type (9800) include water recharge/catchment basins that are not along a natural stream course; ponds or basins associated with land use; and naturally occurring pools of low-lying water within the floodplain but are separate from the main stream/river channels.

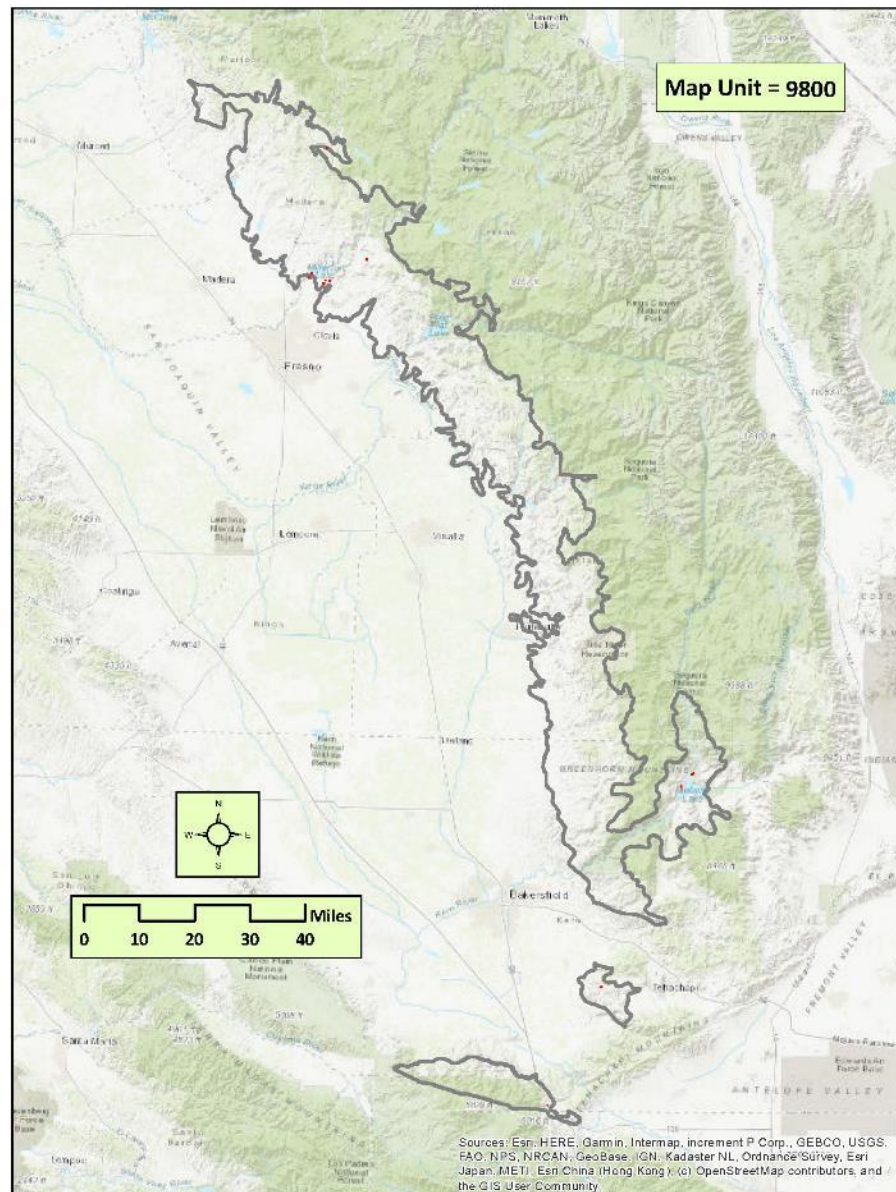
The mapping unit has very few occurrences mapped in all three subareas.

PHOTO INTERPRETATION SIGNATURE: Signatures of this type capture natural and artificial water bodies that appear as a stark black round to irregular shape with a distinctive edge.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

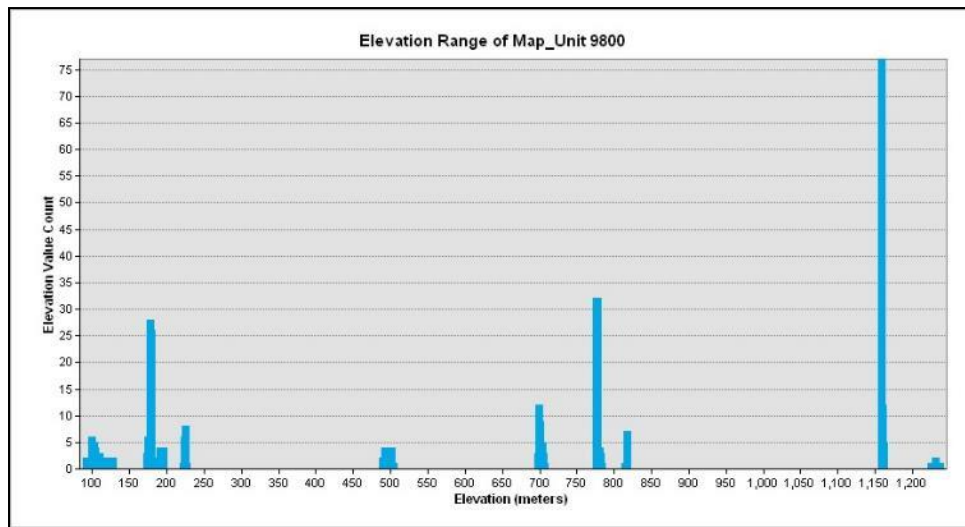
- Perennial Stream Channel Mapping Unit (9801) – This type captures perennial rivers and stream channels with year-round surface water. Upper portions of most rivers within the project area are mapped as this type.
- Reservoirs Mapping Unit (9802) – This type captures large reservoirs created by dammed riverine corridors within the study area.
- Small Earthen Dam Ponds & Natural Lakes Mapping Unit (9803) – This type captures small dammed water bodies along natural stream courses. Typically, there is some kind of structure or land use associated nearby.
- Major Canals and Aqueducts Mapping Unit (9804) – This type depicts significant and large open linear structures that convey water from one location to another over a long stretch of land.

Water Mapping Unit (9800)



DISTRIBUTION: The mapping unit has very few occurrences mapped in all three subareas.

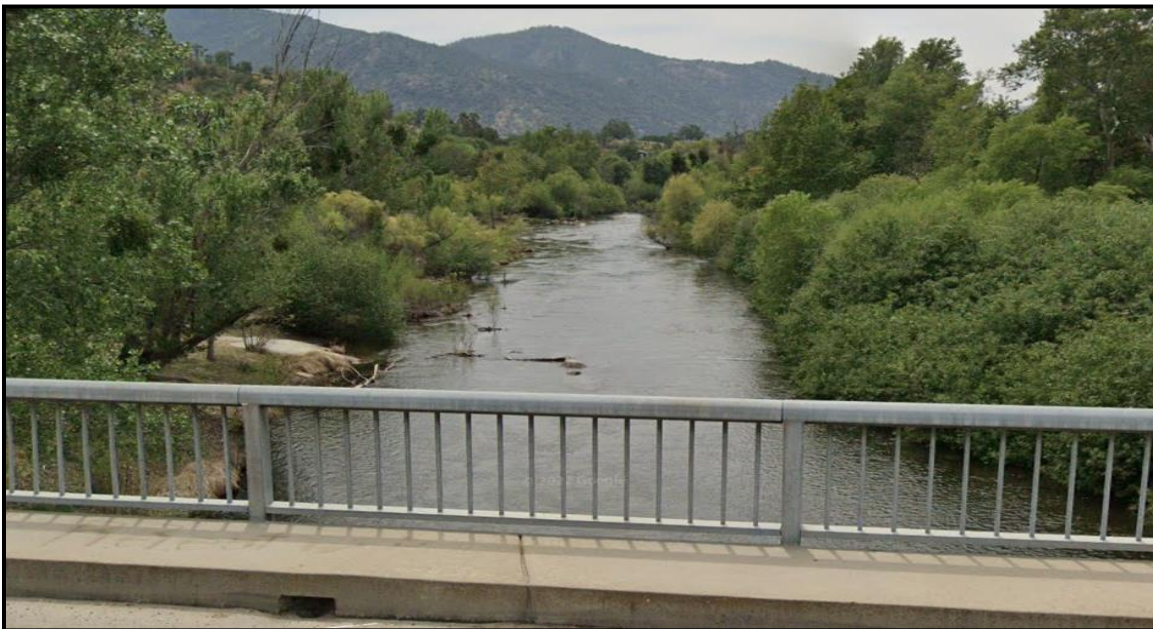
Water Mapping Unit (9800)



Perennial Stream Channel Mapping Unit (9801)



Aerial view of the perennial Kaweah River running through the town of Three Rivers.



View from a bridge over the perennial Kaweah River in Three Rivers.

Perennial Stream Channel Mapping Unit (9801)

DESCRIPTION: This type captures perennial rivers and stream channels with year-round surface water. Upper portions of most rivers within the project area are mapped as this type.

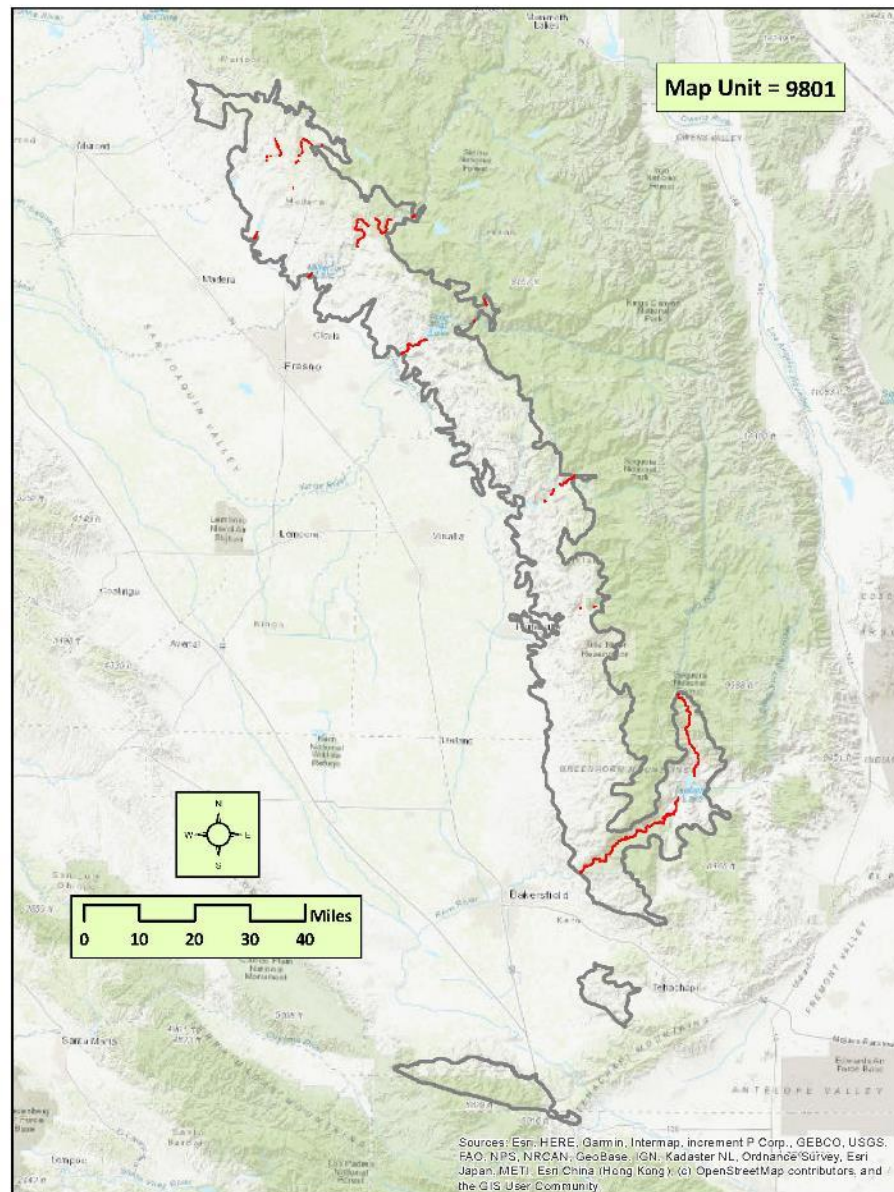
This mapping unit is mapped throughout the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: Stands of this type typically occur as long linear dark-colored water courses following the active channel. Small inclusions of shrubs or trees may occur at low cover.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

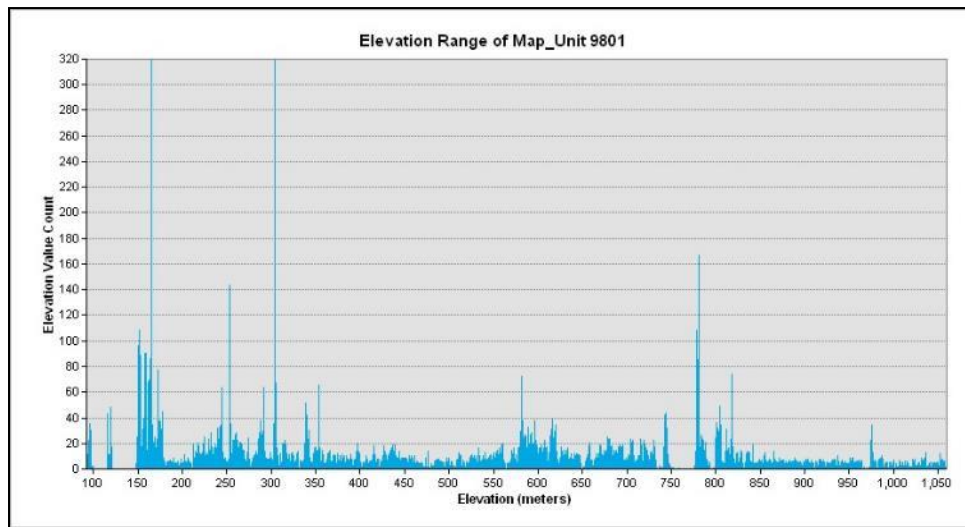
- Water Mapping Unit (9800) – Features coded as this type include water recharge/catchment basins that are not along a natural stream course; ponds or basins associated with land use; and naturally occurring pools of low-lying water within the floodplain but are separate from the main stream/river channels.
- Reservoirs Mapping Unit (9802) – This type captures large reservoirs created by dammed riverine corridors within the study area.
- Small Earthen Dam Ponds & Natural Lakes Mapping Unit (9803) – This type captures small dammed water bodies along natural stream courses. Typically, there is some kind of structure or land use associated nearby.
- Major Canals and Aqueducts Mapping Unit (9804) – This type depicts significant and large open linear structures that convey water from one location to another over a long stretch of land.

Perennial Stream Channel Mapping Unit (9801)

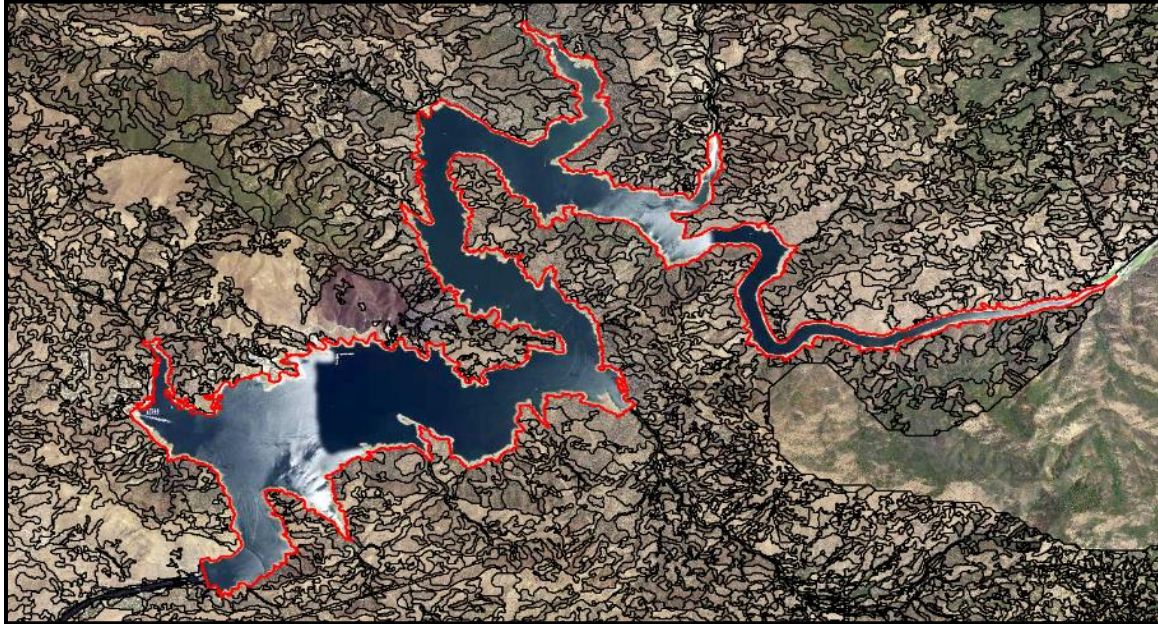


DISTRIBUTION: This mapping unit is mapped throughout the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Perennial Stream Channel Mapping Unit (9801)



Reservoirs Mapping Unit (9802)



Aerial view of the Pine Flat Reservoir on the Kings River in Fresno County.



Ground view across a portion of the Pine Flat Reservoir.

Reservoirs Mapping Unit (9802)

DESCRIPTION: This type captures large reservoirs created by dammed riverine corridors within the study area.

Note that the water level of Lake Isabella fluctuated over time. The water level mapped was based on the USGS topo representation of the high-water line, which matched the base imagery well. However, at the Kern River inlet floodplain the water level seen on the imagery deviated from the high-water level depicted on the topo. It was decided that the riparian vegetation seen on the base imagery would take precedence over the topo water level representation.

Another note is that the existing riparian vegetation represented on the base imagery was mapped on Lake Kaweah below the high reservoir water line.

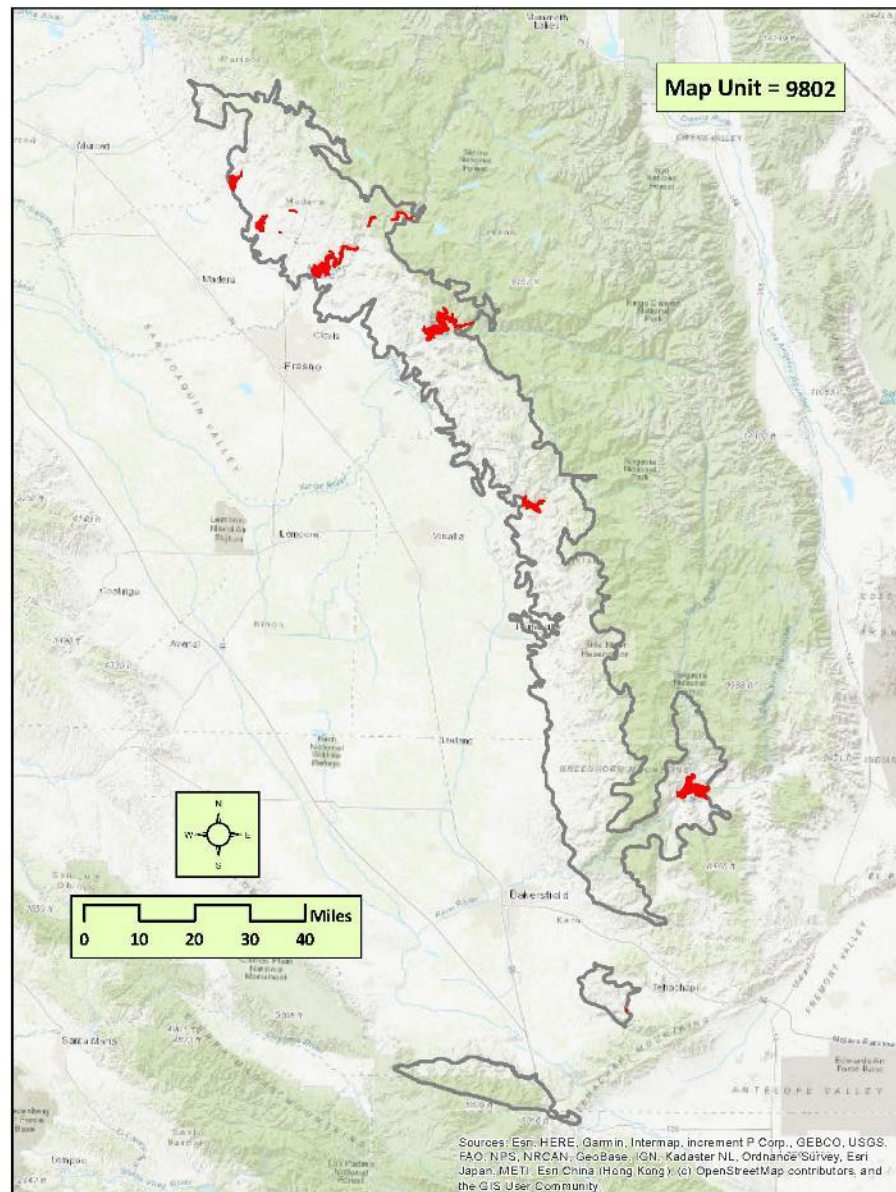
This mapping unit was mapped throughout the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: Reservoirs are typically large in size with stark margins where the dark-colored water meets the light-colored shoreline. Shapes of the mapped unit are variable and follow the topography of each individual waterbody.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

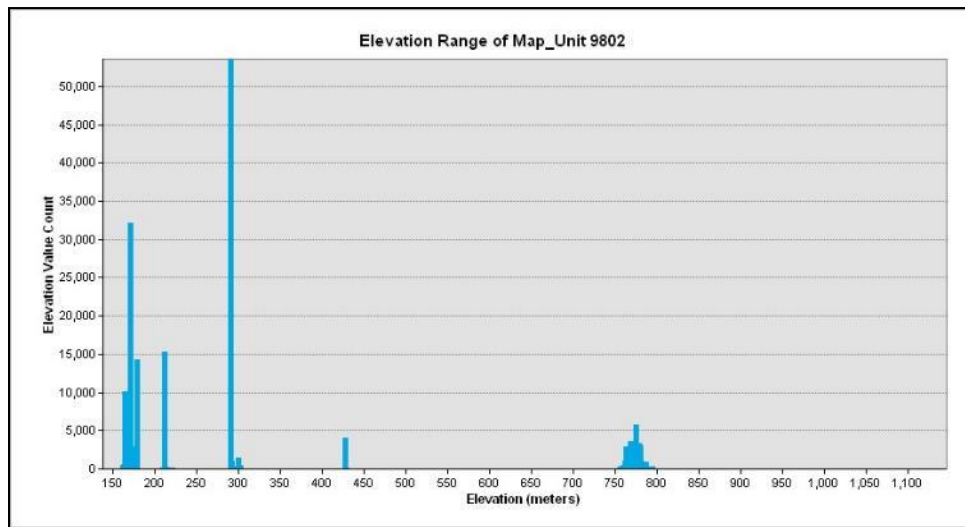
- Water Mapping Unit (9800) – Features coded as this type include water recharge/catchment basins that are not along a natural stream course; ponds or basins associated with land use; and naturally occurring pools of low-lying water within the floodplain but are separate from the main stream/river channels.
- Perennial Stream Channel Mapping Unit (9801) – This type captures perennial rivers and stream channels with year-round surface water. Upper portions of most rivers within the project area are mapped as this type.
- Small Earthen Dam Ponds & Natural Lakes Mapping Unit (9803) – This type captures small dammed water bodies along natural stream courses. Typically, there is some kind of structure or land use associated nearby.
- Major Canals and Aqueducts Mapping Unit (9804) – This type depicts significant and large open linear structures that convey water from one location to another over a long stretch of land.

Reservoirs Mapping Unit (9802)



DISTRIBUTION: This mapping unit was mapped throughout the Southern Sierra Nevada Foothills Proper subarea. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Reservoirs Mapping Unit (9802)



Small Earthen Dam Ponds & Natural Lakes Mapping Unit (9803)



Aerial view of a Small Earthen Dammed Pond, in this case a farm pond in a developed ranch setting.



A Small Earthen Dammed Pond on a developed ranch.

Small Earthen Dam Ponds & Natural Lakes Mapping Unit (9803)

DESCRIPTION: This type captures small dammed water bodies along or adjacent to natural stream courses. In some case there may be some kind of structure or land use associated nearby.

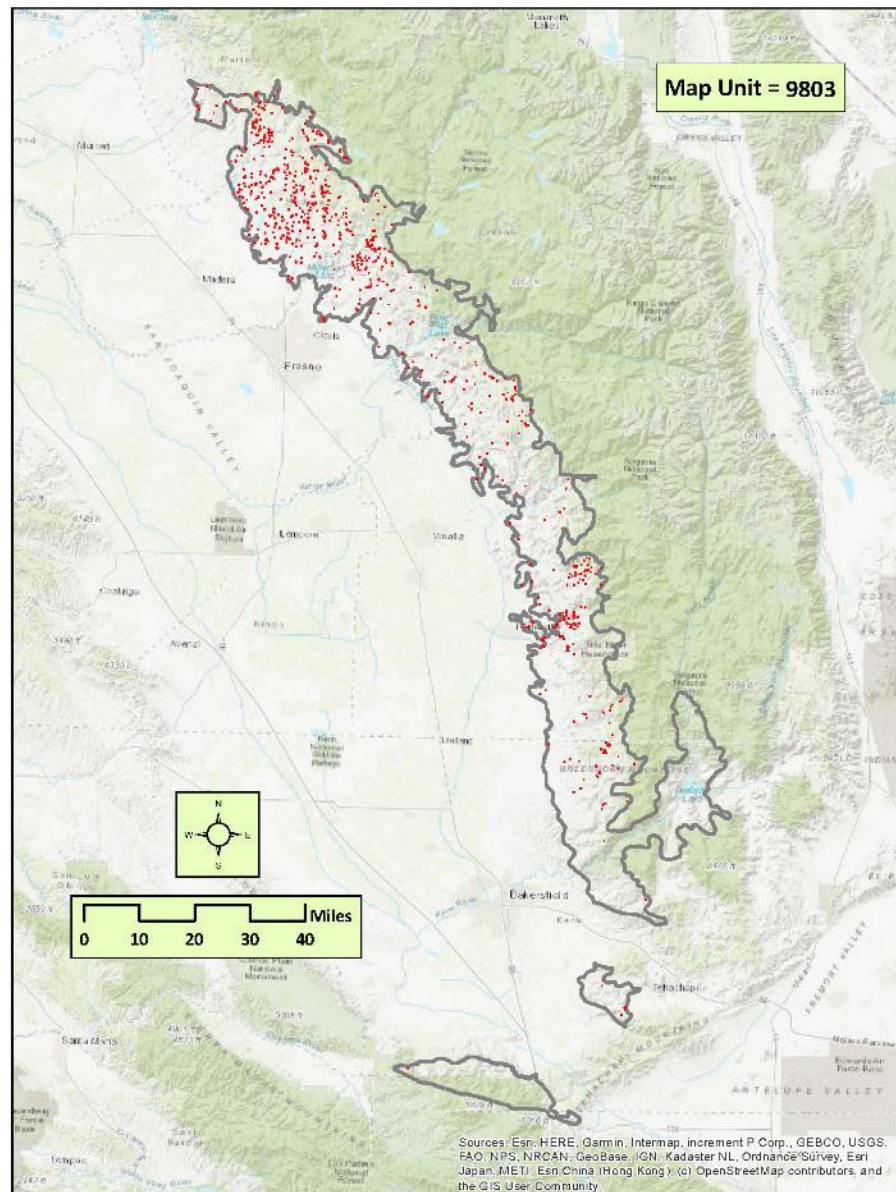
This mapping unit is common and mapped throughout the Southern Sierra Nevada Foothills Proper subarea, with a few sites mapped in the Horsethief Mountain subarea, and one site mapped in the San Emigdio Range subarea.

PHOTO INTERPRETATION SIGNATURE: Stands of this type occur as rounded to irregular shapes with dark-colored water and an earthen dam on the downstream edge. Often a gap in the riparian vegetation is observed on the downstream edge where the earthen dam occurs.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

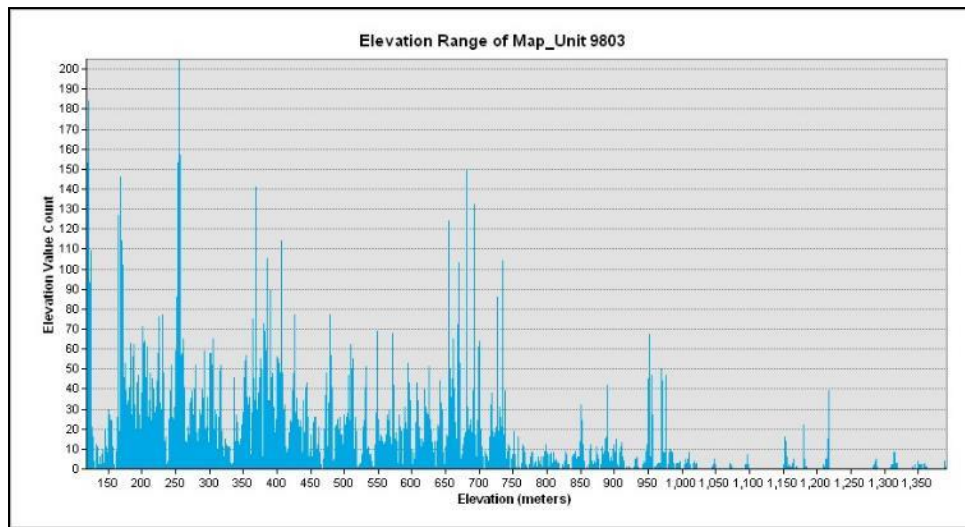
- Water Mapping Unit (9800) – Features coded as this type include water recharge/catchment basins that are not along a natural stream course; ponds or basins associated with land use; and naturally occurring pools of low-lying water within the floodplain but are separate from the main stream/river channels.
- Perennial Stream Channel Mapping Unit (9801) – This type captures perennial rivers and stream channels with year-round surface water. Upper portions of most rivers within the project area are mapped as this type.
- Reservoirs Mapping Unit (9802) – This type captures large reservoirs created by dammed riverine corridors within the study area.
- Major Canals and Aqueducts Mapping Unit (9804) – This type depicts significant and large open linear structures that convey water from one location to another over a long stretch of land.

Small Earthen Dam Ponds & Natural Lakes Mapping Unit (9803)



DISTRIBUTION: This mapping unit is common and mapped throughout the Southern Sierra Nevada Foothills Proper subarea, with a few sites mapped in the Horsethief Mountain subarea, and one site mapped in the San Emigdio Range subarea.

Small Earthen Dam Ponds & Natural Lakes Mapping Unit (9803)



Major Canals and Aqueducts Mapping Unit (9804)



Aerial view of the Friant-Kern Canal beginning from Millerton Lake.



View of section of Friant-Kern Canal south of Millerton Lake.

Major Canals and Aqueducts Mapping Unit (9804)

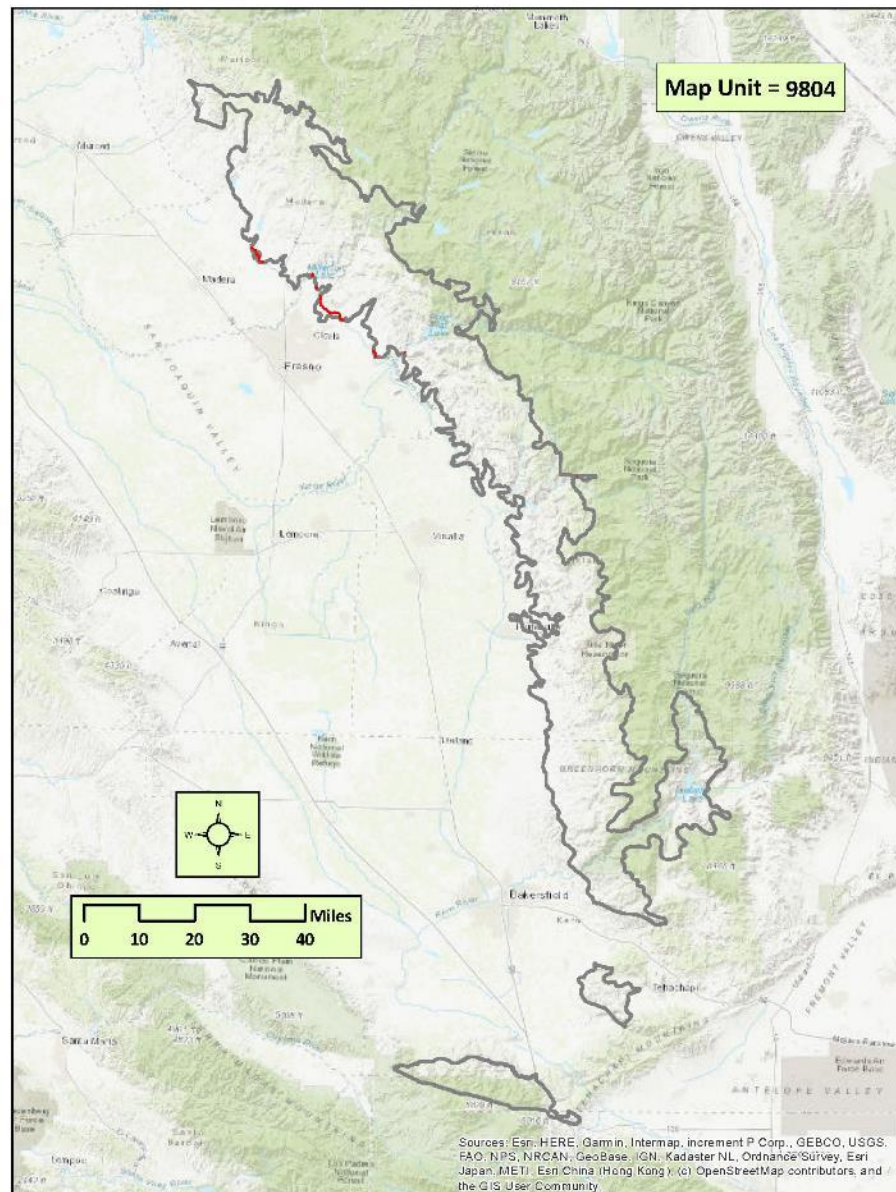
DESCRIPTION: The Major Canals and Aqueducts Mapping Unit depicts significant and large open linear structures that convey water from one location to another over a long stretch of land. One canal is mapped along the western edge of the Southern Sierra Nevada Foothills Proper subarea, northeast of Fresno. The polygons capture the Friant Kern Canal. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

PHOTO INTERPRETATION SIGNATURE: This type appears as a linear feature with white concrete embankments on either side of a dark central strip of water.

TYPES WITH SIMILAR PHOTO INTERPRETATION SIGNATURES:

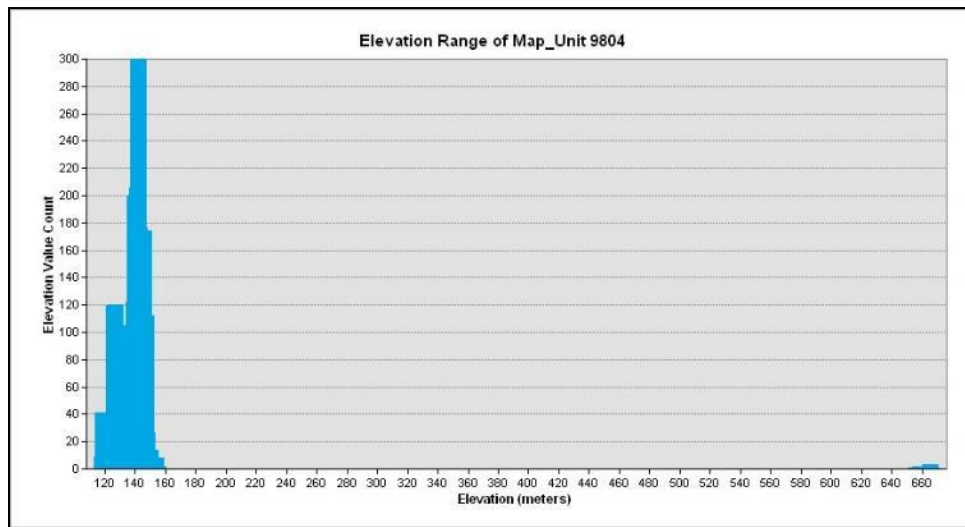
- Water Mapping Unit (9800) – Features coded as this type include water recharge/catchment basins that are not along a natural stream course; ponds or basins associated with land use; and naturally occurring pools of low-lying water within the floodplain but are separate from the main stream/river channels.
- Perennial Stream Channel Mapping Unit (9801) – This type captures perennial rivers and stream channels with year-round surface water. Upper portions of most rivers within the project area are mapped as this type.
- Reservoirs Mapping Unit (9802) – This type captures large reservoirs created by dammed riverine corridors within the study area.
- Small Earthen Dam Ponds & Natural Lakes Mapping Unit (9803) – This type captures small dammed water bodies along natural stream courses. Typically, there is some kind of structure or land use associated nearby.

Major Canals and Aqueducts Mapping Unit (9804)



DISTRIBUTION: One canal is mapped along the western edge of the Southern Sierra Nevada Foothills Proper subarea, northeast of Fresno. The polygons capture the Friant Kern Canal. No sites are mapped in the Horsethief Mountain and San Emigdio Range subareas.

Major Canals and Aqueducts Mapping Unit (9804)



APPENDIX C

SUMMARIES OF ACREAGE AND POLYGON COUNT BY MAP UNIT

Three tables are presented on the following pages. The first table lists each of the map units occurring in the final database of the Southern Sierra Nevada Foothills project, in numerical order by code value. The number of polygons is presented, followed by 4 columns relating to area: the total area covered by the map unit in the study area expressed in hectares; total area in acres; the percent of the total study area mapped as the given map unit; and the map unit's average polygon size in acres. The second table is identical to the first, except the map units are presented in alphabetical order. The third table lists the map units in order by total area from highest to lowest.

Table C-1: Map Unit Acreage, Listed Numerically

Veg Code	Map Unit Description	# of Polygons	Total Area (hectares)	Total Area (acres)	% of Total Area	Average Polygon Size (ac.)
1110	Umbellularia californica Alliance	625	2,401.3	5,933.7	0.3%	9.5
1111	Quercus wislizeni - Quercus parvula (tree) Alliance	19831	163,641.4	404,366.8	22.2%	20.4
1210	Pinus sabiniana Alliance	494	1,578.4	3,900.2	0.2%	7.9
1212	Juniperus californica Alliance	590	2,950.9	7,291.9	0.4%	12.4
1214	Hesperocyparis forbesii - Hesperocyparis nevadensis Alliance	20	128.4	317.3	0.0%	15.9
1310	Aesculus californica Alliance	959	2,446.3	6,045.0	0.3%	6.3
1311	Quercus douglasii Alliance	26201	240,931.8	595,355.5	32.6%	22.7
1312	Quercus kelloggii Alliance	885	6,843.3	16,910.2	0.9%	19.1
1313	Quercus lobata Alliance	65	524.5	1,296.2	0.1%	19.9
1410	Quercus chrysolepis Alliance	2430	17,468.5	43,165.6	2.4%	17.8
2200	Californian montane conifer forest Group (includes managed conifer stands)	3	57.2	141.3	0.0%	47.1
2212	Pinus ponderosa - Calocedrus decurrens - Pseudotsuga menziesii Alliance	43	170.9	422.4	0.0%	9.8
2214	Abies concolor Alliance	2	3.5	8.8	0.0%	4.4
2215	Pinus jeffreyi Alliance	59	1,926.9	4,761.6	0.3%	80.7
2216	Pseudotsuga macrocarpa Alliance	31	912.9	2,255.7	0.1%	72.8
2310	Pinus monophylla - (Juniperus osteosperma) Alliance	490	7,806.0	19,289.2	1.1%	39.4
3100	Southwestern North American riparian evergreen and deciduous woodland Group	1	0.8	2.1	0.0%	2.1
3110	Populus fremontii - Fraxinus velutina - Salix gooddingii Alliance	313	539.2	1,332.3	0.1%	4.3
3113	Juglans hindsii and Hybrids Semi-Natural Alliance	2	0.6	1.5	0.0%	0.8
3114	Salix gooddingii - Salix laevigata Alliance	641	1,291.9	3,192.3	0.2%	5.0
3210	Alnus rhombifolia Alliance	53	71.2	175.8	0.0%	3.3
3211	Fraxinus latifolia Alliance	349	800.8	1,978.9	0.1%	5.7
3310	Platanus racemosa - Quercus agrifolia Alliance	1735	5,716.7	14,126.4	0.8%	8.1
3314	Quercus lobata Riparian Alliance	1252	4,495.0	11,107.4	0.6%	8.9
4111	Adenostoma fasciculatum Alliance	516	2,499.9	6,177.4	0.3%	12.0
4112	Arctostaphylos viscida Alliance	484	1,241.8	3,068.7	0.2%	6.3
4113	Ceanothus cuneatus Alliance	1772	5,253.8	12,982.5	0.7%	7.3

Table C-1: Map Unit Acreage, Listed Numerically

Veg Code	Map Unit Description	# of Polygons	Total Area (hectares)	Total Area (acres)	% of Total Area	Average Polygon Size (ac.)
4118	Arctostaphylos glauca Alliance	76	337.6	834.1	0.0%	11.0
4210	Quercus berberidifolia Alliance	54	261.1	645.2	0.0%	11.9
4211	Cercocarpus montanus Alliance	1996	11,244.4	27,785.5	1.5%	13.9
4410	Quercus wislizeni (Short Stature) Mapping Unit	662	5,689.6	14,059.3	0.8%	21.2
4412	Arctostaphylos pungens - Arctostaphylos pringlei Alliance	142	432.3	1,068.2	0.1%	7.5
4413	Ceanothus leucodermis Alliance	57	106.8	264.0	0.0%	4.6
4501	Frangula californica ssp. tomentella Association	123	276.3	682.7	0.0%	5.6
4710	Ericameria linearifolia - Cleome isomeris Alliance	179	1,153.4	2,850.2	0.2%	15.9
4720	Lotus scoparius - Lupinus albifrons - Eriodictyon spp. Alliance	912	3,349.0	8,275.7	0.5%	9.1
4810	Eriogonum fasciculatum Alliance	1800	8,862.7	21,900.1	1.2%	12.2
4820	Eriogonum wrightii - Eriogonum heermannii - Buddleja utahensis Alliance	123	476.6	1,177.8	0.1%	9.6
5111	Atriplex canescens Alliance	5	14.8	36.6	0.0%	7.3
5211	Encelia (actonii, virginensis) - Viguiera reticulata Alliance	71	396.1	978.7	0.1%	13.8
5212	Ericameria nauseosa Alliance	190	787.4	1,945.8	0.1%	10.2
5311	Artemisia tridentata Alliance	433	1,327.4	3,280.1	0.2%	7.6
5415	Prunus fasciculata - Salazaria mexicana Alliance	1	0.3	0.8	0.0%	0.8
5417	Ephedra viridis Alliance	122	468.9	1,158.8	0.1%	9.5
5423	Yucca brevifolia Alliance	1	0.7	1.8	0.0%	1.8
5428	Eriogonum fasciculatum - Viguiera parishii Alliance	51	349.1	862.7	0.0%	16.9
5431	Achnatherum speciosum Alliance	4	12.6	31.2	0.0%	7.8
5610	Lepidospartum squamatum Alliance	43	147.8	365.3	0.0%	8.5
5620	Ephedra californica - Ephedra trifurca Alliance	16	51.1	126.3	0.0%	7.9
5710	Atriplex polycarpa Alliance	43	222.5	549.9	0.0%	12.8
6110	Ceanothus integerrimus Alliance	1	3.3	8.3	0.0%	8.3
6111	Quercus garryana (shrub) Alliance	363	1,388.1	3,430.1	0.2%	9.4
6210	Baccharis salicifolia Alliance	67	64.6	159.7	0.0%	2.4
6211	Salix exigua Alliance	62	65.2	161.0	0.0%	2.6
6212	Tamarix spp. Semi-Natural Alliance	2	1.8	4.5	0.0%	2.3

Table C-1: Map Unit Acreage, Listed Numerically

Veg Code	Map Unit Description	# of Polygons	Total Area (hectares)	Total Area (acres)	% of Total Area	Average Polygon Size (ac.)
6213	Rubus armeniacus - Sesbania punicea - Ficus carica Semi-Natural Alliance	4	3.2	7.9	0.0%	2.0
6214	Cephalanthus occidentalis Association	43	51.9	128.3	0.0%	3.0
6216	Calycanthus occidentalis Provisional Association	1	0.8	2.0	0.0%	2.0
6217	Salix lasiolepis Alliance	29	24.4	60.4	0.0%	2.1
6218	Rhus trilobata Sierran Association	9	9.4	23.2	0.0%	2.6
6219	Sambucus nigra Association	7	13.6	33.6	0.0%	4.8
6220	Vitis arizonica - Vitis girdiana Alliance	3	2.2	5.4	0.0%	1.8
6221	Heterotheca (oregona, sessiliflora) Alliance	1	0.7	1.8	0.0%	1.8
6231	Rhus trilobata Association	3	2.7	6.6	0.0%	2.2
6301	Toxicodendron diversilobum Alliance	235	415.9	1,027.8	0.1%	4.4
6401	Rosa californica Alliance	8	11.0	27.3	0.0%	3.4
6420	Ribes quercetorum Association	120	136.3	336.7	0.0%	2.8
6510	Quercus john-tuckeri Alliance	568	5,562.2	13,744.4	0.8%	24.2
6520	Ceanothus greggii - Fremontodendron californicum Alliance	99	705.0	1,742.2	0.1%	17.6
7100	California Annual and Perennial Grassland Macrogroup	13802	182,589.4	451,188.3	24.7%	32.7
7101	Mediterranean California naturalized annual and perennial grassland Group	1	19.1	47.3	0.0%	47.3
7102	Vancouverian and Rocky Mountain naturalized perennial grassland Group (irrigated pasture)	48	291.6	720.5	0.0%	15.0
7110	California annual herb/grass Group	19	1,175.3	2,904.3	0.2%	152.9
7112	Artemisia dracunculus Alliance	3	4.5	11.1	0.0%	3.7
7114	Holocarpha (heermannii, virgata) Alliance	10	98.4	243.3	0.0%	24.3
7115	Vulpia microstachys - Selaginella hansenii Association	261	262.5	648.7	0.0%	2.5
7116	Lotus unifoliolatus Alliance	1	0.5	1.3	0.0%	1.3
7121	Corethrogyne filaginifolia - Eriogonum (elongatum, nudum) Alliance	3	8.5	21.0	0.0%	7.0
7122	Leymus condensatus Alliance	13	8.6	21.2	0.0%	1.6
7181	Bromus tectorum - Taeniatherum caput-medusae Semi-Natural Alliance	1	5.7	14.1	0.0%	14.1
7191	Avena spp. - Bromus spp. Semi-Natural Alliance	6	11.7	28.8	0.0%	4.8
7200	Californian warm temperate marsh/seep Group	34	111.5	275.5	0.0%	8.1

Table C-1: Map Unit Acreage, Listed Numerically

Veg Code	Map Unit Description	# of Polygons	Total Area (hectares)	Total Area (acres)	% of Total Area	Average Polygon Size (ac.)
7216	Juncus arcticus (var. balticus, mexicanus) Alliance	61	94.1	232.4	0.0%	3.8
7300	Arid West freshwater emergent marsh Group	1	0.2	0.6	0.0%	0.6
7310	Typha (angustifolia, domingensis, latifolia) Alliance	17	13.3	32.9	0.0%	1.9
7320	Schoenoplectus (acutus, californicus) Alliance	4	2.3	5.6	0.0%	1.4
7400	Vernal Pool & Californian Annual and Perennial Grassland Matrix Mapping Unit	62	5,424.4	13,404.0	0.7%	216.2
7500	Naturalized warm-temperate riparian and wetland Group	1	0.4	1.0	0.0%	1.0
7600	Californian mixed annual/perennial freshwater vernal pool/swale bottomland Group	39	60.3	149.0	0.0%	3.8
7800	Vancouverian coastal/tidal marsh and meadow Group	1	1.7	4.3	0.0%	4.3
7820	Juncus effusus Association	2	1.5	3.8	0.0%	1.9
8110	Distichlis spicata Alliance	3	7.3	18.0	0.0%	6.0
8200	Southwestern North American alkali marsh/seep vegetation Group	1	3.1	7.7	0.0%	7.7
8210	Anemopsis californica - Helianthus nuttallii - Solidago spectabilis Alliance	1	0.1	0.3	0.0%	0.3
8211	Leymus cinereus - Leymus triticoides Alliance	2	5.0	12.4	0.0%	6.2
8212	Schoenoplectus americanus Alliance	1	2.4	5.9	0.0%	5.9
9200	Agriculture Mapping Unit	215	2,889.4	7,140.0	0.4%	33.2
9300	Built-Up & Urban Disturbance Mapping Unit	8679	17,848.1	44,103.7	2.4%	5.1
9400	Areas of Little or No Vegetation Mapping Unit	3	7.9	19.6	0.0%	6.5
9401	Cliffs/Rock Outcrop Mapping Unit	214	353.6	873.8	0.0%	4.1
9402	River and Lacustrine Flats & Streambeds Mapping Unit	97	98.2	242.8	0.0%	2.5
9403	Undefined Areas with Little or No Vegetation Mapping Unit	38	104.3	257.7	0.0%	6.8
9404	Sparsely Vegetated Recently Burned Areas Mapping Unit	57	785.2	1,940.2	0.1%	34.0
9500	Exotic Trees and Planted Trees Mapping Unit	18	51.6	127.5	0.0%	7.1
9501	Eucalyptus spp. - Ailanthus altissima - Robinia pseudoacacia Semi-Natural Alliance	24	30.8	76.0	0.0%	3.2
9600	Standing Dead Trees High Cover Mapping Unit	26	64.3	158.8	0.0%	6.1
9800	Water Mapping Unit	15	17.6	43.6	0.0%	2.9

Table C-1: Map Unit Acreage, Listed Numerically

Veg Code	Map Unit Description	# of Polygons	Total Area (hectares)	Total Area (acres)	% of Total Area	Average Polygon Size (ac.)
9801	Perennial Stream Channel Mapping Unit	44	460.3	1,137.5	0.1%	25.9
9802	Reservoirs Mapping Unit	9	8,616.6	21,292.2	1.2%	2,365.8
9803	Small Earthen Dam Ponds & Natural Lakes Mapping Unit	772	769.2	1,900.8	0.1%	2.5
9804	Major Canals & Aqueducts Mapping Unit	10	90.2	222.9	0.0%	22.3
	Totals	93,194	738,526.5	1,824,938.8	100.0%	19.6

Table C-2: Map Unit Acreage, Listed Alphabetically

Veg Code	Map Unit Description	# of Polygons	Total Area (hectares)	Total Area (acres)	% of Total Area	Average Polygon Size (ac.)
2214	Abies concolor Alliance	2	3.5	8.8	0.0%	4.4
5431	Achnatherum speciosum Alliance	4	12.6	31.2	0.0%	7.8
4111	Adenostoma fasciculatum Alliance	516	2,499.9	6,177.4	0.3%	12.0
1310	Aesculus californica Alliance	959	2,446.3	6,045.0	0.3%	6.3
9200	Agriculture Mapping Unit	215	2,889.4	7,140.0	0.4%	33.2
3210	Alnus rhombifolia Alliance	53	71.2	175.8	0.0%	3.3
8210	Anemopsis californica - Helianthus nuttallii - Solidago spectabilis Alliance	1	0.1	0.3	0.0%	0.3
4118	Arctostaphylos glauca Alliance	76	337.6	834.1	0.0%	11.0
4412	Arctostaphylos pungens - Arctostaphylos pringlei Alliance	142	432.3	1,068.2	0.1%	7.5
4112	Arctostaphylos viscida Alliance	484	1,241.8	3,068.7	0.2%	6.3
9400	Areas of Little or No Vegetation Mapping Unit	3	7.9	19.6	0.0%	6.5
7300	Arid West freshwater emergent marsh Group	1	0.2	0.6	0.0%	0.6
7112	Artemisia dracunculus Alliance	3	4.5	11.1	0.0%	3.7
5311	Artemisia tridentata Alliance	433	1,327.4	3,280.1	0.2%	7.6
5111	Atriplex canescens Alliance	5	14.8	36.6	0.0%	7.3
5710	Atriplex polycarpa Alliance	43	222.5	549.9	0.0%	12.8
7191	Avena spp. - Bromus spp. Semi-Natural Alliance	6	11.7	28.8	0.0%	4.8
6210	Baccharis salicifolia Alliance	67	64.6	159.7	0.0%	2.4
7181	Bromus tectorum - Taeniatherum caput-medusae Semi-Natural Alliance	1	5.7	14.1	0.0%	14.1
9300	Built-Up & Urban Disturbance Mapping Unit	8679	17,848.1	44,103.7	2.4%	5.1
7100	California Annual and Perennial Grassland Macrogroup	13802	182,589.4	451,188.3	24.7%	32.7
7110	California annual herb/grass Group	19	1,175.3	2,904.3	0.2%	152.9
7600	Californian mixed annual/perennial freshwater vernal pool/swale bottomland Group	39	60.3	149.0	0.0%	3.8
2200	Californian montane conifer forest Group (includes managed conifer stands)	3	57.2	141.3	0.0%	47.1
7200	Californian warm temperate marsh/seep Group	34	111.5	275.5	0.0%	8.1

Table C-2: Map Unit Acreage, Listed Alphabetically

Veg Code	Map Unit Description	# of Polygons	Total Area (hectares)	Total Area (acres)	% of Total Area	Average Polygon Size (ac.)
6216	Calycanthus occidentalis Provisional Association	1	0.8	2.0	0.0%	2.0
4113	Ceanothus cuneatus Alliance	1772	5,253.8	12,982.5	0.7%	7.3
6520	Ceanothus greggii - Fremontodendron californicum Alliance	99	705.0	1,742.2	0.1%	17.6
6110	Ceanothus integerrimus Alliance	1	3.3	8.3	0.0%	8.3
4413	Ceanothus leucodermis Alliance	57	106.8	264.0	0.0%	4.6
6214	Cephalanthus occidentalis Association	43	51.9	128.3	0.0%	3.0
4211	Cercocarpus montanus Alliance	1996	11,244.4	27,785.5	1.5%	13.9
9401	Cliffs/Rock Outcrop Mapping Unit	214	353.6	873.8	0.0%	4.1
7121	Corethrogyne filaginifolia - Eriogonum (elongatum, nudum) Alliance	3	8.5	21.0	0.0%	7.0
8110	Distichlis spicata Alliance	3	7.3	18.0	0.0%	6.0
5211	Encelia (actonii, virginensis) - Viguiera reticulata Alliance	71	396.1	978.7	0.1%	13.8
5417	Ephedra viridis Alliance	122	468.9	1,158.8	0.1%	9.5
5620	Ephedra californica - Ephedra trifurca Alliance	16	51.1	126.3	0.0%	7.9
4710	Ericameria linearifolia - Cleome isomeris Alliance	179	1,153.4	2,850.2	0.2%	15.9
5212	Ericameria nauseosa Alliance	190	787.4	1,945.8	0.1%	10.2
5428	Eriogonum fasciculatum - Viguiera parishii Alliance	51	349.1	862.7	0.0%	16.9
4810	Eriogonum fasciculatum Alliance	1800	8,862.7	21,900.1	1.2%	12.2
4820	Eriogonum wrightii - Eriogonum heermannii - Buddleja utahensis Alliance	123	476.6	1,177.8	0.1%	9.6
9501	Eucalyptus spp. - Ailanthus altissima - Robinia pseudoacacia Semi-Natural Alliance	24	30.8	76.0	0.0%	3.2
9500	Exotic Trees and Planted Trees Mapping Unit	18	51.6	127.5	0.0%	7.1
4501	Frangula californica ssp. tomentella Association	123	276.3	682.7	0.0%	5.6
3211	Fraxinus latifolia Alliance	349	800.8	1,978.9	0.1%	5.7
1214	Hesperocyparis forbesii - Hesperocyparis nevadensis Alliance	20	128.4	317.3	0.0%	15.9
6221	Heterotheca (oregona, sessiliflora) Alliance	1	0.7	1.8	0.0%	1.8
7114	Holocarpha (heermannii, virgata) Alliance	10	98.4	243.3	0.0%	24.3
3113	Juglans hindsii and Hybrids Semi-Natural Alliance	2	0.6	1.5	0.0%	0.8

Table C-2: Map Unit Acreage, Listed Alphabetically

Veg Code	Map Unit Description	# of Polygons	Total Area (hectares)	Total Area (acres)	% of Total Area	Average Polygon Size (ac.)
7216	Juncus arcticus (var. balticus, mexicanus) Alliance	61	94.1	232.4	0.0%	3.8
7820	Juncus effusus Association	2	1.5	3.8	0.0%	1.9
1212	Juniperus californica Alliance	590	2,950.9	7,291.9	0.4%	12.4
5610	Lepidospartum squamatum Alliance	43	147.8	365.3	0.0%	8.5
8211	Leymus cinereus - Leymus triticoides Alliance	2	5.0	12.4	0.0%	6.2
7122	Leymus condensatus Alliance	13	8.6	21.2	0.0%	1.6
4720	Lotus scoparius - Lupinus albifrons - Eriodictyon spp. Alliance	912	3,349.0	8,275.7	0.5%	9.1
7116	Lotus unifoliolatus Alliance	1	0.5	1.3	0.0%	1.3
9804	Major Canals & Aqueducts Mapping Unit	10	90.2	222.9	0.0%	22.3
7101	Mediterranean California naturalized annual and perennial grassland Group	1	19.1	47.3	0.0%	47.3
7500	Naturalized warm-temperate riparian and wetland Group	1	0.4	1.0	0.0%	1.0
9801	Perennial Stream Channel Mapping Unit	44	460.3	1,137.5	0.1%	25.9
2215	Pinus jeffreyi Alliance	59	1,926.9	4,761.6	0.3%	80.7
2310	Pinus monophylla - (Juniperus osteosperma) Alliance	490	7,806.0	19,289.2	1.1%	39.4
2212	Pinus ponderosa - Calocedrus decurrens - Pseudotsuga menziesii Alliance	43	170.9	422.4	0.0%	9.8
1210	Pinus sabiniana Alliance	494	1,578.4	3,900.2	0.2%	7.9
3310	Platanus racemosa - Quercus agrifolia Alliance	1735	5,716.7	14,126.4	0.8%	8.1
3110	Populus fremontii - Fraxinus velutina - Salix gooddingii Alliance	313	539.2	1,332.3	0.1%	4.3
5415	Prunus fasciculata - Salazaria mexicana Alliance	1	0.3	0.8	0.0%	0.8
2216	Pseudotsuga macrocarpa Alliance	31	912.9	2,255.7	0.1%	72.8
4210	Quercus berberidifolia Alliance	54	261.1	645.2	0.0%	11.9
1410	Quercus chrysolepis Alliance	2430	17,468.5	43,165.6	2.4%	17.8
1311	Quercus douglasii Alliance	26201	240,931.8	595,355.5	32.6%	22.7
6111	Quercus garryana (shrub) Alliance	363	1,388.1	3,430.1	0.2%	9.4
6510	Quercus john-tuckeri Alliance	568	5,562.2	13,744.4	0.8%	24.2
1312	Quercus kelloggii Alliance	885	6,843.3	16,910.2	0.9%	19.1

Table C-2: Map Unit Acreage, Listed Alphabetically

Veg Code	Map Unit Description	# of Polygons	Total Area (hectares)	Total Area (acres)	% of Total Area	Average Polygon Size (ac.)
3314	Quercus lobata Riparian Alliance	1252	4,495.0	11,107.4	0.6%	8.9
1313	Quercus lobata Alliance	65	524.5	1,296.2	0.1%	19.9
1111	Quercus wislizeni - Quercus parvula (tree) Alliance	19831	163,641.4	404,366.8	22.2%	20.4
4410	Quercus wislizeni (Short Stature) Mapping Unit	662	5,689.6	14,059.3	0.8%	21.2
9802	Reservoirs Mapping Unit	9	8,616.6	21,292.2	1.2%	2,365.8
6231	Rhus trilobata Association	3	2.7	6.6	0.0%	2.2
6218	Rhus trilobata Sierran Association	9	9.4	23.2	0.0%	2.6
6420	Ribes quercetorum Association	120	136.3	336.7	0.0%	2.8
9402	River and Lacustrine Flats & Streambeds Mapping Unit	97	98.2	242.8	0.0%	2.5
6401	Rosa californica Alliance	8	11.0	27.3	0.0%	3.4
6213	Rubus armeniacus - Sesbania punicea - Ficus carica Semi-Natural Alliance	4	3.2	7.9	0.0%	2.0
6211	Salix exigua Alliance	62	65.2	161.0	0.0%	2.6
3114	Salix gooddingii - Salix laevigata Alliance	641	1,291.9	3,192.3	0.2%	5.0
6217	Salix lasiolepis Alliance	29	24.4	60.4	0.0%	2.1
6219	Sambucus nigra Association	7	13.6	33.6	0.0%	4.8
7320	Schoenoplectus (acutus, californicus) Alliance	4	2.3	5.6	0.0%	1.4
8212	Schoenoplectus americanus Alliance	1	2.4	5.9	0.0%	5.9
9803	Small Earthen Dam Ponds & Natural Lakes Mapping Unit	772	769.2	1,900.8	0.1%	2.5
8200	Southwestern North American alkali marsh/seep vegetation Group	1	3.1	7.7	0.0%	7.7
3100	Southwestern North American riparian evergreen and deciduous woodland Group	1	0.8	2.1	0.0%	2.1
9404	Sparsely Vegetated Recently Burned Areas Mapping Unit	57	785.2	1,940.2	0.1%	34.0
9600	Standing Dead Trees High Cover Mapping Unit	26	64.3	158.8	0.0%	6.1
6212	Tamarix spp. Semi-Natural Alliance	2	1.8	4.5	0.0%	2.3
6301	Toxicodendron diversilobum Alliance	235	415.9	1,027.8	0.1%	4.4
7310	Typha (angustifolia, domingensis, latifolia) Alliance	17	13.3	32.9	0.0%	1.9
1110	Umbellularia californica Alliance	625	2,401.3	5,933.7	0.3%	9.5

Table C-2: Map Unit Acreage, Listed Alphabetically

Veg Code	Map Unit Description	# of Polygons	Total Area (hectares)	Total Area (acres)	% of Total Area	Average Polygon Size (ac.)
9403	Undefined Areas with Little or No Vegetation Mapping Unit	38	104.3	257.7	0.0%	6.8
7102	Vancouverian and Rocky Mountain naturalized perennial grassland Group (irrigated pasture)	48	291.6	720.5	0.0%	15.0
7800	Vancouverian coastal/tidal marsh and meadow Group	1	1.7	4.3	0.0%	4.3
7400	Vernal Pool & Californian Annual and Perennial Grassland Matrix Mapping Unit	62	5,424.4	13,404.0	0.7%	216.2
6220	Vitis arizonica - Vitis girdiana Alliance	3	2.2	5.4	0.0%	1.8
7115	Vulpia microstachys - Selaginella hansenii Association	261	262.5	648.7	0.0%	2.5
9800	Water Mapping Unit	15	17.6	43.6	0.0%	2.9
5423	Yucca brevifolia Alliance	1	0.7	1.8	0.0%	1.8
	Totals	93,194	738,526.5	1,824,938.8	100.0%	19.6

Table C-3: Map Units By Total Area

Veg Code	Map Unit Description	# of Polygons	Total Area (hectares)	Total Area (acres)	% of Total Area	Average Polygon Size (ac.)
1311	Quercus douglasii Alliance	26201	240,931.8	595,355.5	32.6%	22.7
7100	California Annual and Perennial Grassland Macrogroup	13802	182,589.4	451,188.3	24.7%	32.7
1111	Quercus wislizeni - Quercus parvula (tree) Alliance	19831	163,641.4	404,366.8	22.2%	20.4
9300	Built-Up & Urban Disturbance Mapping Unit	8679	17,848.1	44,103.7	2.4%	5.1
1410	Quercus chrysolepis Alliance	2430	17,468.5	43,165.6	2.4%	17.8
4211	Cercocarpus montanus Alliance	1996	11,244.4	27,785.5	1.5%	13.9
4810	Eriogonum fasciculatum Alliance	1800	8,862.7	21,900.1	1.2%	12.2
9802	Reservoirs Mapping Unit	9	8,616.6	21,292.2	1.2%	2,365.8
2310	Pinus monophylla - (Juniperus osteosperma) Alliance	490	7,806.0	19,289.2	1.1%	39.4
1312	Quercus kelloggii Alliance	885	6,843.3	16,910.2	0.9%	19.1
3310	Platanus racemosa - Quercus agrifolia Alliance	1735	5,716.7	14,126.4	0.8%	8.1
4410	Quercus wislizeni (Short Stature) Mapping Unit	662	5,689.6	14,059.3	0.8%	21.2
6510	Quercus john-tuckeri Alliance	568	5,562.2	13,744.4	0.8%	24.2
7400	Vernal Pool & Californian Annual and Perennial Grassland Matrix Mapping Unit	62	5,424.4	13,404.0	0.7%	216.2
4113	Ceanothus cuneatus Alliance	1772	5,253.8	12,982.5	0.7%	7.3
3314	Quercus lobata Riparian Alliance	1252	4,495.0	11,107.4	0.6%	8.9
4720	Lotus scoparius - Lupinus albifrons - Eriodictyon spp. Alliance	912	3,349.0	8,275.7	0.5%	9.1
1212	Juniperus californica Alliance	590	2,950.9	7,291.9	0.4%	12.4
9200	Agriculture Mapping Unit	215	2,889.4	7,140.0	0.4%	33.2
4111	Adenostoma fasciculatum Alliance	516	2,499.9	6,177.4	0.3%	12.0
1310	Aesculus californica Alliance	959	2,446.3	6,045.0	0.3%	6.3
1110	Umbellularia californica Alliance	625	2,401.3	5,933.7	0.3%	9.5
2215	Pinus jeffreyi Alliance	59	1,926.9	4,761.6	0.3%	80.7
1210	Pinus sabiniana Alliance	494	1,578.4	3,900.2	0.2%	7.9
6111	Quercus garryana (shrub) Alliance	363	1,388.1	3,430.1	0.2%	9.4
5311	Artemisia tridentata Alliance	433	1,327.4	3,280.1	0.2%	7.6

Table C-3: Map Units By Total Area

Veg Code	Map Unit Description	# of Polygons	Total Area (hectares)	Total Area (acres)	% of Total Area	Average Polygon Size (ac.)
3114	Salix gooddingii - Salix laevigata Alliance	641	1,291.9	3,192.3	0.2%	5.0
4112	Arctostaphylos viscida Alliance	484	1,241.8	3,068.7	0.2%	6.3
7110	California annual herb/grass Group	19	1,175.3	2,904.3	0.2%	152.9
4710	Ericameria linearifolia - Cleome isomeris Alliance	179	1,153.4	2,850.2	0.2%	15.9
2216	Pseudotsuga macrocarpa Alliance	31	912.9	2,255.7	0.1%	72.8
3211	Fraxinus latifolia Alliance	349	800.8	1,978.9	0.1%	5.7
5212	Ericameria nauseosa Alliance	190	787.4	1,945.8	0.1%	10.2
9404	Sparsely Vegetated Recently Burned Areas Mapping Unit	57	785.2	1,940.2	0.1%	34.0
9803	Small Earthen Dam Ponds & Natural Lakes Mapping Unit	772	769.2	1,900.8	0.1%	2.5
6520	Ceanothus greggii - Fremontodendron californicum Alliance	99	705.0	1,742.2	0.1%	17.6
3110	Populus fremontii - Fraxinus velutina - Salix gooddingii Alliance	313	539.2	1,332.3	0.1%	4.3
1313	Quercus lobata Alliance	65	524.5	1,296.2	0.1%	19.9
4820	Eriogonum wrightii - Eriogonum heermannii - Buddleja utahensis Alliance	123	476.6	1,177.8	0.1%	9.6
5417	Ephedra viridis Alliance	122	468.9	1,158.8	0.1%	9.5
9801	Perennial Stream Channel Mapping Unit	44	460.3	1,137.5	0.1%	25.9
4412	Arctostaphylos pungens - Arctostaphylos pringlei Alliance	142	432.3	1,068.2	0.1%	7.5
6301	Toxicodendron diversilobum Alliance	235	415.9	1,027.8	0.1%	4.4
5211	Encelia (actonii, virginensis) - Viguiera reticulata Alliance	71	396.1	978.7	0.1%	13.8
9401	Cliffs/Rock Outcrop Mapping Unit	214	353.6	873.8	0.0%	4.1
5428	Eriogonum fasciculatum - Viguiera parishii Alliance	51	349.1	862.7	0.0%	16.9
4118	Arctostaphylos glauca Alliance	76	337.6	834.1	0.0%	11.0
7102	Vancouverian and Rocky Mountain naturalized perennial grassland Group (irrigated pasture)	48	291.6	720.5	0.0%	15.0
4501	Frangula californica ssp. tomentella Association	123	276.3	682.7	0.0%	5.6
7115	Vulpia microstachys - Selaginella hansenii Association	261	262.5	648.7	0.0%	2.5
4210	Quercus berberidifolia Alliance	54	261.1	645.2	0.0%	11.9
5710	Atriplex polycarpa Alliance	43	222.5	549.9	0.0%	12.8

Table C-3: Map Units By Total Area

Veg Code	Map Unit Description	# of Polygons	Total Area (hectares)	Total Area (acres)	% of Total Area	Average Polygon Size (ac.)
2212	Pinus ponderosa - Calocedrus decurrens - Pseudotsuga menziesii Alliance	43	170.9	422.4	0.0%	9.8
5610	Lepidospartum squamatum Alliance	43	147.8	365.3	0.0%	8.5
6420	Ribes quercetorum Association	120	136.3	336.7	0.0%	2.8
1214	Hesperocyparis forbesii - Hesperocyparis nevadensis Alliance	20	128.4	317.3	0.0%	15.9
7200	Californian warm temperate marsh/seep Group	34	111.5	275.5	0.0%	8.1
4413	Ceanothus leucodermis Alliance	57	106.8	264.0	0.0%	4.6
9403	Undefined Areas with Little or No Vegetation Mapping Unit	38	104.3	257.7	0.0%	6.8
7114	Holocarpha (heermannii, virgata) Alliance	10	98.4	243.3	0.0%	24.3
9402	River and Lacustrine Flats & Streambeds Mapping Unit	97	98.2	242.8	0.0%	2.5
7216	Juncus arcticus (var. balticus, mexicanus) Alliance	61	94.1	232.4	0.0%	3.8
9804	Major Canals & Aqueducts Mapping Unit	10	90.2	222.9	0.0%	22.3
3210	Alnus rhombifolia Alliance	53	71.2	175.8	0.0%	3.3
6211	Salix exigua Alliance	62	65.2	161.0	0.0%	2.6
6210	Baccharis salicifolia Alliance	67	64.6	159.7	0.0%	2.4
9600	Standing Dead Trees High Cover Mapping Unit	26	64.3	158.8	0.0%	6.1
7600	Californian mixed annual/perennial freshwater vernal pool/swale bottomland Group	39	60.3	149.0	0.0%	3.8
2200	Californian montane conifer forest Group (includes managed conifer stands)	3	57.2	141.3	0.0%	47.1
6214	Cephalanthus occidentalis Association	43	51.9	128.3	0.0%	3.0
9500	Exotic Trees and Planted Trees Mapping Unit	18	51.6	127.5	0.0%	7.1
5620	Ephedra californica - Ephedra trifurca Alliance	16	51.1	126.3	0.0%	7.9
9501	Eucalyptus spp. - Ailanthus altissima - Robinia pseudoacacia Semi-Natural Alliance	24	30.8	76.0	0.0%	3.2
6217	Salix lasiolepis Alliance	29	24.4	60.4	0.0%	2.1
7101	Mediterranean California naturalized annual and perennial grassland Group	1	19.1	47.3	0.0%	47.3

Table C-3: Map Units By Total Area

Veg Code	Map Unit Description	# of Polygons	Total Area (hectares)	Total Area (acres)	% of Total Area	Average Polygon Size (ac.)
9800	Water Mapping Unit	15	17.6	43.6	0.0%	2.9
5111	Atriplex canescens Alliance	5	14.8	36.6	0.0%	7.3
6219	Sambucus nigra Association	7	13.6	33.6	0.0%	4.8
7310	Typha (angustifolia, domingensis, latifolia) Alliance	17	13.3	32.9	0.0%	1.9
5431	Achnatherum speciosum Alliance	4	12.6	31.2	0.0%	7.8
7191	Avena spp. - Bromus spp. Semi-Natural Alliance	6	11.7	28.8	0.0%	4.8
6401	Rosa californica Alliance	8	11.0	27.3	0.0%	3.4
6218	Rhus trilobata Sierran Association	9	9.4	23.2	0.0%	2.6
7122	Leymus condensatus Alliance	13	8.6	21.2	0.0%	1.6
7121	Corethrogyne filaginifolia - Eriogonum (elongatum, nudum) Alliance	3	8.5	21.0	0.0%	7.0
9400	Areas of Little or No Vegetation Mapping Unit	3	7.9	19.6	0.0%	6.5
8110	Distichlis spicata Alliance	3	7.3	18.0	0.0%	6.0
7181	Bromus tectorum - Taeniatherum caput-medusae Semi-Natural Alliance	1	5.7	14.1	0.0%	14.1
8211	Leymus cinereus - Leymus triticoides Alliance	2	5.0	12.4	0.0%	6.2
7112	Artemisia dracunculus Alliance	3	4.5	11.1	0.0%	3.7
2214	Abies concolor Alliance	2	3.5	8.8	0.0%	4.4
6110	Ceanothus integerrimus Alliance	1	3.3	8.3	0.0%	8.3
6213	Rubus armeniacus - Sesbania punicea - Ficus carica Semi-Natural Alliance	4	3.2	7.9	0.0%	2.0
8200	Southwestern North American alkali marsh/seep vegetation Group	1	3.1	7.7	0.0%	7.7
6231	Rhus trilobata Association	3	2.7	6.6	0.0%	2.2
8212	Schoenoplectus americanus Alliance	1	2.4	5.9	0.0%	5.9
7320	Schoenoplectus (acutus, californicus) Alliance	4	2.3	5.6	0.0%	1.4
6220	Vitis arizonica - Vitis girdiana Alliance	3	2.2	5.4	0.0%	1.8
6212	Tamarix spp. Semi-Natural Alliance	2	1.8	4.5	0.0%	2.3
7800	Vancouverian coastal/tidal marsh and meadow Group	1	1.7	4.3	0.0%	4.3
7820	Juncus effusus Association	2	1.5	3.8	0.0%	1.9

Table C-3: Map Units By Total Area

Veg Code	Map Unit Description	# of Polygons	Total Area (hectares)	Total Area (acres)	% of Total Area	Average Polygon Size (ac.)
3100	Southwestern North American riparian evergreen and deciduous woodland Group	1	0.8	2.1	0.0%	2.1
6216	Calycanthus occidentalis Provisional Association	1	0.8	2.0	0.0%	2.0
6221	Heterotheca (oregona, sessiliflora) Alliance	1	0.7	1.8	0.0%	1.8
5423	Yucca brevifolia Alliance	1	0.7	1.8	0.0%	1.8
3113	Juglans hindsii and Hybrids Semi-Natural Alliance	2	0.6	1.5	0.0%	0.8
7116	Lotus unifoliolatus Alliance	1	0.5	1.3	0.0%	1.3
7500	Naturalized warm-temperate riparian and wetland Group	1	0.4	1.0	0.0%	1.0
5415	Prunus fasciculata - Salazaria mexicana Alliance	1	0.3	0.8	0.0%	0.8
7300	Arid West freshwater emergent marsh Group	1	0.2	0.6	0.0%	0.6
8210	Anemopsis californica - Helianthus nuttallii - Solidago spectabilis Alliance	1	0.1	0.3	0.0%	0.3
	Totals	93,194	738,526.5	1,824,938.8	100.0%	19.6

RECON FIELD FORM (February 20, 2015)

1

Accuracy Assessment – SSNF 2020

(6/11/2020)

Surveyor: _____		Other Surveyors: _____		Date: _____	
Location Name: _____					
Waypoint ID:	GPS Name _____ Projected? Yes / No / Base				
	If Yes, enter: Bearing (°): _____ Distance (m): _____ Inclination (°): _____				
	If Yes, enter: Base Waypoint ID: _____				
	<u>Record either UTM's or Decimal Degrees</u>				
Polygon UID:	Base UTM's / Projected UTM's (circle one) _____ GPS error: ft / m / PDOP _____				
	UTME _____ UTMN _____				
	Decimal degrees: LAT _____ LONG _____				
Camera name: _____		Photo #s: _____			
Strata	Species	% cover	C	Strata	Species
Notes:					
Map Unit Name: _____			Secondary: _____		
Confidence in map unit ID: L M H Explain: _____					
Describe above:	Linework problems: NO / YES	More than 1 vegetation type in this polygon: NO / YES		Vegetation change since imagery taken: NO / YES	
Conifer Cover: _____ Hardwood Cover: _____ Total Tree Cover: _____ Shrub Cover: _____					
Herb Cover Class 0-<2% 2-<10% 10-40% >40%					
Tree Height <0.5m 0.5-1m 1-2m 2-5m 5-10m 10-15m 15-20m 20-35m 35-50m >50 m NA					
Tree DBH <1" 1-6" >6-11" >11-24" >24" Multilayered, high density					
Exotics (relative cover) Little to none visible (<5%) <33% 33-66% >66%					
Conifer Dieback (not fire-related) No dead wood Dead wood present					
Rough % of polygon viewed from point _____					
Is this a "multiple" point assessment? NO YES if yes: _____ of _____ points for this polygon					

Accuracy Assessment – SSNF 2020

(4/7/2020)

Surveyor: <u>ALJ</u>		Other Surveyors: <u>—</u>		Date: <u>10/28/2021</u>	
Location Name: <u>Mod 3-Avenue 404 & Millwood Dr</u>					
Waypoint ID: <u>SNF3412665</u>		GPS Name <u>Stipa</u> Projected? Yes/No/ Base			
If Yes, enter: Bearing (°): _____ Distance (m): _____ Inclination (°): _____		If Yes, enter: Base Waypoint ID: _____			
Polygon UID: <u>SNF3412665</u>		Record either UTM's or Decimal Degrees			
Base UTM's / Projected UTM's (circle one)		GPS error: <u>(ft)</u> m / PDOP <u>16.4</u>			
UTME _____ UTMN _____		Decimal degrees: LAT <u>36.521718</u> LONG <u>119.131538</u>			
Camera name: <u>Stipa</u> Photo #s: <u>153, 155, 156, 157</u> <u>(N)</u>					
Strata	Species	% cover	C	Strata	Species
T	<u>Platanus racemosa</u>	<u>8</u>			
T/A/E	<u>Salix laevigata</u>	<u>7/t/t</u>			
T	<u>Quercus wislizeni</u>	<u>+</u>			
S	<u>Baccharis salicifolia</u>	<u>1</u>			
T/A	<u>Populus fremontii</u>	<u>4/t</u>			
Notes: Large PLRA and <u>Salix laevigata</u> near northern end of polygon, consistent until very SE portion of polygon that transitions into more upland QUM. All trees spread sporadically across, not in large clusters. BASA in the wash bottom.					
Map Unit Name: <u>Platanus racemosa-Quercus agrifolia Riparian</u>				Secondary:	
Confidence in map unit ID: L M <u>(H)</u> Explain:					
Describe above:		Linework problems <input type="checkbox"/>	More than 1 vegetation type in this polygon <input type="checkbox"/>	Vegetation change since imagery taken <input type="checkbox"/>	
Conifer Cover: <u>0</u>		Hardwood Cover: <u>18</u>	Total Tree Cover: <u>18</u>	Shrub Cover: <u>1</u>	
Herb Cover Class		0-2%	<u>2-10%</u>	10-40%	>40%
Tree Height		<0.5m	0.5-1m	1-2m	2-5m
		5-10m	10-15m	<u>15-20m</u>	20-35m
		35-50m	>50 m	NA	
Tree DBH		<1"	1-6"	>6-11"	<u>>11-24"</u>
		>24"	Multilayered, high density		
Exotics (relative cover)		Little to none visible (<u><5%</u>)		<33%	33-66%
				>66%	
Conifer Dieback (not fire-related)		<u>No dead wood</u>		Dead wood present	
Rough % of polygon viewed from point <u>40</u>					

APPENDIX E: KEY TO THE VEGETATION OF SIERRA NEVADA FOOTHILLS

This is the vegetation key for Sierra Nevada Foothills Ecoregion (USDA). It is based on 3,661 vegetation samples; 1,847 surveys collected between 2003 and 2006 in the northern Sierra Nevada Foothills and 1,703 surveys collected between 2008 and 2016 in the southern Sierra Nevada Foothills. Data from other projects that intersected with the Sierra Nevada Foothills (the Foothills) were included adding 117 surveys.

This key follows the hierarchy from the *Manual of California Vegetation* (MCV) at the time of classification. This key is not dichotomous but instead may present more than two options for each key break. Users should read all options in each key break carefully and sequentially to arrive at the correct vegetation type. This vegetation key includes all expected vegetation types including those that are not accurately detectable in remotely sensed imagery.

Alliance and association names are frequently followed by a number, e.g. (n=5). An asterisk (*) following an alliance name indicates there were no samples classified to that type, but it is expected to occur in the region based on remotely sensed imagery, species distributions and/or personal communications. In some cases, the number of samples recorded for an alliance will equal the sum of the samples recorded for the associations below it. If this is not the case, then some samples could not be classified below the alliance level.

TERMS AND CONCEPTS USED THROUGHOUT THE KEY

Terms regarding vegetation types

Stand: The basic physical unit of plant communities in a landscape. It has no set size. Some vegetation stands are very small, such as certain wetland types, and some may be several square kilometers in size, such as certain forest types. A stand is defined by two main unifying characteristics:

1. It has compositional integrity. Throughout the stand, the combination of species is similar. The stand is differentiated from adjacent stands by a discernible boundary that may be abrupt or occur indistinctly along an ecological gradient.
2. It has structural integrity. It has a similar history or environmental setting that affords relatively similar horizontal and vertical spacing of plant species. For example, a hillside forest originally dominated by the same species that burned on the upper part of the slopes but not the lower would be divided into two stands. Likewise, a sparse woodland occupying a slope with very shallow rocky soils would be considered a different stand from an adjacent slope with deeper, moister soil and a denser woodland or forest of the same species.

The compositional and structural features of a stand are often combined into a term called homogeneity. For an area to meet the definition of a stand, it must be homogeneous at the scale being considered.

Hierarchical Units: The United States National Vegetation Classification (USNVC) is a central organizing framework for how all vegetation in the United States is inventoried and studied, from broad scale formations (biomes) to fine-scale plant communities. The purpose of the USNVC is to produce uniform statistics about vegetation resources across the nation, based on vegetation data gathered at local, regional, or national levels. The *Manual of California Vegetation* hierarchy follows the USNVC hierarchy.

The hierarchy units in the USNVC from highest to lowest (i.e., broadest to finest) are:

1. Formation Class
2. Formation Subclass
3. Formation
4. Division
5. Macrogroup
6. Group
7. Alliance
8. Association

Alliance: Plant communities based on dominant/diagnostic species of the uppermost or dominant stratum. Accepted alliances are part of the USNVC hierarchy. For the Modoc-Lassen Vegetation Map, map classes for trees and shrubs are typically at the alliance level of the USNVC hierarchy. Herbaceous stands are mapped at a higher level of the hierarchy.

Association: The most botanically detailed or finest-scale plant community designation based on dominant species and multiple co-dominant or sub-dominant indicator species from any stratum. Associations are also part of the USNVC hierarchy.

Plant community nomenclature: Species separated by "-" are within the same stratum; species separated by "/" are in different strata.

Forest: In the USNVC, a forest is defined as a tree-dominated stand of vegetation with 60% or greater absolute cover of trees. Most forest alliances tend to have average cover of trees >60%, but individual stands under certain conditions may drop lower than 60%.

Woodland: In the USNVC, a woodland is defined as a tree-dominated stand of vegetation with between 25% and 60% absolute cover of trees. Most woodland alliances tend to have average cover of trees with 25-60%, but individual stands under certain conditions may drop higher or lower than this range.

Terms regarding species abundance/cover/constancy

Cover: The primary metric used to quantify the importance/abundance of a particular species or a particular vegetation layer within a stand. It is measured by estimating the aerial extent of the living plants, or the bird's-eye view looking from above, for each category. Cover in this mapping project uses the concept of "porosity" or foliar cover rather than "opacity" or crown cover. Thus, field crews are trained to estimate the amount of light versus shade produced by the canopy of a plant or a stratum by taking into account the amount of shade it casts excluding the openings it may have in the interstitial spaces (e.g., between leaves or branches). This is assumed to provide a more realistic estimate of the actual amount of shade cast by the individual or stratum which, in turn, relates to the actual amount of light available to individual species or strata beneath it. However, as a result, cover

estimates can vary substantially between leaf-on versus leaf-off conditions. Stands dominated by deciduous species (e.g., *Aesculus californica*, *Toxicodendron diversilobum*) should be sampled during leaf-on since they will have substantially less cover when leaves are absent and may key to another type.

Absolute cover: The actual percentage of the surface area of the survey that is covered by a species or physiognomic group (trees, shrubs, herbaceous), as in "tan oak covers 10% of the area being surveyed." Absolute cover of all species or physiognomic groups, when added together, may total greater than 100%, because this is not a proportional number and plants can overlap with each other. For example, a stand could have 25% tree cover in the upper layer, 40% shrub cover in the middle layer, and 50% herbaceous cover when surveyed on the ground. However, when aerial interpretation is being used, the maximum absolute value is 100%, since lower levels of vegetation cannot be seen through the overstory on aerial photographs.

Relative cover: The percentage of surface area within a survey area that is covered either by one species relative to other species within the same physiognomic stratum (tree, shrub, herbaceous) or one stratum relative to the total vegetation cover in a polygon. Thus, 50% relative cover of *Quercus douglasii* in the tree layer means that *Q. douglasii* comprises half the cover of all tree species within a stand, while 50% relative shrub cover means that shrubs make up half the cover of all vegetation within a stand. Relative cover values are proportional numbers that, when added together, total 100% for all the species within a stratum or each stratum within a stand of vegetation.

Dense/Continuous cover:— Used to describe individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where there is greater than 66% absolute cover.

Intermittent cover: Used to describe individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where there is 33-66% absolute cover.

Open cover: Used to describe individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where the cover is less than 33% absolute cover.

Sparse cover: Used to describe individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where the average cover value is <2% absolute cover (though the range in cover could be <1-9% cover).

Emergent: A plant (or vegetation layer) is considered emergent if it has low cover and rises above a layer that has more cover in the stand. For example, individual *Pseudotsuga menziesii* trees may comprise an emergent tree layer of 2% cover over dense *Gaultheria shallon* and *Rubus parviflorus* in the shrub understory; the stand would be considered within the *Gaultheria shallon* – *Rubus (ursinus)* Shrubland Alliance because the total tree cover is <10% and the shrub cover is >10%. Medium to tall shrubs are not considered emergent over shorter shrubs, but short trees are considered emergent over tall shrubs.

Dominance: Dominance refers to the preponderance of vegetation cover in a stand of uniform composition and site history. It may refer to cover of an individual species as in "dominated by tan oak," or it may refer to dominance by a physiognomic group, as in "dominated by shrubs." When we use the term in the key, a species is dominant if it is in relatively high cover in each stand. See "dominance by layer," below, for further explanation.

Dominance by layer/stratum: Tree, shrub, and herbaceous layers are considered physiognomically distinct. Alliances are usually named by the dominant and/or characteristic species of the tallest characteristic layer (see tree-characterized, shrub-characterized, and herb-characterized vegetation definitions below). Average covers within the dominant layer reflect the "modal" concept of the health/age/environment of a particular vegetation type. For example, a higher average cover of woody plants within a stand not recently affected by disturbance reflects a mode of general availability of water, nutrition, and equitable climate, while lower average cover under similar conditions would reflect lower availability of these things.

Strongly dominant: A species in the dominant lifeform stratum has 60% or greater relative cover.

Sole dominant: No other species is co-dominant.

Co-dominant: Co-dominance refers to two or more species in a stand with similar cover. Specifically, each species has between 30% and 60% relative cover. For example, in a coastal scrub stand with 5% *Baccharis pilularis*, 4% *Frangula californica*, and 3% *Rubus ursinus* (total 13% shrub cover), technically only the *Baccharis* ($5/13 = 39\%$ relative cover) and the *Frangula* ($4/13 = 31\%$ relative cover) would be co-dominant because *Rubus* would only have 23% relative cover ($3/13 = 23\%$).

Sub-dominant: Significant cover in a stratum that is typically greater than 10% but less than 30% relative cover.

Characteristic/Diagnostic species: Should be present in at least 80% of the stands of the type, with no restriction on cover. Relatively even spacing throughout the stand is important, particularly in vegetation with low total cover, since an even distribution of the diagnostic species is a much better indicator than overall cover. Characteristic species that are evenly distributed are better indicators of a type than species with higher cover and patchy distribution.

Terms regarding floristics

Tree: A one-stemmed woody plant that normally grows to be greater than 5 meters tall. In some cases, trees may be multi-stemmed (ramified due to fire or other disturbance) but the height of mature plants typically exceeds 5 meters. If less than 5 meters tall, undisturbed individuals of these species are usually single-stemmed. Certain species that sometimes resemble shrubs but may be trees in other areas (e.g., *Aesculus californica*) are, out of statewide tradition or by the USNVC, called trees. It behooves one to memorize which species are "traditionally" placed in one life-form or another. We use the accepted lifeforms in the USNVC or the PLANTS Database (USDA NRCS 2015) to do this.

Shrub: A multi-stemmed woody plant that is usually 0.2-5 meters tall. Definitions are blurred at the low and high ends of the height scales. At the tall end, shrubs may approach tree-size based on disturbance frequencies (e.g., old-growth re-sprouting chaparral species such as *Cercocarpus montanus*, *Fremontodendron californicum*, *Prunus ilicifolia*, and so forth, may frequently attain "tree size", but are still typically multi-stemmed and are considered shrubs in this key). At the short end, woody perennial herbs or subshrubs of various species are often difficult to categorize into a consistent life-form (e.g., *Eriogonum latifolium*, *Lupinus chamissonis*); in such instances, we refer to the PLANTS Database or "pick a lane" based on best available definitions.

Subshrub: A multi-stemmed plant with noticeably woody stems less than 0.5 meter tall. May be easily confused with a perennial herb or small shrub. We lump them into the “shrub” category in stand tables and descriptions of vegetation types.

Herbaceous plant: Any species of plant that has no main woody stem development; includes grasses, forbs, and perennial species that die back each year.

KEY FOR DISTINGUISHING VEGETATION TYPES IN THE SIERRA NEVADA FOOTHILLS

Class A. Vegetation with an overstory of mesomorphic or xeromorphic trees. Tree canopy is generally greater than 10%, but occasionally may be less than 10% when overall vegetation cover is low (<20% total cover) and the trees are evenly distributed in the stand. = **Forest & Woodland Vegetation**

Class B. Vegetation characterized by woody mesomorphic and xeromorphic shrubs in the canopy. Tree species, if present, generally total less than 10% absolute cover. Occasionally tree cover may be >10% but shrub cover is >3 times the tree cover. Herbaceous species may total higher cover than shrubs. Shrubs are usually at least 10% cover = **Shrubland Vegetation**

Class C. Vegetation characterized by non-woody, herbaceous species in the canopy including grass, graminoid, and broad-leaved herbaceous species. Shrubs, if present, usually comprise <10% of the vegetation. Trees, if present, generally compose <5% cover: = **Herbaceous Vegetation**

Class A. Forest & Woodland Vegetation

Group I: Woodlands and forests characterized by needle or scale-leaved conifer trees, including the following genera: *Pinus*, *Abies*, *Calocedrus*, *Pseudotsuga*, *Juniperus*, and *Hesperocyparis*. Conifers generally are co-dominant to dominant in the overstory and may be associated with tree oaks or shrubs.

I.A The overstory is dominated by pine (*Pinus*) trees alone or co-dominant with broadleaf evergreen trees...

IA.1 *Pinus sabiniana* is the sole dominant tree in the overstory, mature trees of *P. sabiniana* generally >10% absolute cover. Shrub cover can range from sparse to intermittent, but shrub cover is not significantly higher (>3 times greater) than tree cover. If sparse foothill pine is over a denser shrub layer, key stand to the appropriate shrubland alliance...

***Pinus sabiniana* Alliance (n=46)**

IA1.a *Pinus sabiniana* occurs over a primarily herbaceous understory with a variety of non-native and native herbs. *Toxicodendron diversilobum* may be present in an open shrub layer...

Pinus sabiniana / herbaceous Association (n=12)

IA1.b *Pinus sabiniana* occurs over *Arctostaphylos viscida*. Other shrubs may also occur in the understory at lower cover than the manzanita. Found mostly on gabbro and other ultramafic substrates such as serpentinite...

Pinus sabiniana / *Arctostaphylos viscida* Association (n=6)

IA1.c *Pinus sabiniana* occurs over a diverse, open to intermittent shrub layer characterized by *Ceanothus cuneatus*. A variety of other shrubs including *Fremontodendron californica*,

Quercus wislizeni, *Heteromeles arbutifolia*, *Eriodictyon californica*, and *Toxicodendron diversilobum* are present and may be co-dominant. The herbaceous layer may be sparse to intermittent including native and non-native species. Stands are often post-fire on granitic soils...

Pinus sabiniana / *Ceanothus cuneatus* – (*Rhamnus ilicifolia*) Association (n=17)

IA1.d *Pinus sabiniana* occurs over an open shrub understory dominated by *Adenostoma fasciculatum*; found on a variety of substrates including metamorphic and ultramafic. Stands occur in the northern Sierra Nevada Foothills...

Pinus sabiniana / *Adenostoma fasciculatum* Association (n=7)

IA1.e *Pinus sabiniana* occurs scattered over an open shrub understory of *Ceanothus cuneatus* and other shrubs. The herbaceous understory has a high diversity and cover of native species, including *Plantago erecta* and *Vulpia microstachys*. Restricted to serpentine or other poor nutrient soils...

Pinus sabiniana / *Ceanothus cuneatus* / *Plantago erecta* Association (n=2)

IA.2 *Pinus ponderosa* is dominant in the tree canopy with >50% relative cover, while *Quercus* spp. are low in cover if present. *Calocedrus decurrens* and/or *Pseudotsuga menziesii* are absent...

***Pinus ponderosa* Alliance (n=3)**

IA2.a *Arctostaphylos viscida* is dominant in the understory. Stands are typical on convex middle slopes to ridgetops...

Pinus ponderosa / *Arctostaphylos viscida* Association (n=2)

IA.3 *Pinus ponderosa*, *Calocedrus decurrens* and/or *Pseudotsuga menziesii* is dominant or are co-dominant and together comprise >60% relative cover. These are mixed conifer stands with more than one conifer present. Oaks are characteristically present, but sub-dominant. Stands of this alliance are more typical of elevations greater than the foothill belt. Stands in the foothills are often on sheltered north-facing slopes or lower slopes and terraces near bottoms of canyons...

***Pinus ponderosa* – *Calocedrus decurrens* – *Pseudotsuga menziesii* Alliance (n=21)**

IA3.a *Pinus ponderosa* is dominant or co-dominant in the tree canopy with *Calocedrus decurrens*, which sometimes may have higher cover than *P. ponderosa*. *Quercus kelloggii* and/or *Q. chrysolepis* is present to sub-dominant. Stands usually form a multi-layered canopy with *Q. kelloggii* and *C. decurrens* underneath a canopy of *P. ponderosa*. Stands typically occur in mesic settings on northerly slopes or on terraces near streams...

Pinus ponderosa – *Calocedrus decurrens* – *Quercus kelloggii* Association (n=11)

IA3.b *Pinus ponderosa* is strongly dominant in the tree canopy. If *Calocedrus decurrens* is present, it has low cover. Shrub cover is typically sparse. Stands are found on terraces adjacent to streams or rivers...

Pinus ponderosa – (*Calocedrus decurrens*) stream terrace Association (n=5)

IA3.c *Pseudotsuga menziesii* occurs as the dominant tree in the overstory. *Pinus ponderosa* is present as a sub-dominant. A sub-canopy of hardwoods such as *Quercus chrysolepis* and *Q. kelloggii* may be present...

Pinus ponderosa – *Pseudotsuga menziesii* – *Quercus chrysolepis* / *Galium bolanderi*
Association (n=5)

IA.4 *Pinus jeffreyi* is dominant to co-dominant in the tree layer with any of the following species: *Quercus chrysolepis*, *Abies concolor* and/or *P. monophylla*. *A. concolor* may be dominant in the tree canopy but *P. jeffreyi* is at least 1% in cover. Found in the San Emigdio Mountains of the southern Sierra Nevada Foothills. The shrub layer is sparse to open with *Artemisia tridentata*, *Symphoricarpos molis*, and *Eriogonum wrightii*...

Pinus jeffreyi – *Pinus monophylla* Association (n=14)
of the ***Pinus jeffreyi* Alliance (n=14)**

IA.5 *Pinus ponderosa* and/or *P. sabiniana* are emergent and/or co-dominant in the tree layer with *Quercus kelloggii*...

***Quercus kelloggii* Alliance (n=137)**

IA5.a *Quercus kelloggii* and *Pinus ponderosa* are co-dominant in the tree canopy. *Calocedrus decurrens* is absent or very low in cover. The shrub understory is sparse to open with *Toxicodendron diversilobum* often present...

Quercus kelloggii – *Pinus ponderosa* Association (n=6)

IA5.b The tree canopy is characterized by *Quercus kelloggii* and *Pinus ponderosa* with the two often co-dominant. The shrub understory is open to dense dominated by *Arctostaphylos viscida* with *Heteromeles arbutifolia* characteristically present to co-dominant...

Quercus kelloggii – *Pinus ponderosa* / *Arctostaphylos viscida* Association (n=35)

IA5.c The tree canopy is dominated by *Quercus kelloggii* with *Pinus ponderosa* typically present to co-dominant. The shrub understory is open to intermittent with *Ceanothus integerrimus* present to dominant with other shrubs such as *Toxicodendron diversilobum* and *Heteromeles arbutifolia*...

Quercus kelloggii / *Ceanothus integerrimus* Association (n=14)

IA.6 *Pinus ponderosa* and/or *P. sabiniana* are co-dominant in the tree layer with *Quercus wislizeni*...

***Quercus wislizeni* – *Quercus parvula* (tree) Alliance (n=478)**

IA6.a *Pinus ponderosa* is dominant to co-dominant with *Quercus wislizeni* in the tree canopy. The shrub layer is variable and ranges from sparse to open...

Quercus wislizeni – *Pinus ponderosa* Association (n=6)

IA6.b *Pinus sabiniana* is dominant to co-dominant with *Quercus wislizeni* in the tree canopy. *Quercus douglasii* cover is < 5% and the shrub layer is sparse to open...

Quercus wislizeni – *Pinus sabiniana* / annual grass – herb Association (n=28)

IA.7 *Quercus chrysolepis* is dominant to co-dominant in the tree canopy with emergent to co-dominant pines or other conifers. If co-dominant with *Pinus monophylla*, key to *P. monophylla*. *Q. kelloggii* may be present as a sub-dominant in the understory...

***Quercus chrysolepis* Alliance (n=147)**

IA7.a *Pinus ponderosa* is emergent in the tree layer with *Quercus chrysolepis*. Other conifers such as *Calocedrus decurrens* and *Pseudotsuga menziesii* may be present at higher cover than *P. ponderosa*...

Quercus chrysolepis – *Pinus ponderosa* Association (n=3)

IA7.b *Pinus jeffreyi* is emergent in the tree layer with *Quercus chrysolepis*. Other conifers such as *Abies concolor* and *Pinus lambertiana* may be present to co-dominant and have higher cover than *P. jeffreyi*...

Quercus chrysolepis – *Pinus jeffreyi* Association (n=2)

IA7.c *Pinus sabiniana* is co-dominant in the tree layer with *Quercus chrysolepis*. The sparse to intermittent shrub layer is variable with *Toxicodendron diversilobum*, *Ceanothus* spp., and *Cercocarpus montanus* often characteristic...

Quercus chrysolepis – *Pinus sabiniana* Association (n=1)

IA.8 *Pinus monophylla* is the dominant tree or is co-dominant (sometimes having as low as 5% absolute cover) with *Juniperus californica* or *Quercus* spp. in open woodlands. If larger conifers, such as pines, firs, etc., are present they do not reach co-dominance. Understory shrubs may include *Q. john-tuckeri*, *Artemisia tridentata*, *Eriogonum fasciculatum*, and *Ephedra* spp. Found in southern Sierra Nevada Foothills...

***Pinus monophylla* – (*Juniperus osteosperma*) Alliance (n=17)**

IA8.a *Pinus monophylla* is dominant in the open to intermittent tree layer. *Quercus john-tuckeri* is dominant in the shrub layer. *Juniperus californica* and *Q. chrysolepis* are often present as trees or tall shrubs. Stands are typically found on steep slopes in the San Emigdio Mountains...

Pinus monophylla / *Quercus john-tuckeri* Provisional Association (n=9)

IA8.b *Pinus monophylla* is the dominant tree in the open tree canopy. *Eriogonum fasciculatum* is present in the sparse to open shrub layer...

Pinus monophylla / *Eriogonum fasciculatum* Association (n=1)

IA8.c *Cercocarpus ledifolius* is dominant or co-dominant in the shrub layer with *Hesperoyucca whipplei*, *Arctostaphylos parryana*, *Artemisia tridentata*, and *Purshia tridentata*...

Pinus monophylla – (*Juniperus osteosperma*) / *Cercocarpus ledifolius* Association (n=1)

IA8.d *Pinus monophylla* is dominant in the open to intermittent tree layer. The shrub layer is sparse. The herbaceous layer is typically sparse with *Poa secunda* and/or *Bromus tectorum* present...

Pinus monophylla – (*Juniperus osteosperma*) / Sparse Understory Association (n=4)

IA.9 *Pinus attenuata* dominates or co-dominates with one or more *Quercus* spp. in the tree overstory or is strongly regenerating after fire...

Pinus attenuata* Alliance

I.B The overstory is dominated by one or more non-pine conifers such as *Abies concolor*, *Calocedrus decurrens*, *Pseudotsuga menziesii*, or *Hesperocyparis* spp., or these conifers may share dominance with broadleaf evergreen trees or shrubs...

IB.1 *Abies concolor* is dominant with >60% relative cover in the tree canopy. If *Pinus jeffreyi* is present at 30% relative cover or greater, key to *Pinus jeffreyi* Alliance. *Quercus kelloggii* is sub-dominant in the tree layer under *Abies concolor*. *Calocedrus decurrens* may be present to co-dominant...

Abies concolor – *Calocedrus decurrens* – *Quercus kelloggii* Association (n=1)
of the ***Abies concolor* Alliance (n=1)**

IB.2 *Calocedrus decurrens* is strongly dominant in the tree canopy and *Quercus kelloggii* is present. *Pinus ponderosa* or *Pseudotsuga menziesii* are absent. These are small azonal stands limited by fire protection and moisture availability along rivers or near seeps. Stands are likely below the minimum mapping unit...

Calocedrus decurrens – *Quercus chrysolepis* – *Quercus kelloggii* Association (n=2)
of the ***Calocedrus decurrens* Alliance (n=2)**

IB.3 *Calocedrus decurrens* is co-dominant in the tree canopy with *Alnus rhombifolia*. Other riparian trees are often present at low cover. The open shrub layer is characterized by riparian species. Stands found along creeks...

Calocedrus decurrens – *Alnus rhombifolia* Association (n=3)
of the ***Alnus rhombifolia* Alliance (n=93)**

IB.4 *Pseudotsuga menziesii* is co-dominant with *Quercus kelloggii* and *Umbellularia californica*. *Quercus chrysolepis* is present at low cover. Shrub layer is intermittent with *Toxicodendron diversilobum* and occasionally *Heteromeles arbutifolia* ...

Quercus kelloggii – *Pseudotsuga menziesii* – *Umbellularia californica* Association (n=5)
of the ***Quercus kelloggii* Alliance (n=137)**

IB.5 *Pseudotsuga menziesii* is co-dominant with *Acer macrophyllum* in the tree overstory or midstory. This hardwood-conifer mix has an understory of upland and riparian herbs, including *Dryopteris arguta* and *Adiantum jordanii*. Found in the Lassen volcanic foothills ...

Acer macrophyllum – *Pseudotsuga menziesii* / *Dryopteris arguta* Association (n=1)
of the ***Acer macrophyllum* – *Alnus rubra* Alliance (n=3)**

IB.6 *Pseudotsuga macrocarpa* occurs as a dominant or co-dominant conifer in the overstory as a canopy tree, usually with at least 20% relative cover, and there may be an abundant (co-dominant or dominant) sub-canopy of oaks. Stands were not surveyed in the project area but have been observed...

Pseudotsuga macrocarpa* Alliance

IB.7 *Hesperocyparis macnabiana* is the dominant tree in the overstory with *Arctostaphylos viscida* in the understory. Found in northern Sierra Nevada Foothills on volcanic or serpentine substrates...

Hesperocyparis macnabiana / *Arctostaphylos viscida* Woodland Provisional Association (n=2)
of the ***Hesperocyparis (sargentii, macnabiana)* Alliance (n=2)**

IB.8 *Hesperocyparis nevadensis* is the dominant to co-dominant tree in the overstory with at least 30% relative cover. In post-fire settings, *Hesperocyparis nevadensis* may be as seedlings or saplings. *Pinus monophylla* may be present to co-dominant. Found in the southern Sierra Nevada Foothills on granitic substrate ...

Hesperocyparis nevadensis Association (n=2)
of the ***Hesperocyparis forbesii* – *Hesperocyparis nevadensis* Alliance (n=2)**

IB.9 *Juniperus californica* is evenly distributed and characterizes the tree or shrub canopy with >4% absolute cover. Oaks are typically absent or much lower in cover than *J. californica* in the overstory. Sites tend to be rocky and/or sandy...

***Juniperus californica* Alliance (n=17)**

IB9.a *Juniperus californica* is dominant in the overstory as a short tree or tall shrub. *Cercocarpus montanus* and/or *Hesperoyucca whipplei* are characteristically present and may be co-dominant. Other chaparral shrub species are typically present...

Juniperus californica – (*Cercocarpus montanus* – *Fraxinus dipetala*) Association (n=5)

IB9.b *Juniperus californica* forms an open to intermittent canopy over grasses and forbs...

Juniperus californica / herbaceous Association (n=12)

Group II. Woodlands and forests characterized mainly by broad-leaved evergreen and deciduous tree species such as *Quercus* spp., *Salix* spp., etc. Conifers may be taller, and in some cases co-dominant with the broad-leaved trees.

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

IIA.1 *Quercus douglasii* (or occasionally *Quercus xalvordiana*, which is defined operationally by tree size and morphology, but with some leaf characteristics of *Q. john-tuckeri*) is the dominant oak species in the overstory. Other trees, such as *Pinus sabiniana* and *Aesculus californica*, or other oaks, may be present and co-dominant. If *Quercus wislizeni* or *Q. chrysolepis* are co-dominant, *Q. douglasii* must have at least twice as much cover as those oaks...

***Quercus douglasii* Alliance (n=347)**

IIA1.a *Aesculus californica* is present and conspicuous in the overstory at >2% cover with *Quercus douglasii*. Other tree species may be present, but at relatively lower cover. The understory is usually well-developed with herbs, and the shrub layer is often sparse but occasionally has higher cover of mesic shrubs such as *Toxicodendron diversilobum* and *Rhamnus ilicifolia*...

Quercus douglasii – *Aesculus californicus* / grass Association (n=17)

IIA1.b *Juniperus californica* is present and typically co-dominant with *Quercus douglasii*. *Ceanothus cuneatus* is characteristically present in the shrub layer. Other characteristic shrubs include *Rhamnus ilicifolia*, *Toxicodendron diversilobum*, and *Arctostaphylos manzanita*. If *Cercocarpus montanus* is present, it occurs at low cover...

Quercus douglasii – *Juniperus californica* / *Ceanothus cuneatus* – *Cercocarpus montanus*
Association (n=5)

IIA1.c The understory has a defined shrub layer that is co-dominated by *Juniperus californica* and *Ericameria linearifolia*, though sometimes one of the two species may be dominant. Other shrubs may be present in lower cover...

Quercus douglasii – *Juniperus californica* / *Ericameria linearifolia* Association (n=1)

IIA1.d *Arctostaphylos viscida* is characteristically present in the understory at >2% cover. Other shrub species typically present include *Heteromeles arbutifolia* and *Rhamnus ilicifolia*. *Pinus sabiniana* may be emergent to co-dominant in the tree layer...

Quercus douglasii – *Pinus sabiniana* / *Arctostaphylos viscida* Association (n=11)

IIA1.e *Arctostaphylos manzanita* is the dominant shrub in the understory, typically with >10% cover, and the herb layer is usually intermittent to dense. This association occurs in the northern Sierra Nevada Foothills...

Quercus douglasii / *Arctostaphylos manzanita* / herbaceous Association (n=7)

IIA1.f *Pinus sabiniana* is co-dominant in the tree canopy with *Quercus douglasii*. The shrub layer is diverse and characterized by co-dominant *Ceanothus cuneatus* and *Cercocarpus montanus*...

Quercus douglasii – *Pinus sabiniana* / *Ceanothus cuneatus* – *Cercocarpus montanus*
Association (n=4)

IIA1.g *Ceanothus cuneatus* is dominant in the shrub layer at >5% cover. Total shrub cover is typically >10% and the herbaceous layer is open to dense and generally dominated by non-native annual grasses. *Pinus sabiniana*, if present is sub-dominant...

Quercus douglasii / *Ceanothus cuneatus* Association (n=24)

IIA1.h *Quercus douglasii* occurs in the overstory as the main tree species; however, the understory is shared in dominance by *Toxicodendron diversilobum* in the shrub layer and annual grasses and forbs in the herb layer, both exhibit similar cover...

Quercus douglasii / *Toxicodendron diversilobum* / grass Association (n=14)

IIA1.i Annual native forbs such as *Navarretia pubescens*, *Centaurium muehlenbergii*, *Clarkia purpurea*, and *Selaginella hansenii* occur with non-native annuals such as *Avena barbata*, *Bromus hordeaceus*, and *Trifolium hirtum* in the understory. Typically found on volcanic substrates...

Quercus douglasii / *Selaginella hansenii* – *Navarretia pubescens* Association (n=7)

IA1.j Perennial grasses are characteristic in the understory, and shrubs are low in cover. Non-native annuals such as *Cynosurus echinatus* may be dominant but native perennial grasses, including *Nassella pulchra*, *Achnatherum lemmonii*, *Melica californica*, *Elymus glaucus*, and *E. elymoides* are characteristic, typically with at least 2% absolute cover. Found on volcanic mud or granitic parent materials...

Quercus douglasii / (*Achnatherum lemmonii* – *Nassella pulchra*) Association (n=18)

IIA1.k Annual grasses, forbs, and bulbs dominate the understory, and shrubs are low in cover. The most common species include non-natives *Bromus hordeaceus*, *Bromus diandrus*, *Trifolium hirtum*, *Torilis arvensis*, and *Avena* spp. However, annual species vary significantly both seasonally and annually...

Quercus douglasii / *Bromus* spp. – (*Daucus pusillus*) Association (n=203)

IIA1.l *Pinus sabiniana* is co-dominant in the tree layer. The stands are characterized by a grassy herbaceous understory. The shrub layer is usually <10% absolute cover but *Toxicodendron diversilobum* can be higher in cover...

Quercus douglasii – *Pinus sabiniana* / grass Association (n=14)

IIA1.m Shrubs are sparse in the understory and the herbaceous layer is characterized by native annual forbs including *Amsinckia* sp., *Plagiobothrys nothofulvus*, *Madia elegans* although non-native grasses may be dominant. Perennial native bunch grasses are typically absent...

Quercus douglasii / *Amsinckia (intermedia, menziesii)* – *Plagiobothrys nothofulvus* Association (n=14)

IIA.2 *Quercus wislizeni* is dominant or co-dominant at >30% relative cover, with other tree species in the overstory. *Pinus sabiniana* or *P. ponderosa*, if present, may be conspicuous and have equal or higher cover than *Q. wislizeni*. If *Q. wislizeni* is co-dominant with *Umbellularia californica* key to the *Umbellularia californica* Alliance...

***Quercus wislizeni* – *Quercus parvula* Alliance¹ (n=478)**
(Also see Class B, IIB2.b. for key to shrub Associations)

IIA2.a *Quercus wislizeni* occurs as a riparian (or semi-riparian) forest/tall shrubland with riparian indicators such as *Salix laevigata*, *Acer macrophyllum*, *Vitis californica*, *Frangula californica*, *Artemisia douglasiana*, *Rubus armeniacus*, and others...

Quercus wislizeni – *Salix laevigata* / *Frangula californica* Association (n=44)

IIA2.b *Aesculus californica* occurs as a conspicuous member of the canopy with *Quercus wislizeni* and *Q. douglasii* may also be co-dominant...

Quercus wislizeni – *Aesculus californica* Association (n=92)

IIA2.c *Quercus wislizeni* and *Q. douglasii* are co-dominant in the the oversotry. *Pinus sabiniana* may be present at low cover. Shrub cover is typically sparse to open and herbaceous cover is variable...

Quercus wislizeni – *Quercus douglasii* / herbaceous Association (n=70)

IIA2.d *Pinus sabiniana* is dominant to co-dominant with *Quercus wislizeni* in the tree canopy. *Quercus douglasii* cover is < 5% and the shrub layer is sparse to open...

Quercus wislizeni – *Pinus sabiniana* / annual grass – herb Association (n=28)

IIA2.e *Quercus wislizeni* occurs as a tree or tall shrub in the overstory. *Pinus sabiniana* is often present at low cover. *Heteromeles arbutifolia* is dominant to co-dominant in the shrub layer with *Toxicodendron diversilobum*. *Arctostaphylos viscida* is often present but at half the cover of *H. arbutifolia*. Stands are typically of mesic settings (concavities and northerly-facing slopes)...

Quercus wislizeni / *Heteromeles arbutifolia* Association (n=65)

IIA2.f *Quercus wislizeni* occurs as a tree or tall shrub in the overstory. *P. sabiniana* is often present and may be co-dominant. *Arctostaphylos viscida* characterizes the shrub layer with >30% relative cover. *Heteromeles arbutifolia* and *Toxicodendron diversilobum* are often present but together have less cover than *A. viscida*. Stands are less mesic than the associations characterized by *H. arbutifolia* and *T. diversilobum*. Typically, of upper slopes and exposed upland settings...

Quercus wislizeni – (*Pinus sabiniana*) / *Arctostaphylos viscida* Association (n=21)

IIA2.g *Quercus wislizeni* occurs as an intermittent to dense forest or tall shrubland in mesic settings. The shrub layer is absent to continuous with *Toxicodendron diversilobum* as the major understory shrub species. If *Heteromeles arbutifolia* or *Arctostaphylos viscida*, are

present, they each comprise no more than 5% cover and *T. diversilobum* has two times the cover of either species...

Quercus wislizeni / *Toxicodendron diversilobum* Association (n=110)

IIA2.h *Quercus wislizeni* occurs as a large shrub or tree in the overstory. *Pinus sabiniana* is always present and *Quercus douglasii* may be co-dominant. *Arctostaphylos manzanita* is co-dominant, with greater than 30% relative cover, in a diverse and dense shrub layer. *Toxicodendron diversilobum*, *Lonicera hispidula* and *Heteromeles arbutifolia* are usually present...

Quercus wislizeni – *Pinus sabiniana* / *Arctostaphylos manzanita* Association (n=10)

IIA2.i *Arbutus menziesii* is co-dominant in the tree canopy. *Heteromeles arbutifolia* and *Toxicodendron diversilobum* are co-dominant in the open to continuous shrub layer...

Quercus (wislizeni, parvula) – *Arbutus menziesii* / *Toxicodendron diversilobum* Association (n=5)

IIA2.j *Pinus ponderosa* is dominant to co-dominant with *Quercus wislizeni* in the tree canopy. The shrub layer is variable and ranges from sparse to open...

Quercus wislizeni – *Pinus ponderosa* Association (n=6)

IIA2.k *Quercus chrysolepis* and *Quercus wislizeni* are co-dominant in the tree canopy with *Q. wislizeni* having higher cover than *Q. chrysolepis*. *Umbellularia californica* is typically present. Stands often occur on steep, rocky slopes...

Quercus wislizeni – *Quercus chrysolepis* tree Association (n=7)

IIA2.l Disturbance species such as *Eriodictyon californicum*, *Ceanothus leucodermis*, *Diplacus aurantiacus*, *Lotus scoparius*, and *Lupinus albifrons* are characteristic in an open to intermittent shrub layer. Stands are often found on rocky and sometimes steep sites...

Quercus wislizeni – *Eriodictyon californicum* Association (n=9)

IIA.3 *Quercus kelloggii* is dominant in the tree canopy or co-dominant with *Q. wislizeni*. Stands may have conspicuous tall conifers such as *Pseudotsuga menziesii* or *Pinus ponderosa* with equal or higher cover than *Q. kelloggii*...

***Quercus kelloggii* Alliance (n=137)**

IIA3.a The tree canopy is dominated by *Quercus kelloggii* with *Pinus ponderosa* often present. The shrub understory is sparse to continuous with *Toxicodendron diversilobum* always present with no other shrubs of greater cover...

Quercus kelloggii / *Toxicodendron diversilobum* Association (n=27)

IIA3.b The tree canopy is dominated by *Quercus kelloggii*, and *Pinus ponderosa* may be present. The shrub understory is open with *Styrax officinalis* present with *Toxicodendron diversilobum*, *Heteromeles arbutifolia*, and a variety of herbs. Found on Gabbro soils...

Quercus kelloggii / *Toxicodendron diversilobum* – *Styrax redivivus* / *Triteleia laxa* Association (n=3)

IIA3.c The tree canopy is dominated by *Quercus kelloggii* with *Pinus ponderosa* often present to sub-dominant. *Ceanothus integerrimus* is always present in the open to intermittent shrub understory with other shrubs such as *Toxicodendron diversilobum* and *Heteromeles arbutifolia*...

Quercus kelloggii / *Ceanothus integerrimus* Association (n=14)

IIA3.d *Quercus chrysolepis* is co-dominant in the overstory with *Q. kelloggii*, and the understory has strong presence of *Toxicodendron diversilobum* with other shrubs and herbs...

Quercus kelloggii – *Quercus chrysolepis* / *Toxicodendron diversilobum* Association (n=9)

IIA3.e *Quercus kelloggii* is co-dominant with *Pseudotsuga menziesii* and/or *Umbellularia californica*. Other conifers such as *Pinus ponderosa* or *Calocedrus decurrens* may also be present...

Quercus kelloggii – *Pseudotsuga menziesii* – *Umbellularia californica* Association (n=5)

IIA3.f *Quercus kelloggii* and *Pinus ponderosa* are co-dominant in the tree layer. The shrub understory is sparse to open...

Quercus kelloggii – *Pinus ponderosa* Association (n=6)

IIA3.g *Q. kelloggii* and *Pinus ponderosa* are co-dominant in the tree layer. The shrub understory is open to dense with *Arctostaphylos viscida* and *Heteromeles arbutifolia* characteristically present...

Quercus kelloggii – *Pinus ponderosa* / *Arctostaphylos viscida* Association (n=35)

IIA3.h *Quercus kelloggii* is co-dominant with *Q. wislizeni* in the overstory with at least 5% cover. Other trees may include *Pinus sabiniana*. The understory can have significant shrub cover with *Heteromeles arbutifolia*, *Frangula californica* and, *Toxicodendron diversilobum*...

Quercus wislizeni – *Quercus kelloggii* / *Heteromeles arbutifolia* – *Toxicodendron diversilobum* Association (n=16)

IIA3.i *kelloggii* is dominant in the tree canopy. *Q. lobata* is often present at low cover. The intermittent to continuous shrub layer is characterized by *Ribes roezlii*...

Quercus kelloggii – *Ribes roezlii* Provisional Association (n=6)

IIA3.j *Quercus kelloggii* is the sole dominant in the overstory, while other oaks or conifers may be present at low cover. A variety of herbs are present usually at moderate to high cover in the understory, and shrubs such as *Toxicodendron diversilobum* may also occur in at low cover...

Quercus kelloggii / annual grass-herb Association (n=11)

IIA.4 *Quercus chrysolepis* is usually the dominant species in the overstory. Other broad-leaf trees such *Aesculus californica*, *Umbellularia californica*, and *Q. wislizeni* can be co-dominant and even higher covers than *Q. chrysolepis*. If *Q. kelloggii* is present, it is sub-dominant or found in the understory of *Q. chrysolepis*. Conifers may be emergent and occasionally co-dominant. If *Pinus monophyla* or *Pseudotsuga menziesii* are co-dominant key to those alliances, respectively...

***Quercus chrysolepis* Alliance (n=147)**

IIA4.a *Quercus chrysolepis* is dominant in the tree canopy or may be co-dominant with *Umbellularia californica*. Riparian species such as *Calycanthus occidentalis* or *Vitis californica* are always present...

Quercus chrysolepis / *Calycanthus occidentalis* – *Vitis californica* Association (n=35)

IIA4.b *Quercus chrysolepis* and *Q. wislizeni* are co-dominant in the canopy. *Q. chrysolepis* has greater cover in the overstory and *Q. wislizeni* is typically in the sub-canopy as a shrub or tall tree. If the two are co-dominant both as shrubs in the southern Sierra Nevada Foothills, key to the *Quercus wislizeni* – *Quercus chrysolepis* (shrub) Shrubland Alliance...

Quercus chrysolepis / *Quercus (wislizeni, parvula)* Association (n=15)

IIA4.c *Quercus chrysolepis* is dominant in the tree canopy and *Pinus ponderosa* may be emergent. The shrub layer is dominated by *Arctostaphylos viscida* and *Heteromoles arbutifolia* is usually present to co-dominant...

Quercus chrysolepis / *Arctostaphylos viscida* Association (n=21)

IIA4.d *Pinus ponderosa* is characteristically present and usually has low cover compared to *Quercus chrysolepis*; *Calocedrus decurrens* also may be present in the overstory. *Quercus kelloggii* is absent or has very low cover. Usually on lower to mid slopes...

Quercus chrysolepis – *Pinus ponderosa* Association (n=3)

IIA4.e *Pinus jeffreyi* is emergent in the tree layer with *Quercus chrysolepis*. Other conifers such as *Abies concolor* and *Pinus lambertiana* may be present to co-dominant and have higher cover than *P. jeffreyi*...

Quercus chrysolepis – *Pinus jeffreyi* Association (n=2)

IIA4.f *Pinus sabiniana* is co-dominant in the tree layer with *Quercus chrysolepis*. The sparse to intermittent shrub layer is variable with *Toxicodendron diversilobum*, *Ceanothus* spp., and *Cercocarpus montanus* is often characteristic...

Quercus chrysolepis – *Pinus sabiniana* Association (n=1)

IIA4.g *Quercus kelloggii* is sub-dominant in the overstory with *Q. chrysolepis*. If *Q. kelloggii* is in the understory, below *Q. chrysolepis*, it may have higher cover than *Q. chrysolepis*. *Pinus ponderosa* is also often present. Usually occurs on upland, northerly-facing slopes...

Quercus chrysolepis – *Quercus kelloggii* Association (n=10)

IIA4.h *Umbellularia californica* occurs as a sub-dominant to co-dominant with *Quercus chrysolepis*. *Toxicodendron diversilobum* and *Heteromeles arbutifolia* are typically present in the understory. Found in upland settings on steep slopes with rocky soils...

Quercus chrysolepis – *Umbellularia californica* Association (n=12)

IIA4.i *Quercus chrysolepis* is typically strongly dominant in the overstory (>60% relative cover), and sometimes conifers such as *Pinus sabiniana* are emergent at low cover. No significant indicator species are identified in the understory, though shrubs may be intermittent in cover. Usually on northerly slopes...

Quercus chrysolepis Association (n=47)

IIA.5 *Quercus chrysolepis* shares cover with *Pseudotsuga menziesii*, which is usually >30% cover in the overstory and higher in cover than canyon live oak...

Pinus ponderosa – *Pseudotsuga menziesii* – *Quercus chrysolepis* / *Galium bolanderi* Association (n=5)

of the ***Pinus ponderosa* – *Calocedrus decurrens* – *Pseudotsuga menziesii* Alliance (n=21)**

IIA.6 *Quercus lobata* is co-dominant to dominant tree in riparian settings. Riparian influences may be minor including draws, drainages, ditches, or areas where water may collect. Other riparian species are typically present however in areas that have been disturbed (i.e. grazing) other riparian species may be absent and the shrub layer is dominated by *Toxicodendron diversilobum*, *Rhus trilobata*, and/or *Rubus armeniacus*....

***Quercus lobata* Riparian Alliance (n=115)**

IIA6.a *Quercus lobata* is dominant or co-dominant with *Alnus rhombifolia*. *Rubus armeniacus* and *Vitis californica* are often present and variable in cover. Found in riparian settings...

Quercus lobata – *Alnus rhombifolia* Association (n=13)

IIA6.b *Quercus lobata* and *Fraxinus latifolia* generally co-dominate, although the latter may have low cover. *Vitis californica* is present and characterizes the shrub layer. Found strictly in riparian settings...

Quercus lobata – *Fraxinus latifolia* / *Vitis californica* Association (n=9)

IIA6.c *Quercus lobata* is usually dominant to co-dominant with *Q. wislizeni* in the overstory. *Toxicodendron diversilobum* is usually present and variable in cover, while *Rubus armeniacus* is sometimes present with low cover. Other trees may be present, including *Aesculus californica*, *Pinus sabiniana* and *Platanus racemosa*. Found in riparian settings...

Quercus lobata – *Quercus wislizeni* Association (n=29)

IIA6.d *Quercus lobata* is the sole dominant over a grassy or herbaceous understory (especially *Bromus diandrus*). Shrubs may sometimes be present with usually <10% cover. Usually associated with small creeks, stream terraces, bottomlands, and other low-lying features...

Quercus lobata / herbaceous semi-riparian Association (n=18)

IIA6.e *Quercus lobata* is dominant in the overstory. The open to continuous shrub layer has >10% cover and is usually characterized by *Rubus armeniacus* or *Rhus trilobata*. Found in riparian or semi-riparian settings...

Quercus lobata / *Rubus armeniacus* Association (n=23)

IIA6.f *Quercus lobata* is usually dominant in the overstory. *Salix lasiolepis* and/or *S. laevigata* or other willows are present and dominant to co-dominant in the understory. *Rubus armeniacus* may also be characteristic in the shrub layer...

Quercus lobata – *Salix lasiolepis* Association (n=6)

IIA6.g *Quercus lobata* and *Q. chrysolepis* are co-dominant in the tree canopy. Shrub layer is often characterized by *Vitis californica* or *Toxicodendron diversilobum*...

Quercus lobata – *Quercus chrysolepis* / *Vitis californica* Association
(n=12)

IIA.7 *Quercus lobata* is the dominant large tree in upland (non-riparian) settings. *Quercus kelloggii* or *Quercus douglasii* may be co-dominant. Stands are found on slopes or in broad valleys with no riparian influence...

***Quercus lobata* Alliance (n=21)**

IIA7.a *Quercus lobata* is the dominant tree in upland settings. Shrubs are typically absent and herbaceous layer is often dense and dominated by non-native annual grasses...

Quercus lobata / grass Association (n=11)

IIA7.b *Quercus kelloggii* is co-dominant with *Q. lobata*. Other trees are often present at lower cover. Shrub cover is typically low and riparian species are not characteristic. If there is a riparian influence or riparian species are characteristic of the stand the stand should be keyed to *Quercus lobata* Riparian Alliance...

Quercus lobata – *Quercus kelloggii* Association (n=6)

IIA7.c *Quercus douglasii* is co-dominant with *Q. lobata*. Other trees may be present at lower cover. Shrub cover is sparse...

Quercus douglasii – *Quercus lobata* Association (n=3)

II.B Stands characterized or dominated by broad-leafed tree species other than oaks

II.B.1 *Umbellularia californica* is strongly dominant or co-dominant with *Quercus wislizeni* in the overstory as a tree or tall shrub; If *U. californica* is co-dominant with *Alnus rhombifolia*, *Arbutus menziesii*, or *Quercus chrysolepis*, key to those alliances...

***Umbellularia californica* Alliance (n=25)**

II B1.a *Umbellularia californica* is strongly dominant in the overstory. *Quercus wislizeni* and *Aesculus californica* may be present at low cover. Shrub and herbaceous cover are typically sparse to open...

Umbellularia californica Association (n=12)

II B1.b *Umbellularia californica* and *Quercus wislizeni* are co-dominant in the overstory as trees or tall shrubs. Stands are typically intermittent to continuous in cover and occur on northerly facing slopes post-disturbance...

Umbellularia californica – *Quercus wislizeni* Association (n=12)

II B.2 *Arbutus menziesii* is dominant in the overstory, usually with *Umbellularia californica* and *Quercus kelloggii*. This is a localized uncommon type (appears to be below minimum mapping unit size) that may transition to the *Q. kelloggii* or *Quercus chrysolepis* Alliance without significant disturbance...

Arbutus menziesii – *Umbellularia californica* Association (n=1)
of the ***Arbutus menziesii* Alliance (n=1)**

II B.3 *Aesculus californica* is strongly dominant (>60% relative cover) as a tree or tall shrub in the overstory. If it is co-dominant with an oak species, see the *Quercus douglasii* and *Quercus wislizeni* Alliances...

***Aesculus californica* Alliance (n=72)**

II B3.a *Aesculus californica* is the sole dominant tree in the overstory. The shrub layer is typically sparse and the understory is characterized by herbs such as *Bromus diandrus*, *B. hordeaceus*, *Avena* spp. and *Torilis arvensis*...

Aesculus californica Association (n=21)

II B3.b *Aesculus californica* is dominant as a tree or shrub; oaks may be present but do not reach co-dominance. *Toxicodendron diversilobum* and other mesic shrubs such as *Cercis occidentalis*, and *Rhamnus ilicifolia* characterize the shrub layer. Sites are usually rocky with bedrock and large boulders covered with moss, lichen and/or *Selaginella* spp....

Aesculus californica / *Toxicodendron diversilobum* / moss Association (n=44)

II B3.c *Umbellularia californica* is present to co-dominant with *Aesculus californica*...

Aesculus californica – *Umbellularia californica* Association (n=4)

II B.4 *Acer macrophyllum* is dominant or co-dominant with >30% relative cover in the canopy. *Quercus chrysolepis* is typically present and stands may include equal or higher cover of *Pseudotsuga menziesii*. Found in the Lassen volcanic foothills or occasionally southward, usually on lower slopes of rocky, shady canyons ...

***Acer macrophyllum* – *Alnus rubra* Alliance (n=3)**

II B4.a *Pseudotsuga menziesii* is co-dominant with *Acer macrophyllum* in the tree overstory or midstory. This hardwood-conifer mix has an understory of upland and riparian herbs, including *Dryopteris arguta* and *Adiantum jordanii*. Found in the Lassen volcanic foothills...

Acer macrophyllum – *Pseudotsuga menziesii* / *Dryopteris arguta* Association (n=1)

IIB4.b *Acer macrophyllum* is dominant (with >60% relative cover) in the tree or shrub layer; other trees may include *Quercus* spp. as sub-dominants. The understory is variable with shrubs and herbs, including *Frangula californica*, *Toxicodendron diversilobum*, *Elymus glaucus*, and *Cynosurus echinatus*...

Acer macrophyllum / (*Rubus ursinus*) Association (n=2)

IIB.5 *Juglans hindsii* is strongly dominant in the overstory. If it is co-dominant with other riparian trees, key to the appropriate riparian alliance. All stands in the Foothills are planted or of hybrid origin...

Juglans hindsii Association (n=3)

of the ***Juglans hindsii* and Hybrids Special Stands and Semi-Natural Alliance (n=3)**

IIB.6 Non-native tree species such as *Ailanthus altissima*, *Eucalyptus* spp. or *Prunus* spp. dominates in planted or naturalized stands. Often found in groves, windbreaks, uplands, and along stream courses. Stands were observed and mapped but not sampled in the region...

Eucalyptus* spp. – *Ailanthus altissima* – *Robinia pseudoacacia* Semi-Natural Alliance

IIB.7 Stands dominated or characterized by other typical riparian winter deciduous trees or tall shrubs in the following genera: *Populus*, *Salix*, *Fraxinus*, *Platanus*, or *Alnus*...

IIB7.a *Populus fremontii* has equal or greater than 5% absolute cover in overstory, usually as a dominant or co-dominant in the overstory with willows or other riparian tree species. If *Salix gooddingii* is >50% relative cover in the tree canopy key to the *Salix gooddingii* – *Salix laevigata* Forest & Woodland Alliance. If *P. fremontii* is co-dominant with *Platanus racemosa* key to the *Platanus racemosa* – *Quercus agrifolia* Riparian Woodland Alliance...

***Populus fremontii* – *Fraxinus velutina* – *Salix gooddingii* Alliance (n=51)**

IIB7a.1 *Populus fremontii* occurs in association with *Salix laevigata*, where *S. laevigata* usually has ≥5% absolute cover but can be absent. Other riparian trees may be present and sometimes co-dominant, including *Quercus lobata*, *Alnus rhombifolia*, and/or *Fraxinus latifolia*...

Populus fremontii – *Salix laevigata* Association (n=37)

IIB7a.2 *Salix lasiolepis* is characteristic in the shrub/ low tree layer and has ≥5% absolute cover. Other riparian trees may be present at low cover, including *Quercus lobata* and/or *Fraxinus latifolia*. *Salix laevigata* is absent or low in cover...

Populus fremontii – *Salix lasiolepis* Association (n=2)

IIB7a.3 *Salix gooddingii* is present in the tree canopy and is typically co-dominant. Other riparian trees may be present including *Quercus lobata*. The shrub layer is variable, and the herbaceous layer is characterized by annual grasses including *Bromus diandrus* and *Cynodon dactylon*...

Populus fremontii – *Salix gooddingii* Association (n=4)

II B7a.4 *Populus fremontii* occurs in an association with *Salix exigua*, where *Salix exigua* has ≥5% absolute cover. Other riparian trees may be present including *Alnus rhombifolia*...

Populus fremontii / *Salix exigua* Association (n=4)

II B7a.5 *Populus fremontii* is the sole dominant tree. *Vitis californica* is conspicuous and usually has >10% cover...

Populus fremontii / *Vitis californica* Association (n=1)

II B7.b *Platanus racemosa* has >5% absolute cover in the overstory. Other species may intermix in the overstory, including *Quercus wislizeni*, *Aesculus californica*, *Umbellularia californica*, and/or *Fraxinus latifolia*. If *Alnus rhombifolia* is present, *P. racemosa* is dominant or co-dominant and *A. rhombifolia* has < 3 times the cover of *P. racemosa*...

***Platanus racemosa* – *Quercus agrifolia* Alliance (n=60)**

II B7b.1 *Platanus racemosa* is the sole dominant tree. Other trees may be present but are sub-dominant. Occasionally non-native trees such as *Ailanthus altissima* may reach co-dominance. Annual grasses and forbs are present, including *Amsinckia menziesii* and *Bromus diandrus*, and are variable in cover. Shrub cover is typically <10% and include *Cephalanthus occidentalis* and *Vitis californica*...

Platanus racemosa / annual grass Association (n=12)

II B7b.2 *Platanus racemosa* occurs in association with *Quercus lobata*. *Rubus armeniacus* and *Vitis californica* are usually present (at >5% absolute cover). Found strictly in riparian settings...

Platanus racemosa – *Quercus lobata* Association (n=16)

II B7b.3 *Salix* spp. may share dominance with *Platanus racemosa* in the overstory and shrubby *Salix* spp. characterize the understory with other riparian shrubs including *Rubus* spp. and *Baccharis salicifolia*. *Populus fremontii* is absent or very low in cover...

Platanus racemosa – *Salix laevigata* / *Salix lasiolepis* – *Baccharis salicifolia* Association (n=10)

II B7b.4 *Populus fremontii* has at least 5% absolute cover in the tree canopy and may reach co-dominance with *Platanus racemosa*. *Salix gooddingii* is often present...

Platanus racemosa – *Populus fremontii* / *Salix lasiolepis* Association (n=4)

II B7b.5 *Platanus racemosa* is dominant or co-dominant in the tree canopy. *Populus fremontii* and *Salix* spp. are absent. The shrub layer is characterized by *Baccharis salicifolia* which is usually dominant or co-dominant...

Platanus racemosa / *Baccharis salicifolia* Association (n=1)

IIb7b.6 *Aesculus californica* as a tree or sapling is co-dominant with *Platanus racemosa*. *Quercus wislizeni* is typically present and is often co-dominant and may have higher cover than *P. racemosa* or *A. californica*...

Platanus racemosa – *Aesculus californica* Association (n=15)

IIb7b.7 *Umbellularia californica* occurs along streams or in ravines with co-dominance to a low cover presence of *Platanus racemosa*...

Umbellularia californica – *Platanus racemosa* Association (n=1)

IIb7.c *Alnus rhombifolia* is typically dominant or co-dominant with other riparian species in the tree overstory. If co-dominant with *Fraxinus latifolia* or *Platanus racemosa*, key to those alliances...

***Alnus rhombifolia* Alliance (n=93)**

IIb7c.1 *Alnus rhombifolia* is co-dominant in the canopy with *Umbellularia californica* and/or *Quercus chrysolepis*. *Toxicodendron diversilobum* is present in the shrub layer with riparian species including *Vitis californica* and *Calycanthus occidentalis*...

Alnus rhombifolia – *Umbellularia californica* – (*Quercus chrysolepis*) Association (n=14)

IIb7c.2 *Alnus rhombifolia* is usually the dominant tree with *Salix exigua* >5% cover in the shrub layer. Other riparian shrubs such as *Salix* spp. and *Rubus armeniacus* are usually also present...

Alnus rhombifolia / *Salix exigua* – (*Rosa californica*) Association (n=9)

IIb7c.3 *Carex nudata* and/or other *Carex* or *Juncus* spp. are present at >5% cover and *Alnus rhombifolia* is the sole dominant tree. Shrubby *Salix lasiolepis* may be present, and *A. rhombifolia* may be low and shrubby or young. Usually in active, rocky stream channels...

Alnus rhombifolia / *Carex (nudata)* Association (n=13)

IIb7c.4 *Salix laevigata* is >5% cover in the tree and/or shrub layer, and it may be higher in cover than *Alnus rhombifolia*. There is not significant cover of *Platanus racemosa*, *Populus fremontii*, or *Fraxinus latifolia* in the overstory...

Alnus rhombifolia – *Salix laevigata* Association (n=10)

IIb7c.5 *Alnus rhombifolia* is the dominant tree in the overstory. Other riparian trees may be present but are sub-dominant. A variety of riparian shrubs or herbs may be present in the understory and variable in cover...

Alnus rhombifolia Association (n=37)

IIb7c.6 *Darmera peltata* is characteristically present with >2% cover as an understory herb. *Alnus rhombifolia* is the sole dominant tree in the canopy...

Alnus rhombifolia / *Darmera peltata* Association (n=1)

II B7c.7 *Calocedrus decurrens* is co-dominant in the tree canopy with *Alnus rhombifolia*. Other riparian trees are often present at low cover. The open shrub layer characterized by riparian species. Stands found along creeks...

Calocedrus decurrens – *Alnus rhombifolia* Association (n=3)

II B7c.8 *Platanus racemosa* is present but not co-dominant in the canopy with *Alnus rhombifolia*...

Alnus rhombifolia – *Platanus racemosa* Association (n=3)

IB7.d *Fraxinus latifolia* makes up at least 5% absolute cover in the overstory canopy. This species is a strong indicator as a dominant or co-dominant tree...

***Fraxinus latifolia* Alliance (n=33)**

II B7d.1 *Fraxinus latifolia* mixes with *Alnus rhombifolia* and the two species often co-dominate...

Fraxinus latifolia – *Alnus rhombifolia* Association (n=14)

II B7d.2 *Fraxinus latifolia* is dominant in the tree canopy, and other trees may be present at low cover including *Quercus lobata* and *Populus fremontii*. Riparian shrubs are present including *Cephalanthus occidentalis* and *Rubus armeniacus*. *Salix laevigata* is absent...

Fraxinus latifolia Association (n=8)

II B7d.3 *Salix laevigata* is dominant in the shrub layer under *Fraxinus latifolia*...

Fraxinus latifolia – *Salix laevigata* Association (n=9)

II B7.e *Salix gooddingii* or *S. laevigata* are typically dominant in the canopy with at least 10% absolute cover. *S. laevigata* often occurs as a shrub and other willows may be co-dominant. *Quercus wislizeni* may be present at low cover, <5% absolute cover. If *Populus fremontii* is co-dominant with *S. gooddingii*, key to the *Populus fremontii* – *Fraxinus velutina* – *Salix gooddingii* Forest & Woodland Alliance...

***Salix gooddingii* – *Salix laevigata* Alliance (n=64)**

II B7e.1 *Salix gooddingii* is the sole dominant in the tree canopy. Shrubby willow species, *Cephalanthus occidentalis*, or other shrubs and/or herbs may have high cover in the understory...

Salix gooddingii Association (n=17)

II B7e.2 *Salix laevigata* is dominant in the overstory with at least 10% cover and *S. lasiolepis* is absent or has very low cover. Other riparian shrubs are often present typically at low cover...

Salix laevigata Association (n=40)

IIB7e.3 *Salix laevigata* and *Salix lasiolepis* are co-dominant in the shrub layer, while *Rubus armeniacus* is usually present in the understory with a variety of other herbs and shrubs, including *Typha* spp....

Salix laevigata – *Salix lasiolepis* Association (n=6)

IIB7.f *Salix exigua* is characteristically present as a dominant or co-dominant shrub. It forms an open to continuous canopy along riparian corridors. Other willows or riparian tree species may be present as sub-dominants with low cover...

***Salix exigua* Alliance (n=31)**

IIB7f.1 *Salix exigua* is dominant or co-dominant with *Salix lasiolepis* and *Rubus armeniacus*, and *R. armeniacus* is typically greater than 5% cover. Other shrubs and herbs may also be present to co-dominant, such as *Vitis californica*, *Cephalanthus occidentalis*, and *Brickellia californica*...

Salix exigua – (*Salix lasiolepis*) – *Rubus armeniacus* Association (n=10)

IIB7f.2 *Salix melanopsis* is dominant or co-dominant with *S. exigua* forming an open to intermittent shrub canopy along exposed, sandy, or cobbled river terraces...

Salix exigua – *Salix melanopsis* Shrubland Association*

IIB7f.3 *Salix exigua* is the sole dominant and forms an intermittent to continuous shrub canopy over a variety of wetland herbs including *Artemisia douglasiana*. Other riparian shrubs may be present at low cover...

Salix exigua Association (n=20)

IIB7.g *Salix lasiolepis* is dominant as a shrub or low tree, with at least 10% absolute cover (and at least 50% relative cover)...

***Salix lasiolepis* Alliance (n=8)**

IIB7g.1 *Rubus armeniacus*, is characteristic in the understory with a variety of wetland shrubs and herbs. *Rosa californica* and other willow species may be present at low cover...

Salix lasiolepis / *Rubus* spp. Association (n=6)

IIB7g.2 Other riparian shrubs are present at low cover. *Artemisia douglasiana* often characterizes the herbaceous layer with other wetland species including *Mimulus guttatus* and *Stachys albens*...

Salix lasiolepis – *Artemisia douglasiana* Association (n=1)

Group III. *Yucca brevifolia* evenly distributed at $\geq 1\%$ cover, *Juniperus californicus* and/or *Pinus monophylla* $< 1\%$ absolute cover in the tree canopy. This type is rare in the Foothills but may be found at the edge of the ecoregion in the Tehachapi Mountains and in the upper Kern River Watershed near Kelso Valley...

***Yucca brevifolia* Alliance (n=1)**

No Associations defined

Class B. Shrubland Vegetation

Group I. Shrub-dominated vegetation typical of temperate riparian or bottomland settings. Except for the introduced *Tamarix*, most characteristic species in the foothills are broad-leaved winter deciduous, and include the following genera: *Salix*, *Cephalanthus*, *Rubus*, *Baccharis*, *Ribes*, *Sambucus* and *Toxicodendron*.

I.A Stands dominated by non-native riparian shrubs...

IA.1. *Tamarix* spp. dominates in the shrub canopy. Other trees or shrubs may be present at low cover, including *Quercus* spp., *Salix* spp., and *Rubus* spp....

***Tamarix* spp. Semi-Natural Alliance (n=1)**
No Associations defined

IA.2 Stands in riparian settings dominated by non-native *Rubus armeniacus* or *Ficus carica*...

***Rubus armeniacus* – *Sesbania punicea* – *Ficus carica* Semi-Natural Alliance (n=10)**

IA2.a *Rubus armeniacus* forms dense briar patches in openings between trees and shrubs in riparian settings. This species may also form dense understories in adjacent riparian woodlands and forests, where it is considered part of the treed stands...

Rubus armeniacus Association (n=9)

IA2.b Stand dominated by naturalized *Ficus carica*...

Ficus carica Ruderal Association (n=0)

I.B Stands in riparian or wetland settings dominated by one or more of the following species: *Cephalanthus occidentalis*, *Calycanthus occidentalis*, *Baccharis salicifolia*, *Rosa* spp., *Rhus trilobata*, *Frangula californica*, *Cornus sericea*, *Vitis* spp., or *Salix* spp. If any of these species are dominant in a mesic upland setting, see **II.A** below. For desert wash settings see **III.B**...

IB.1 *Baccharis salicifolia* is dominant in the shrub layer. Riparian trees may be emergent at low cover. Other shrubs if present are low cover, and annual herbs, including *Bromus diandrus*, *B. hordeaceus*, and *B. madritensis*, are usually present and may be abundant in the understory. Found in gravelly, sandy washes periodically disturbed by flooding...

Baccharis salicifolia Association (n=9)
of the ***Baccharis salicifolia* Alliance (n=9)**

IB.2 *Cephalanthus occidentalis*, *Calycanthus occidentalis*, or *Rosa californica* are the dominant shrub forming an open to intermittent shrub canopy along rocky riparian settings. Riparian trees may be emergent or intermix in the canopy...

***Cephalanthus occidentalis* – *Rosa californica* Alliance (n=21)**

IB2.a *Cephalanthus occidentalis* is the dominant shrub forming an open to intermittent shrub canopy along exposed sandy/cobbly streambeds. Occasionally *Baccharis salicifolia* may be present and co-dominant...

Cephalanthus occidentalis Association (n=13)

IB2.b *Rosa californica* is dominant in the shrub canopy. *Salix* spp. is typically present at low cover. Stands are small and found typically in rocky riparian settings...

Rosa californica Association (n=4)

IB2.c *Calycanthus occidentalis* is dominant in the shrub overstory. *Quercus wislizeni* is often emergent in the overstory. Other riparian shrubs are present including *Salix* spp., *Sambucus nigra*, and *Vitis californica*...

Calycanthus occidentalis Provisional Association (n=4)

IB.3 *Cornus sericea* dominates the shrub overstory. Other shrubs such as *Cercis occidentalis* and *Toxicodendron diversilobum* may be sub-dominant in the understory. Stands are small patches found in riparian settings...

Cornus sericea Association (n=1)
of the ***Cornus sericea* – *Rosa woodsii* – *Ribes* spp. Alliance (n=1)**

IB.4 *Frangula californica* is the dominant shrub in a riparian setting. *Hoita macrostachya* and/or other riparian shrubs are also present. *F. californica* dominated stands not in riparian settings are being treated under the *Ribes quercetorum* – *Rhus trilobata* – *Frangula californica* Alliance (see **II.A** below)...

Frangula californica ssp. *tomentella* – *Hoita macrostachya* Association (n=1)
of the ***Frangula californica* – *Rhododendron occidentale* – *Salix breweri* Alliance (n=1)**

IB.5 *Rhus trilobata* or *Forestiera pubescens* is dominant in an open to continuous shrub canopy with a sparse to open herbaceous layer. Stands are typically small and can be found on stream banks or other riparian settings...

***Rhus trilobata* – *Crataegus rivularis* – *Forestiera pubescens* Alliance (n=3)**

IB5.a1 *Forestiera pubescens* is dominant in the shrub overstory, and associates with *Sambucus nigra*, *Ribes quercetorum*, and other shrubs in riparian settings...

Forestiera pubescens – *Sambucus nigra* Association (n=2)

IB5.b *Rhus trilobata* is dominant in the shrub overstory. Other riparian indicators are also present including *Vitis californica*...

Rhus trilobata Association (n=1)

IB.6 Stands composed of dense liana thickets of *Vitis californica*, spreading across gravel and sand on river or creek terraces, or in some rocky, lower slope concavities. Most stands are < 0.5 ha, but have a distinctive signature...

Vitis californica provisional Association (n=6)
of the ***Vitis arizonica* – *Vitis girdiana* Alliance (n=6)**

IB.7 One or more willow species (*Salix* spp.) dominate the shrub layer, generally considered to be 5 m or less in height. (Note: some shrub willows may be tall enough to be identified as trees in the Foothills and thus, are also included in the tree-overstory section of this key)...

IB7.a *Salix lasiolepis* is dominant as a shrub or low tree, with at least 10% absolute cover (and at least 50% relative cover)...

***Salix lasiolepis* Alliance (n=8)**

IB7a.1 *Rubus armeniacus* is characteristic to co-dominant in the shrub layer with *Salix lasiolepis*. *Rosa californica* and other willow species may be present at low cover...

Salix lasiolepis – *Rubus* spp. Association (n=6)

IB7a.2 *Salix lasiolepis* is dominant in the overstory. *Artemisia douglasiana* is characteristic to dominant in the understory. Riparian trees may be emergent in the overstory...

Salix lasiolepis – *Artemisia douglasiana* Association (n=1)

IB7.b *Salix exigua* is characteristically present as a dominant or co-dominant shrub. It forms an open to continuous canopy along riparian corridors. Other willow species may be present as sub-dominants with low cover...

***Salix exigua* Alliance (n=31)**

IB7b.1 *Salix exigua* is dominant or co-dominant with *Salix lasiolepis* and *Rubus armeniacus*, and *R. armeniacus* is typically greater than 5% cover. Other shrubs and herbs may also be present, such as *Vitis californica*, *Cephalanthus occidentalis*, and *Brickellia californica*...

Salix exigua – (*Salix lasiolepis*) – *Rubus armeniacus* Association (n=10)

IB7b.2 *Salix exigua* is the sole dominant and forms an intermittent to continuous shrub canopy over a variety of wetland herbs including *Artemisia douglasiana*. Other riparian shrubs may be present at low cover...

Salix exigua Association (n=20)

IB7.c *Salix laevigata* is dominant or co-dominant in the overstory layer as a tall shrub or short tree with at least 10% cover. *Salix lasiolepis* may occur as a sub- or co-dominant...

***Salix gooddingii* – *Salix laevigata* Alliance (n=64)**

IB7c.1 *Salix lasiolepis* has at least 10% cover in the shrub layer, while *Rubus armeniacus* and *Artemisia douglasiana* are usually present in the understory with a variety of other herbs and shrubs including cattail *Typha* spp....

Salix laevigata – *Salix lasiolepis* Association (n=6)

IB7b.2 *Salix laevigata* is dominant in the overstory with at least 10% cover and *S. lasiolepis* is absent or has very low cover. *Rubus armeniacus* is often present with variable cover in the understory...

Salix laevigata Association (n=40)

Group II. Shrub dominated stands in upland, non-riparian settings. Sites may be mesic to xeric, but vegetation is temperate and not common of desert settings...

II.A Mesic shrublands often found at higher and cooler elevations of the foothills or moist, cool settings. Except for *Frangula californica*, dominant shrubs are non-sclerophyll species that are strongly drought-deciduous including *Quercus garryana* var. *breweri*, *Ceanothus integerrimus*, *Prunus* spp., *Ribes quercetorum*, *Rhus trilobata*, *Sambucus nigra*, *Cercis occidentalis*, *Baccharis pilularis*, and *Toxicodendron diversilobum*. If these species are dominant in a riparian setting, see **I.B...**

IIA.1 Stands of low shrubs to short clonal trees of *Quercus garryana* var. *breweri* dominate or co-dominate the shrub canopy with other shrubs including *Cercocarpus montanus* and *Toxicodendron diversilobum*. Emergent trees are often present and may reach > 10% absolute cover but shrub cover is at least 3 times greater than tree cover...

***Quercus garryana* (shrub) Alliance (n=21)**

IIA1.a *Quercus garryana* is strongly dominant in the shrub layer. Other shrubs are frequently present but do not reach co-dominance...

Quercus garryana (shrub) Association (n=14)

IIA1.b *Quercus garryana* is dominant to co-dominant with other shrubs in the canopy. *Cercocarpus montanus* is characteristic and often co-dominant...

Quercus garryana – *Cercocarpus montanus* Association (n=6)

IIA.2 *Ceanothus integerrimus* is dominant or co-dominant in the shrub canopy. Found in the northern Sierra Nevada Foothills...

***Ceanothus integerrimus* Alliance² (n=11)**

IIA2.a *Ceanothus integerrimus* dominates or co-dominates with *Heteromeles arbutifolia* and *Arctostaphylos* spp....

Ceanothus integerrimus Association (n=2)

IIA2.b *Quercus garryana* var. *fruticosa* is typically present as a sub-dominant shrub to *Ceanothus integerrimus*. *Cercis occidentalis* and *Fraxinus dipetala* are frequently present with low to moderate cover...

Ceanothus integerrimus – *Quercus garryana* var. *fruticosa* Provisional Association (n=9)

IIA.3 *Prunus virginiana* or *Prunus subcordata* is dominant in the shrub layer. Stands are often dense and growing in or around large boulder outcrops...

***Prunus virginiana* Alliance (n=4)**

IIA3.a *Prunus virginiana* is dominant in the shrub layer. *Sambucus nigra* and other mesic shrubs are typically present at low cover...

Prunus virginiana Association (n=3)

IIA3.b *Prunus subcordata* is strongly dominant in the shrub layer. Other shrubs may be present at low cover...

Prunus subcordata Association (n=1)

IIA.4 Stands are dominated by mesic shrubs such as *Ribes quercetorum*, *Rhus trilobata*, *Frangula californica*, *Sambucus nigra*, and *Cercis occidentalis* in mesic upland settings. Stands are often small, less than 1 acres found on rocky outcrops and north-facing slopes...

***Ribes quercetorum* – *Rhus trilobata* – *Frangula californica* Alliance**

IIA4.a *Ribes quercetorum* is strongly dominant in the shrub canopy often occurring with *Sambucus nigra* on steep, rocky, or concave northerly-facing slopes...

Ribes quercetorum Association (n=21)

IIA4.b *Rhus trilobata* is the dominant shrub in the canopy. Other shrubs may be present but in lower cover, including *Sambucus nigra*, *Prunus* sp., or *Toxicodendron diversilobum*...

Rhus trilobata Sierran Association (n=10)

IIA4.c *Sambucus nigra* is dominant in the shrub canopy. Stands may be found on moist north-facing slopes but are uncommon in the study area...

Sambucus nigra Association (n=1)

IIA4.d *Frangula californica* is dominant in the shrub canopy. Other shrubs may be present at low cover. Stands are in upland settings often on rocky outcrops...

Frangula californica ssp. *tomentella* Association (n=12)

IIA4.e *Cercis occidentalis* is dominant in the shrub canopy. The shrub layer is diverse with other mesic shrubs at low cover...

Cercis occidentalis Provisional Association (n=6)

IIA.5 *Baccharis pilularis* dominates the shrub overstory in disturbed areas that may have been cleared or burned. Emergent trees, other shrub species, and a variety of forbs and grasses often intermix with low cover. Found in the northern Sierra Nevada Foothills...

Baccharis pilularis Association (n=2)
of the ***Baccharis pilularis* Alliance (n=2)**

IIA.6 *Toxicodendron diversilobum* is dominant in the shrub overstory. Other shrubs such as *Rhamnus ilicifolia*, *Ceanothus cuneatus*, and *Sambucus mexicana* may intermix at low cover or sub-dominate...

***Toxicodendron diversilobum* Alliance (n=42)**

IIA6.a *Toxicodendron diversilobum* is strongly dominant in the shrub overstory. ...

Toxicodendron diversilobum / Herbaceous Shrubland Association (n=38)

II.B Non-riparian shrublands dominated by sclerophyllous (with leaves hardened by a waxy cuticle) temperate shrubs. Stands are dominated by typical chaparral shrub genera, including *Adenostoma fasciculatum*, *Arctostaphylos*, *Ceanothus*, shrubby *Quercus*, etc....

II.B.1 Chaparral stands dominated or co-dominated by *Arctostaphylos* spp. Stands often occur on upper convex slopes of hills and mountains...

II.B.1.a One or more of the following three manzanita species are dominant or co-dominant: *Arctostaphylos glandulosa*, *Arctostaphylos parryana*, and/or *Arctostaphylos glauca*. Stands are limited to the southernmost portions of the Sierra Nevada Foothills in the Tehachapi and San Emigdio Mountains ...

II.B.1.a.1 *Arctostaphylos glandulosa* is dominant in the shrub layer with *Adenostoma fasciculatum* sub-dominant. Shrub layer is intermittent to continuous and herbaceous layer is sparse. Vegetation type is uncommon in the foothills and found only in the Tehachapi Mountains above Antelope Valley...

Arctostaphylos glandulosa – *Adenostoma fasciculatum* Association (n=2)
of the ***Arctostaphylos glandulosa* Alliance (n=2)**

II.B.1.a.2 *Arctostaphylos parryana* is dominant in the shrub canopy, though other shrubs may be present with low to moderate cover. Found in the San Emigdio Mountains and occasionally in the Tehachapi Mountains...

Arctostaphylos parryana Shrubland Association (n=9)
of the ***Arctostaphylos pungens* – *Arctostaphylos pringlei* Alliance (n=9)**

II.B.1.a.3 *Arctostaphylos glauca* is dominant in the shrub canopy, though other shrubs may be present with low cover. Shrub cover is open to intermittent and herb cover is sparse. Found in the southern Sierra Nevada Foothills in the San Emigdio Mountains and the foothills west of Isabella Lake...

Arctostaphylos glauca Association (n=4)
of the ***Arctostaphylos glauca* Alliance (n=4)**

II B1.b Stands are dominated or co-dominated by *Arctostaphylos viscida*, or *A. manzanita* and can be found throughout the Sierra Nevada Foothills. In some localized stands, on ultramafic soils, *Adenostoma fasciculatum* may be dominant with *A. viscida* merely present...

II B1b.1 *Arctostaphylos viscida* intermixes with a variety of associated shrubs, including *Adenostoma fasciculatum*, *Heteromeles arbutifolia*, and *Ceanothus* spp., in the canopy. In some cases, particularly in older stands on ultramafic substrate, *A. viscida* ranges from co-dominant to sub-dominant with some stands dominated at least locally by *Adenostoma fasciculatum*. If *Quercus wislizeni* is co-dominant in the overstory see **II B.2b**...

***Arctostaphylos viscida* Alliance (n=110)**

II B1b.1a *Arctostaphylos viscida* forms an intermittent to continuous canopy as the sole dominant shrub. *Adenostoma fasciculatum* is typically absent. Other chaparral shrubs such as *Heteromeles arbutifolia* and *Quercus wislizeni* may occur with <5% cover...

Arctostaphylos viscida Association (n=31)

II B1b.1b *Adenostoma fasciculatum* characterizes an open to continuous shrub overstory while *Salvia sonomensis* characterizes the understory. *Arctostaphylos viscida* is typically co- to sub-dominant, but sometimes merely present and may occasionally be absent. Occasionally *Ceanothus lemmonii* or *C. roderickii* are the dominant shrub in the overstory with these characteristic species. If *Quercus wislizeni* is present, it typically has lower relative cover than *A. fasciculatum*. Found primarily on gabbro substrate from Butte County to southern portion of study area...

(*Arctostaphylos viscida* – *Adenostoma fasciculatum*) / *Salvia sonomensis* Association
(n=30)

II B1b.1c *Salvia sonomensis* and *Carex brainerdii* are characteristically present with variable in cover in the understory. *Adenostoma fasciculatum* and *Quercus wislizeni* are typically absent but may be present with sparse cover. This association is a regionally defined type that occurs on gabbro substrate...

Arctostaphylos viscida / *Salvia sonomensis* – *Carex (brainerdii, xerophilla)* Provisional
Association (n=7)

IB1b.1d *Arctostaphylos viscida* is present as a co-dominant or sub-dominant shrub with *Adenostoma fasciculatum*. *Heteromeles arbutifolia* is often present and may be similar in cover to the manzanita. *Salvia sonomensis* is absent. Found primarily on sedimentary, volcanic, and serpentine substrates (not found on gabbro substrate)...

Arctostaphylos viscida – *Adenostoma fasciculatum* Association (n=35)

IB1b.1e *Arctostaphylos viscida* is typically dominant in the shrub layer with *Quercus wislizeni* is characteristically present with >5% cover in the shrub and/or tree layer(s). If *Adenostoma fasciculatum* is present, it usually has lower relative cover than *Q. wislizeni*...

Arctostaphylos viscida – *Quercus wislizeni* Association (n=5)

IB1b.2 *Arctostaphylos manzanita* is dominant to co-dominant in the shrub canopy, though other shrubs may be present with moderate cover. Stands may exist in the northern and central portions of the Sierra Nevada Foothills, although the species is present, there is some uncertainty about the identity of the diagnostic species mentioned in some stands assigned to this alliance...

Arctostaphylos manzanita Association (n=2)
of the ***Arctostaphylos (canescens, manzanita, stanfordiana)* Alliance (n=2)**

IIB.2 Evergreen shrubby oaks are dominant or co-dominant in the overstory often mixing with other chaparral shrub species...

IIB2.a *Quercus john-tuckeri* is dominant in the overstory as a low tree or shrub. Emergent conifers including *Pinus monophylla* and *Juniperus californica* may be present. Other shrubs are present as sub-dominants including *Cercocarpus montanus*, *Garrya flavescens*, and *Ceanothus* spp. Stands occur in the southern Sierra Nevada foothills from the Kern River watershed, southward to the San Emigdio Mountains and Tehachapi Mountains....

Quercus john-tuckeri Association (n=11)
of the ***Quercus john-tuckeri* Alliance (n=11)**

IIB2.b *Quercus wislizeni* is dominant or co-dominant as a shrub or small tree at >30% relative cover, with other species in the overstory. *Q. berberidifolia* and *Q. chrysolepis*, if present, occur at low cover. Stands occur in the southern Sierra Nevada Foothills east of Fresno south to the San Emigdio Mountains...

***Quercus wislizeni* – *Quercus chrysolepis* (shrub) Alliance¹ (n=38)**

IIB2b.1 *Quercus wislizeni* (var. *frutescens*) is the sole dominant shrub or tree in the overstory. Other shrubs may be present at low cover. The herbaceous layer is typically sparse and non-native annual grasses are common in the stand...

Quercus wislizeni var. *frutescens* Association (n=10)

¹ Stands of shrubby statured, multi-stemmed *Quercus wislizeni* belong to the *Quercus wislizeni* – *Quercus chrysolepis* shrubland alliance. However, due to inconsistencies in the classification of these stands by the NVC and MCV and to maintain constancy between the northern and southern Sierra Nevada Foothills maps, these stands were mapped as ***Quercus wislizeni* (Short Stature) Mapping Unit.**

II B2b.2 *Cercocarpus montanus* is present to co-dominant with *Quercus wislizeni* in the shrub overstory. Other chaparral species may also be present including *Ceanothus cuneatus*...

Quercus wislizeni – *Cercocarpus montanus* Association (n=17)

II B2b.3 *Ceanothus leucodermis* is typically co-dominant in the shrub layer with *Quercus wislizeni* with *Keckiella breviflora* and *Lonicera interrupta* present to co-dominant...

Quercus wislizeni – *Ceanothus leucodermis* Association (n=7)

II B2b.4 *Carpenteria californica* is co-dominant with *Quercus wislizeni* in the shrub layer. *Aesculus californica* is usually emergent in the tree layer...

Quercus wislizeni – *Carpenteria californica* Provisional Association (n=4)

II B2b.5 *Quercus wislizeni* is the primary species in the overstory, usually occurring as a tree, but occasionally as a tall shrub with *Arctostaphylos viscida*. Both species typically have at least 5% absolute cover. *Heteromeles arbutifolia* and other shrubs. Typically of upper slopes and relatively exposed, upland settings...

Quercus wislizeni – (*Pinus sabiniana*) / *Arctostaphylos viscida* Association (n=21)
of the ***Quercus wislizeni* – *Quercus parvula* (tree) Alliance (n=478)**

II B2.c *Quercus durata* is dominant or co-dominant in the shrub canopy with *Adenostoma fasciculatum*. *Arctostaphylos viscida* may be present at low cover and *Salvia sonomensis* is present in the understory with native forbs and grasses Found primarily on gabbro or serpentine substrates in the northern Sierra Nevada Foothills...

Quercus durata – *Adenostoma fasciculatum* / *Salvia sonomensis* Shrubland Provisional Association (n=4)
of the ***Quercus durata* Alliance (n=4)**

II B2.d *Quercus berberidifolia* is dominant or co-dominant with other shrubs in the canopy. Trees may be emergent but have relatively low cover compared to shrubs...

***Quercus berberidifolia* Alliance (n=26)**

II B2d.1 *Quercus berberidifolia* is the sole dominant shrub in the intermittent to continuous shrub layer...

Quercus berberidifolia Association (n=5)

II B2d.2 *Quercus berberidifolia* and *Adenostoma fasciculatum* are co-dominant in the shrub canopy. *A. fasciculatum* typically has higher cover than *Q. berberidifolia* and other shrubs are present to co-dominant as well...

Quercus berberidifolia – *Adenostoma fasciculatum* Association (n=1)

II B2d.3 *Quercus berberidifolia* and *Cercocarpus montanus* are co-dominant in the shrub layer...

Quercus berberidifolia – *Cercocarpus montanus* Association (n=3)

II B2d.4 *Ceanothus cuneatus* and *Quercus berberidifolia* form an open to continuous shrub canopy with other chaparral shrubs such as *Cercocarpus montanus*, *Eriodictyon californicum*, and *Arctostaphylos* spp....

Quercus berberidifolia – *Ceanothus cuneatus* Association (n=11)

II B2d.5 *Quercus berberidifolia*, *Heteromeles arbutifolia*, and *Toxicodendron diversilobum* form an intermittent to continuous shrub canopy on north-facing slopes. *Fraxinus dipetala* may also be present and sometimes co-dominant...

Quercus berberidifolia – *Heteromeles arbutifolia* Association (n=4)

II B.3 Stands are dominated by sclerophyllous shrubs other than *Arctostaphylos* spp. or *Quercus* spp. including *Cercocarpus montanus*, *Heteromeles arbutifolia*, *Ceanothus* spp., *Fremontodendron californica*, and *Adenostoma fasciculatum*...

II B3.a *Cercocarpus montanus* is dominant or co-dominant in the shrub layer with *Ceanothus cuneatus*, *Adenostoma fasciculatum*, or *Juniperus californica* as a small tree or shrub, forming an open to intermittent canopy. Occasionally other shrubs such as *Arctostaphylos viscida* and *Artemisia tridentata* can reach co-dominance...

***Cercocarpus montanus* Alliance (n=34)**

II B3a.1 *Cercocarpus montanus* is typically the sole dominant in the overstory with a variety of other shrubs such as *Brickellia californica* and *Cercis occidentalis* occurring at sparse cover. The herb understory is open...

Cercocarpus montanus var. *glaber* Association (n=18)

II B3a.2 *Cercocarpus montanus* and *Ceanothus cuneatus* form an open to intermittent shrub canopy, where the two species usually co-dominate. Other shrub species including *Toxicodendron diversilobum* may intermix at low cover. Found primarily on volcanic soils in the northern portion of the study area...

Cercocarpus montanus – *Ceanothus cuneatus* Association (n=6)

II B3a.3 *Cercocarpus montanus* is co-dominant with *Adenostoma fasciculatum*. While both shrubs exhibit at least 30% relative cover in the shrub layer, other shrubs such as *Arctostaphylos* spp. and *Rhamnus ilicifolia* are present...

Cercocarpus montanus – *Adenostoma fasciculatum* Association (n=1)

II B3a.4 *Cercocarpus montanus* is co-dominant in a diverse shrub layer. Other shrubs present include *Toxicodendron diversilobum*, *Eriodictyon californicum*, *Rhamnus ilicifolia*, and *Fremontodendron californicum*. Stands are typically post-disturbance such as fire...

Cercocarpus montanus – *Fremontodendron californicum* Association (n=4)

II B3a.5 *Ceanothus cuneatus* and *Quercus john-tuckeri* are co-dominant with *Cercocarpus montanus*. Stands are found in the southern Sierra Nevada Foothills...

Cercocarpus montanus – *Ceanothus cuneatus* – *Quercus john-tuckeri* Association (n=2)

II B3.b *Heteromeles arbutifolia* dominates the shrub canopy, though *Ceanothus cuneatus* is typically present and may be co-dominant. Found primarily on serpentine substrate in the northern Sierra Nevada Foothills...

Heteromeles arbutifolia Serpentine Association (n=7)
of the ***Prunus ilicifolia* – *Heteromeles arbutifolia* – *Ceanothus spinosus* Alliance (n=7)**

II B3.c *Fremontodendron californicum* is typically dominant in the shrub layer but may be co-dominant with *Ceanothus greggii*. Other shrubs including *Cercocarpus montanus*, *Eriodictyon californica*, and *Ephedra viridis* may be present at low cover...

***Ceanothus greggii* – *Fremontodendron californica* Alliance (n=14)**

II B3c.1 *Fremontodendron californicum* is dominant in the shrub layer or co-dominant with *Ceanothus greggii*, *C. cuneatus*, or *Cercocarpus montanus* but *F. californicum* has higher cover than any other shrub species...

Fremontodendron californicum Association (n=13)

II B3.d *Adenostoma fasciculatum* is dominant to co-dominant in the overstory with other chaparral species such as *Arctostaphylos manzanita* and *Heteromeles arbutifolia*, and disturbance related chaparral species such as *Eriodictyon californicum* and *Lotus scoparius*. If *A. fasciculatum* co-dominates with *Arctostaphylos viscida*, *Ceanothus* spp., or shrubby oak species, key to those alliances....

***Adenostoma fasciculatum* Alliance (n=66)**

II B3d.1 *Eriodictyon californicum* and/or (*Lotus scoparius*) form an open to continuous shrub canopy with *Adenostoma fasciculatum*. *Heteromeles arbutifolia* is often present and may reach a level of co-dominance but no other shrub species has significant cover in the overstory. The understory is comprised of non-native forbs and grasses...

Adenostoma fasciculatum – (*Lotus scoparius* – *Eriodictyon* spp.) Association (n=15)

II B3d.2 *Adenostoma fasciculatum* is strongly dominant in the shrub canopy and other chaparral species if present, are relatively low in cover, including *Arctostaphylos* spp., *Ceanothus cuneatus*, and/or *Eriodictyon californicum*. Found typically on sedimentary and igneous substrates, and occasionally on ultramafic substrate...

Adenostoma fasciculatum Association (n=43)

II B3d.3 *Arctostaphylos manzanita* is characteristically present, having similar or lower cover to *Adenostoma fasciculatum*. *Heteromeles arbutifolia* is often present, sometimes having higher cover than *Adenostoma fasciculatum*. *A. viscida* and *Ceanothus cuneatus* are typically absent, but may occasionally have sparse cover...

Adenostoma fasciculatum – *Arctostaphylos manzanita* Association (n=6)

II B3.e *Ceanothus cuneatus* is typically dominant in the shrub layer or may be co-dominant with *Adenostoma fasciculatum* or *Eriodictyon californicum*. If it is co-dominant with *Cercocarpus montanus*, key to that alliance. Trees such as *Pinus sabiniana* may be present in the overstory but have significantly less cover than the shrubs...

***Ceanothus cuneatus* Alliance (n=156)**

II B3e.1 *Ceanothus cuneatus* forms an open to intermittent shrub canopy as the sole dominant shrub. Other chaparral shrubs may occur occasionally with low cover. Native herbs that are characteristically present in the open to intermittent understory include *Plantago erecta* and *Vulpia microstachys*. Found on serpentine substrate...

Ceanothus cuneatus / *Plantago erecta* Association (n=20)

II B3e.2 *Ceanothus cuneatus* and *Adenostoma fasciculatum* co-dominate in an intermittent to continuous shrub canopy. Other chaparral shrubs are usually present at low cover. *Aira caryophylla* and other herbs comprise a sparse to open understory...

Ceanothus cuneatus – *Adenostoma fasciculatum* Association (n=4)

II B3e.3 *Ceanothus cuneatus* forms an open to continuous shrub canopy as the sole dominant shrub with at least 50% relative cover. Other chaparral shrubs may occur but are sub-dominant. Emergent trees are also often present at low covers. The understory is comprised mostly of non-native grasses and forbs...

Ceanothus cuneatus Association (n=118)

II B3e.4 *Ceanothus cuneatus* is co-dominant with other chaparral shrub species including *Eriodictyon californicum*. *Fremontodendron californicum* is often present but at lower cover than *C. cuneatus*. The understory is comprised mostly of non-native grasses and forbs...

Ceanothus cuneatus – *Eriodictyon californicum* – (*Fremontodendron californicum*)
Association (n=12)

II B3.f *Ceanothus leucodermis* is dominant to co-dominant with other chaparral shrubs in the shrub layer. Trees may be emergent, and the herbaceous layer is typically sparse to open. Stands typically occur on relatively early post-fire sites in the southern Sierra Nevada Foothills...

Ceanothus leucodermis Association (n=10)
of the ***Ceanothus leucodermis* Shrubland Alliance (n=10)**

II.C Non-riparian shrublands dominated by drought and cold deciduous shrubs (with the exception of *Hesperoyucca whipplei*) that are largely restricted to cis-montane California west of the deserts.

Dominant shrubs include *Eriogonum fasciculatum*, *Ericameria linearifolia*, *Eriodictyon* spp., *Cleome isomeris*, *Lotus scoparius*, *Lupinus albifrons*, *Diplacus aurantiacus*, and *Cytisus* spp....

II C.1 *Ericameria linearifolia*, *Cleome isomeris*, or *Eastwoodia elegans* are dominant or co-dominant in the shrub layer. Typically found on north-facing, steep slopes in the southern Sierra Nevada Foothills in the Tehachapi Mountains...

***Ericameria linearifolia* – *Cleome isomeris* Alliance (n=9)**

II C1.a *Cleome isomeris* is dominant in the shrub overstory. Found often on steep slopes and in washes...

Cleome isomeris Provisional Association (n=6)

II C1.b *Ericameria linearifolia* is primarily dominant or co-dominant with other shrubs in the shrub overstory...

Ericameria linearifolia Association (n=3)

II C.2 *Eriogonum fasciculatum* and/or *Hesperoyucca whipplei* are dominant or co-dominant in the shrub layer together usually accounting for >50% of the shrub cover. Stands are found on steep slopes typically west of the Sierra crest from west of Sequoia NP to the Tehachapi and San Emigdio Mountains. Occasionally, *Encelia actonii* is dominant on steep gravelly slopes with *H. whipplei* present. *E. actonii* dominant in washes is keyed out as *Encelia (actonii, virginensis)* – *Viguiera reticulata* Alliance...

***Eriogonum fasciculatum* Alliance (n=57)**

II C2.a *Eriogonum fasciculatum* is dominant shrub in the canopy. Other shrubs may be present as sub-dominants...

Eriogonum fasciculatum Association (n=28)

II C2.b *Hesperoyucca whipplei* is present with at least 2% cover, and it is sometimes co-dominant with *Eriogonum fasciculatum*...

Eriogonum fasciculatum var. *foliolosum* – *Hesperoyucca whipplei* Association (n=15)

II C2.c *Hesperoyucca whipplei* or *Encelia actonii* is dominant or may be co-dominant with other shrubs such as *Ribes quercetorum*, *Ceanothus cuneatus*, *Eriodictyon californica* or *Toxicodendron diversilobum*. *Eriogonum fasciculatum* is noticeably absent from these stands or has very low cover...

Hesperoyucca whipplei Association (n=13)

II C.3 *Eriodictyon californicum*, *E. crassifolium*, *E. parryi*, *Lupinus* spp., *Lotus scoparius*, or other disturbance related shrubs dominate the shrub canopy with low to moderate cover. *Adenostoma fasciculatum* is typically absent...

***Lotus scoparius* – *Lupinus albifrons* – *Eriodictyon* spp. Alliance (n=91)**

IIC3.a *Eriodictyon californicum* dominates the shrub canopy with open to intermittent cover over annual grasses and forbs. Other shrubs may intermix at relatively low cover. Found often in recently disturbed sites including those recently burned, and tolerates serpentine substrates...

Eriodictyon californicum / herbaceous Association (n=42)

IIC3.b *Eriodictyon crassifolium* occurs as the dominant shrub in an open to intermittent overstory while other shrubs may be present at low cover...

Eriodictyon crassifolium Association (n=4)

IIC3.c *Lotus scoparius* is dominant to co-dominant with other short-lived shrubs in the shrub overstory including *Eriodictyon californicum* in the shrub overstory, forming an open to intermittent canopy. Found in recently disturbed areas, often from fire and/or mining...

Lotus scoparius Association (n=11)

IIC3.d Low shrublands in open dry alluvial and fluvial terraces, dominated by *Lupinus albifrons* var. *albifrons*. Other shrubs present at low cover may include *Lotus scoparius*. The understory herbaceous layer generally includes *Senecio flaccidus*, *Bromus hordeaceus*, *Bromus diandrus*, or *Bromus madritensis*...

Lupinus albifrons – *Senecio flaccidus* var. *douglasii* Association (n=5)

IIC3.e Usually steep or alluvial, rocky surfaces dominated by *Lupinus albifrons* in the overstory. The herbaceous layer may be diverse and high in cover with native and non-native species...

Lupinus albifrons Association (n=24)

IIC3.f *Eriodictyon parryi* is dominant in the shrub canopy. Stands have not been widely surveyed but may be found in the southern Sierra Nevada foothills and the Transverse and Peninsular ranges ...

Eriodictyon parryi Provisional Association (n=1)

IIC.4 Shrublands on moderate to abrupt slopes on most aspects, often unstable, or recently burned, or a product of recent land or rockslides, and dominated by *Diplacus aurantiacus*. Other shrubs may be present with low cover, such as *Eriodictyon californicum*, *Toxicodendron diversilobum*, or *Lotus scoparius*. Moss and lichen are always present and can be quite abundant in the understory...

Diplacus (aurantiacus, puniceus) Association (n=3)
of the ***Diplacus aurantiacus* Alliance (n=3)**

IIC.5 *Malacothamnus fremontii* or *M. fasciculatus* is the dominant or codominant shrub species in the canopy. These stands typically arise following fire or other disturbance events and do not persist for more than a decade or so...

***Malacothamnus fasciculatus* – *Malacothamnus* spp. Alliance (n=1)**

II C.6 *Cytisus scoparius* is dominant in the overstory. Stands occur in disturbed areas and often have a high cover of other non-natives...

Cytisus scoparius Association (n=1)

of the ***Cytisus scoparius* – *Genista monspessulana* – *Cotoneaster* spp. Semi-Natural Alliance**
(n=1)

Group III. Shrublands dominated or characterized by plants with xeromorphic adaptations typical of deserts or the drier warmer parts of interior California, west of the deserts, including such genera as: *Ambrosia*, *Artemisia*, *Atriplex*, *Encelia*, *Ephedra*, *Ericameria*, *Eriogonum*, *Isocoma* and *Lepidospartum*...

III.A Stands in alkaline settings found in warmer interior California west of the deserts and dominated by *Isocoma acradenia*. Shrub canopy is open and other shrubs may be sub-dominant. The herb layer is usually well-developed, including natives and non-natives...

Isocoma acradenia Association (n=1)
of the ***Suaeda moquinii* Alliance** (n=1)

III.B Stands found in desert washes characterized by species such as *Encelia actonii*, *Lepidospartum squamatum*, *Prunus fasciculata*, *Ambrosia salsola*, *Ephedra californica*. Stands are not common in the Sierra Nevada Foothills but can be found in the southern part of the ecoregion where desert influences occur...

IIIB.1 *Encelia actonii* has $\geq 2\%$ cover and other wash indicator species such as *Ambrosia salsola* are present. No other shrub species has greater or equal cover. Stands occur in washes in the study area near Lake Isabella...

Encelia actonii Association (n=1)
of the ***Encelia (actonii, virginensis)* – *Viguiera reticulata* Alliance**

IIIB.2 Vegetation characterized by *Lepidospartum squamatum*. Stands are concentrated along washes on the western foothills from the Kern River south in the Sierra Nevada foothills. Usually in larger washes with regular flooding, the substrate texture is coarse sand to small cobbles to gravel. Some old senescent stands have been isolated on higher terraces adjacent to rapidly downcutting stream channels...

***Lepidospartum squamatum* Alliance** (n=9)

IIIB2.a *Lepidospartum squamatum* is dominant in the shrub canopy. Other shrubs, if present, are at low cover and a variety of herbs are present in the understory...

Lepidospartum squamatum / ephemeral annuals Association (n=5)

IIIB2.b *Lepidospartum squamatum* is characteristically present with a diverse mix of species including the presence of one or more of the following species, *Eriodictyon* spp., *Hesperoyucca whipplei*, and *Lupinus albifrons*. Stands occur on more recently disturbed

alluvial fans, with disturbance from fire and flood...

Lepidospartum squamatum – *Eriodictyon trichocalyx* – *Hesperoyucca whipplei* Association
(n=2)

IIIB2.c *Baccharis salicifolia* is sub-dominant to co-dominant in the shrub canopy...

Lepidospartum squamatum – *Baccharis salicifolia* Association (n=2)

IIIB.3 *Prunus fasciculata* is dominant in the shrub layer. Typically, of washes and arroyos but may occur on wash terraces or on rocky concave slopes. Occurs in the Tehachapi and San Emigdio Mountains...

Prunus fasciculata Association (n=1)
of the ***Prunus fasciculata* – *Salazaria mexicana* Alliance (n=1)**

IIIB.4 *Ambrosia salsola* is dominant or co-dominant in the shrub layer. Stands are uncommon in the region but may be found in washes or other disturbed areas...

***Ambrosia salsola* – *Bebbia juncea* Alliance (n=1)**
No Association defined

IIIB.5 *Ephedra californica* is dominant or co-dominant in the shrub overstory, forming a sparse to open canopy. Typically found in disturbed areas...

Ephedra californica* – *Ephedra trifurca* Alliance

IIIB.6 *Atriplex polycarpa* is dominant in the open shrub layer with >50% relative cover. Non-native annuals are dominant in the herbaceous layer ranging from sparse to open. Found at lower elevations in southern Sierra Nevada Foothills in washes and ravines above the Central Valley, or uplands with alkaline substrate as in the foothills east of Bakersfield...

Atriplex polycarpa / annual herbaceous Association (n=3)
of the ***Atriplex polycarpa* Alliance (n=3)**

IIIB.7 *Atriplex canescens* is dominant or co-dominant in the shrub layer along washes with other disturbance or wash indicator shrubs including *Ericameria nauseosa* and *Ambrosia salsola*...

Atriplex canescens desert wash Association (n=1)
of the ***Atriplex canescens* Alliance (n=1)**

III.C Shrublands dominated by upland species commonly found in the cool semi-deserts of the Great Basin and/or the Mojave Desert including *Artemisia tridentata*, *Prunus andersonii*, *Cercocarpus ledifolius*, *Ephedra* spp., *Ericameria* spp., and *Eriogonum wrightii*...

IIIC.1 Semi-arid shrublands dominated or co-dominated by *Artemisia tridentata*. In disturbed settings *Prunus andersonii* dominant or co-dominant with other disturbance related species...

IIIC1.a *Artemisia tridentata* is dominant in the shrub layer. *Ceanothus* spp., *Ericameria nauseosa*, *Eriogonum fasciculatum*, *Eriogonum wrightii*, or *Ribes quercetorum* may be co-dominant. Other shrubs are typically present at low cover. Trees such as *Juniperus californica*, *Quercus douglasii*, and *Pinus monophylla* may be emergent. Found in the southern Sierra Nevada Foothills...

***Artemisia tridentata* Alliance (n=25)**

IIIC1a.1 *Eriogonum wrightii* is sub-dominant to co-dominant in the shrub canopy. Stands can be found in the southern Sierra Nevada Foothills in desert transitional zones...

Artemisia tridentata – *Eriogonum wrightii* Association (n=6)

IIIC1a.2 *Artemisia tridentata* is dominant in the shrub overstory and *Ericameria nauseosa* and/or other disturbance related shrubs are characteristic...

Artemisia tridentata – *Ericameria nauseosa* Association (n=5)

IIIC1a.3 *Artemisia tridentata* is dominant in the shrub canopy and *Ceanothus cuneatus* is characteristic to co-dominant. Other shrub species are also present including *Fremontodendron californicum*, *Sambucus nigra*, and *Keckiella breviflora*...

Artemisia tridentata – *Ceanothus cuneatus* Association (n=14)

IIIC1.b *Prunus andersonii* is dominant to co-dominant in the shrub layer with disturbance related shrubs such as *Tetradymia canescens*, *Chrysothamnus viscidiflorus*, and *Ericameria nauseosa*. The herbaceous layer is sparse to open and often characterized by *Bromus tectorum* or other non-native species. *Eriogonum* spp. are often present. Disturbance such as fire is usually evident...

Purshia tridentata – *Artemisia tridentata* – (*Tetradymia canescens* / *Eriogonum umbellatum*) Association (n=1)
of the ***Purshia tridentata* – *Artemisia tridentata* Alliance (n=1)**

IIIC1.c The low shrub *Eriogonum wrightii* is characteristic and is usually dominant or co-dominant with native perennial and non-native annual herbs in rocky sites on ridges and upper slopes that often have experienced some disturbance. *Eriogonum wrightii* is found on nutrient poor, gravelly slopes in the southern Sierra Nevada Foothills...

***Eriogonum wrightii* – *Eriogonum heermannii* – *Buddleja utahensis* Alliance (n=13)**

IIIC1c.1 *Eriogonum wrightii* is dominant in the stand although other shrubs such as *Ericameria nauseosa* may be present...

Eriogonum wrightii (ssp. *subscaposum*, ssp. *wrightii*) Association (n=11)

IIIC1c.2 *Eriogonum wrightii* is characteristic in the stand with *Eriophyllum confertiflorum*, which may have greater cover. A variety of herbaceous species also occur, including *Poa secunda* and *Avena* spp....

Eriogonum wrightii – *Eriophyllum confertiflorum* / *Monardella antonina* ssp. *benitensis*
Association (n=1)

IIIC1.d *Eriogonum fasciculatum* is dominant in the shrub layer with other desert scrub species including *Ericameria* spp., *Ephedra* spp., and *Opuntia* spp. Cis-montane shrub species including *Hesperoyucca whipplei* and *Ceanothus cuneatus* are typically absent. Stands occur in areas transitioning to desert in the San Emigdio Mountains and near Lake Isabella...

***Eriogonum fasciculatum* – *Viguiera parishii* Alliance (n=3)**

IIIC1d.1 *Ericameria linearifolia* is co-dominant with *Eriogonum fasciculatum* in the shrub layer...

Eriogonum fasciculatum – *Ericameria* (*laricifolia*, *linearifolia*) Association (n=1)

IIIC1d.2 *Eriogonum fasciculatum* is dominant in alluvial wash settings. *Ericameria nauseosa* is usually present...

Eriogonum fasciculatum (Wash) Association (n=2)

IIIC1.e Species of *Ephedra* are co-dominant to dominant with other desert shrubs...

IIIC1e.1 Stands of the *Ephedra nevadensis* – *Lycium andersonii* – *Grayia spinosa* Alliance occupy the transition between warm desert and cool desert vegetation in the Tehachapi Mountains, and in the upper Kern River Valley south-east of Lake Isabella. *G. spinosa* does resprout after fire, and along with *Salazaria mexicana*, *Encelia actoni*, and *Lycium andersonii*, may replace *Coleogyne ramosissima* stands as a result. There are many post-fire seral stands that have strong mixtures of multiple species. If *Ephedra viridis* is present at ≥ 2% cover and evenly distributed, please see *E. viridis* Alliance...

Ephedra nevadensis* – *Lycium andersonii* – *Grayia spinosa* Alliance

IIIC1e.2 *Ephedra viridis* is dominant with > 50% relative cover in the shrub layer. *Eriogonum fasciculatum* is present with other shrubs including *Hesperoyucca whipplei*. Herbaceous cover is sparse...

Ephedra viridis Association (n=5)
of the ***Ephedra viridis* Alliance (n=5)**

IIIC1.f *Ericameria nauseosa* dominates stands in recently burned or otherwise disturbed portions of the southern foothills. If *E. nauseosa* is co-dominant with *Eriogonum fasciculatum*, key to the *E. fasciculatum* Alliance. If present, *Juniperus californica* has trace cover. Several

subspecies are included in this type (e.g., *E. nauseosa* var. *mohavensis* in the cismontane or desert sides of the study area, or *E. nauseosa* var. *hololeuca* in some semi-riparian stands in the Tehachapi Mountains) ...

Ericameria nauseosa Association (n=16)
of the ***Ericameria nauseosa* Alliance (n=16)**

IIIC1.g *Ericameria teretifolia* is dominant in the shrub layer. Stands may occupy shallow rocky post-fire stands associated with *Juniperus californica* or other upland alliances or in washes. In our area it is usually found as low cover shrubland in granitic or other rocky uplands on south- or north-facing steep, boulder slopes, and is more warm-tolerant than *Ephedra viridis* and thus usually at lower elevations. When co-dominant with *Grayia* spp., *E. viridis*, *Coleogyne* spp., or *Salazaria* spp., key to those alliances. Stands are in the southern Sierra Nevada foothills near the desert margins (Lake Isabella, Tehachapi Mountains, and San Emigdio Mountains), usually on rocky slopes or at bases of outcrops...

Ericameria teretifolia Association (n=1)
of the ***Ericameria teretifolia* Alliance (n=1)**

IIIC1.h *Cercocarpus ledifolius* is codominant as a shrub layer or short tree in the overstory. Conifers such as *Pinus jeffreyi* or *P. monophylla* may be emergent at low cover...

***Cercocarpus ledifolius* Alliance (n=1)**
No Associations defined

Group IV. Sparsely vegetated (<10% absolute cover) stands occurring on steep boulder covered slopes or on steep canyon slopes. *Ericameria cuneata* is dominant or co-dominant with *Toxicodendron diversilobum*, *Diplacus aurantiacus* or *Eriodictyon californicum*. A high cover of lichen, moss and/or *Selaginella* spp. is usually present.

Californian Cliff, Scree & Rock Vegetation Group

Class C. Herbaceous Vegetation

Group I. Grasslands and broad-leaved herbaceous stands restricted to upland settings usually with only ambient precipitation (no additional moisture due to proximity to permanent or intermittent streams, rivers, ponds, etc.).

I.A Vegetation characterized by native or non-native grasses and herbs adapted to a summer-dry, Mediterranean climate...

California Annual and Perennial Grassland Macrogroup

Note: stands that are assumed to contain native species especially without wildflower signatures have been mapped at the Macrogroup level.

IA.1 Stands characterized by native grasses and herbs, though they may be low in cover. Native grasses and herbs are characteristic and evenly distributed across the herbaceous layer, though non-native forbs and grasses may be dominant. If non-native herbs and grasses are present, they are not strongly dominant, with the native species evenly distributed and generally at least 10%

relative cover throughout the stand...

IA1.a Stands dominated or characterized by annual grasses and forbs. Cover and composition vary from year to year depending upon timing and quantity of available moisture, but native herbs and grasses are usually present in sufficient amounts or with low cover but high diversity of native species to differentiate from non-native stands. Diagnostic species include *Amsinckia* spp., *Eschscholzia* spp., *Lupinus* spp., *Lasthenia* spp., *Plantago erecta* and *Vulpia microstachys*. Stands are variable from year to year. Many stands are difficult to determine to finer floristic levels, except during peak phenology following adequate rainfall...

California annual herb/grass Group

IA1a.1 *Eschscholzia californica*, *E. caespitosa*, or *E. lobbii*. and/or *Lupinus bicolor*, *L. nanus*, *L. microcarpus*, or *L. benthamii* are seasonally dominant on upland slopes or flats with well-drained sandy to loamy soils. A variety of other native and non-native forbs and grasses may be present. In the southern foothills stands are often associated with perennial stands of the *Poa secunda*, *Achnatherum speciosum*, *Eriogonum fasciculatum*, *Ericameria linearifolia* – *Cleome isomeris*, and/or *E. nauseosa* Alliances. If *Plagiobothrys nothofulvus* is co-dominant with *Eschscholzia* spp., key here. If *P. nothofulvus* is co-dominant with *L. bicolor*, key to the *Plagiobothrys nothofulvus* Alliance...

Eschscholzia (californica) – Lupinus (nanus) Alliance (n=60)

IA1a.1a *Lupinus nanus* is dominant to co-dominant in the herb layer with *Bromus hordeaceus* and diverse *Trifolium* species including *T. hirtum*, *T. dubium*, *T. depauperatum*, and *T. microcephalum*...

Bromus hordeaceus – *Lupinus nanus* – *Trifolium* spp. Association (n=7)

IA1a.1b *Eschscholzia californica*, or similar *Eschscholzia* spp., is dominant in the herbaceous layer with a variety of non-native forbs and grasses which may be higher in cover. If *Lupinus bicolor* is present, it has less than half the cover of the *Eschscholzia* spp. cover...

Eschscholzia californica Association (n=11)

IA1a.1c *Lupinus bicolor* is always present and characteristic and may be co-dominating with *Erodium botrys*. *Eschscholzia* spp. and *Plagiobothrys* spp. are typically absent...

Lupinus bicolor Association (n=6)

IA1a.1d *Lupinus benthamii* and/or *Chorizanthe membranacea* are characteristic in the herb layer with variable cover and a high herbaceous species diversity (native or not). Typically found on hot, dry, south-facing slopes with well-draining rocky or sandy substrates...

Lupinus benthamii – *Chorizanthe membranacea* Association (n=32)

IA1a.2 *Eschscholzia* spp. and/or *Lupinus* spp. are not conspicuous in the spring flowering

season. Other wildflower species characteristic of Mediterranean California are present. *Amsinckia menziesii*, *A. tessellata*, *A. vernicosa*, and/or annual species of *Phacelia* are seasonally characteristic in the herbaceous layer with greater than or equal to 10% relative cover. Soils are often well-drained and loamy and may have high levels of bioturbation (e.g., rodent burrows) and/or high levels of (past/current) grazing...

***Amsinckia (menziesii, tessellata) – Phacelia* spp. Alliance (n=30)**

IA1a.2a *Amsinckia menziesii* or *A. tessellata* are present and typically dominant to co-dominant with non-native annual grasses and herbs such as *Bromus diandrus*, *B. hordeaceus*, and *Erodium* spp. Other natives present may include *Lupinus bicolor*, *Thysanocarpus curvipes*, and *Claytonia perfoliata*. If *Lupinus bicolor* dominant, see the *Eschscholzia (californica) – Lupinus (nanus)* Alliance...

Amsinckia (intermedia, menziesii) Association (n=14)

IA1a.2b *Phacelia cicutaria* is present and strongly dominant in the herb layer...

Phacelia cicutaria Provisional Association (n=9)

IA1a.2c *Phacelia tanacetifolia* and/or *Amsinckia eastwoodiae* is present and often co-dominant in the herb layer with non-native annual grasses and herbs such as *Bromus diandrus* and *Erodium cicutarium*, though native herb diversity is often high...

Phacelia tanacetifolia Association (n=6)

IA1a.3 *Vulpia microstachys*, *Plantago erecta*, *Lasthenia californica* and/or *L. gracilis* are characteristically present in stands and usually at least 10% relative herb cover. Other native species such as *Castilleja exserta*, *Lupinus* spp., and *Trifolium* spp. are often well-represented and sometimes co-dominant. Soils may be clayey, wet to moist in spring and dry by summer. Generally occurring on loamy soils, compared to the *Monolopia (lanceolata) – Coreopsis (calliopsidea)* Alliance. If *Achyrrachaena mollis* and/or *Layia fremontii* are characteristically present, see *Layia fremontii – Achyrrachaena mollis* Alliance...

***Lasthenia californica – Plantago erecta – Vulpia microstachys* Alliance (n= 190)**

IA1a.3a *Lasthenia californica* is strongly dominant in the herbaceous layer with *Plantago erecta*, *Triphysaria eriantha*, *Trifolium depauperatum*, and *Layia fremontii* on vernal wet depressions on volcanic mud flow or basalt. If *Layia fremontii* is co-dominant, see the *Layia fremontii – Achyrrachaena mollis* Alliance of the Californian mixed annual / perennial freshwater vernal pool / swale bottomland Group...

Lasthenia (californica, gracilis) Association (n=26)

IA1a.3b *Layia pentachaeta* is strongly dominant to co-dominant to *Plagiobothrys* spp.

and/or *Vulpia myuros* in the herbaceous layer...

Layia pentachaeta – *Plagiobothrys (canescens)* Association (n=2)

IA1a.3c *Lepidium nitidum* is co-dominant with or without *Trifolium gracilentum* and *Vulpia microstachys* and is often with non-native annual grasses and herbs such as *Bromus* spp., *Avena* spp., and *Erodium* spp....

Lepidium nitidum – *Trifolium gracilentum* – *Vulpia microstachys* Association (n=2)

IA1a.3d *Vulpia microstachys* is co-dominant in the herbaceous layer with *Bromus hordeaceus*, *Vulpia myuros*, and *Avena* spp. *Plantago erecta* and *Lasthenia* spp. are absent. Native *Trifolium* spp. commonly occur in stands...

Vulpia microstachys Association (n=5)

IA1a.3e *Vulpia microstachys* is co-dominant with *Elymus elymoides* and/or *Achnatherum lemmonii*. *Lessingia virgata*, *Petrorhagia dubia*, and *Minuartia* spp. may also have significant cover...

Vulpia microstachys – *Elymus elymoides* – *Achnatherum lemmonii* Association (n=8)

IA1a.3f *Vulpia microstachys* and *Plantago erecta* occur with characteristic species *Navarretia tagetina*, *Bromus hordeaceus*, and *Hemizonia fitchii*. Other mesic species indicating vernal wet, clay soils may be present including *Triphysaria eriantha*, *Juncus bufonius*, and *Centaureum muhlenbergia*. If *Lasthenia californica* is present, it is sub-dominant to *Vulpia microstachys*. In late spring, *Calycadenia* spp. may have significant cover. *Navarretia tagetina* is limited in distribution as species to northern California, as a result this type is only known to occur in the Northern Sierra Nevada foothills...

Vulpia microstachys – *Navarretia tagetina* Association (n=28)

IA1a.3g *Vulpia microstachys* and *Plantago erecta* occur with a high diversity of other native and non-native species including *Trifolium depauperatum*, *Gilia tricolor*, *Bromus hordeaceus*, and *Hypochaeris glabra*. In late spring, *Calycadenia* spp. may have significant cover. *Lasthenia californica* can be similar in cover with *Vulpia microstachys* and *Plantago erecta* when relative herb cover is dominated by *Calycadenia* spp. or when the cover of *Lasthenia californica*, *Plantago erecta*, and *Vulpia microstachys* are all low (typically less than 1% absolute cover). Key to *Vulpia microstachys* – *Navarretia tagetina* Association if *Navarretia tagetina* is present or *Plantago erecta* is conspicuously absent. While this type is ecologically similar to the *Vulpia microstachys* – *Navarretia tagetina* Association, it is a broader ranging association, occurring in both the northern and southern Sierra Nevada Foothills...

Vulpia microstachys – *Plantago erecta* Association (n=20)

IA1a.3h *Vulpia microstachys* and *Sedella pumila* are co-dominant to characteristic in the herb layer with *Lasthenia californica*, *Plantago erecta*, and *Selaginella* spp....

Vulpia microstachys – *Sedella pumila* – *Lasthenia californica* Association (n=23)

IA1a.3i *Selaginella hansenii* and *Vulpia microstachys* occur on rocky volcanic substrate, intermixing with other native species such as *Plantago erecta*, *Lessingia virgata*, *Lupinus nanus*, *Lupinus spectabilis*, *Minuartia californica*, *Dichelostemma capitatum*, *Hypochaeris glabra*, and *Triphysaria eriantha*. *Sedella pumila* is typically absent or, when present, uncharacteristic and trace in cover. Generally, restricted to rocky substrates, including slate, metamorphic, ultramafic, or volcanic rock...

Vulpia microstachys – *Selaginella hansenii* Association (n=71)

IA1a.4 *Monolopia stricta* and/or *Coreopsis calliopsidea* or *C. stillmanii* are seasonally dominant or co-dominant on fine-textured soil on moderate to steep slopes. Less than 2% absolute shrub cover and/or shrubs not evenly distributed. Stands of *C. stillmanii* form bright golden-yellow patches on fine textured serpentine soils in the central Foothills in Mariposa and Tuolumne counties (near Coulterville). More broadly throughout this alliance's range in Central and Southern California, *Coreopsis* spp. can occur without *Monolopia* spp....

***Monolopia (lanceolata)* – *Coreopsis (calliopsidea)* Alliance (n=1)**

IA1a.4a *Coreopsis calliopsidea*, *Mentzelia pectinata*, *Monolopia* spp., and/or *Camissonia boothii* seasonally dominant or co-dominant with a variety of other native herbs. Due to the limited range of these species within the Sierra Nevada Foothills, this type is likely limited in range to the far southern portions of the Sierra Nevada Foothills...

Coreopsis calliopsidea – *Mentzelia pectinata* Association (n=1)

IA1a.5 *Plagiobothrys nothofulvus* or other *Plagiobothrys* spp. are dominant and/or characteristic in spring season with good rainfall. Species such as *Daucus pusilis* and *Trifolium* spp are often a characteristic. In late spring/summer season, stands are characterized by *Madia elegans* and *Clarkia* spp., which may occur with or without *Plagiobothrys nothofulvus*. Stands are mappable in the study area on well-drained gentle to steep slopes. Stands with *Plagiobothrys* spp. or other ecologically similar species (e.g., *Cryptantha* or *Pectocarya* sp.) are often a component of and may co-dominate in other alliances such as *Eschscholzia (californica)* – *Lupinus (nanus)*, *Lasthenia californica* – *Plantago erecta* – *Vulpia microstachys*, etc. Key to this alliance, if other species such as *Amsinkia* spp., *Phacelia* spp., *Lasthenia* spp., *Vulpia microstachys*, *Plantago erecta*, *Lupinus* spp., *Eschscholzia* spp. are absent or low in cover, not reaching sub- or co-dominance. If *Lupinus bicolor* is co-dominant with *P. nothofulvus*, key to this alliance...

***Plagiobothrys nothofulvus* Alliance (n=61)**

IA1a.5a Stands characterized by annual late spring flowering herbs such as *Clarkia* spp. and *Madia* spp., often in small openings in *Quercus douglasii* or *Q. wislizeni* woodlands. *Madia elegans* is dominant to sub-dominant in the herbaceous layer. *Plagiobothrys nothofulvus* is typically present, often sub-dominant to trace in cover. Other species present that may share dominance include non-native annual grasses and herbs such as *Bromus diandrus*, *Bromus hordeaceus*, and *Vulpia myuros*...

Madia elegans – *Plagiobothrys nothofulvus* Association (n=16)

IA1a.5b *Plagiobothrys nothofulvus* is characteristically present to co-dominant in the herbaceous layer with *Castilleja exserta* and/or *Lupinus* spp. Other species present that may co-dominate include *Holocarpha heermannii*, *Dichelostemma capitatum*, and *Amsinckia eastwoodiae*...

Plagiobothrys nothofulvus – *Castilleja exserta* – (*Lupinus nanus*) Association (n=3)

IA1a.5c *Plagiobothrys nothofulvus* is characteristically present to co-dominant in the herbaceous layer with *Daucus pusillus* and/or *Trifolium microcephalum*. *Daucus pusillus* and/or *Trifolium microcephalum* need only be consistent in the stand and may only be trace in cover. Non-native annual grasses and herbs such as *Bromus hordeaceus*, *Erodium botrys*, *Bromus diandrus*, and *Hypochaeris glabra* are often dominant, but native herb diversity is abundant and may include various native *Trifolium* species, *Lupinus bicolor*, *Amsinckia menziesii*, *Dichelostemma capitatum*, and *Vulpia microstachys*. If an *Amsinckia* spp. is co-dominant, key to *Amsinckia* (*menziesii*, *tessellata*) – *Phacelia* spp. Alliance...

Plagiobothrys nothofulvus – *Daucus pusillus* – *Trifolium microcephalum* Association (n=41)

IA1a.6 *Holocarpha virgata* and/or *Holocarpha heermannii* is present and typically between 5 and 30% absolute cover and is co-dominant in the herbaceous layer. On occasion, *Holocarpha* spp. will be sub-dominant or even <1% when with non-native grasses and herbs or disturbance related natives such as *Bromus* spp., *Centaurea melitensis*, and *Croton setigerus*...

***Holocarpha* (*heermannii*, *virgata*) Alliance (n=55)**

IA1a.6a *Holocarpha virgata* is characteristic in the herbaceous layer with variable cover. Other herbs such as *Bromus hordeaceus*, *Erodium botrys*, *Juncus bufonius*, *Lupinus bicolor*, *Taeniatherum caput-medusae*, and *Vulpia bromoides* are present. Klein et al. (2007) previously defined this association as *Bromus hordeaceus*–*Holocarpha virgata*–*Taeniatherum caput-medusae*...

Holocarpha virgata Association (n=13)

IA1a.6b *Holocarpha heermannii* is characteristic in the herbaceous layer with variable cover. Other herbs such as *Bromus hordeaceus*, *Bromus diandrus*, *Erodium* spp., *Croton setigerus*, and *Vulpia* spp. are present...

Holocarpha heermannii Association (n=39)

IA1a.6 The annual, pink-flowered herb *Lotus unifoliolatus* dominates vernal moist sites with shallow rocky soils as along edges of seeps, small streams. Stands are generally less than 1 acre in size...

Lotus unifoliolatus Association (n=16)
of the ***Lotus unifoliolatus* Provisional Alliance (n=16)**

IA1.b Stands of grassland settings characterized by native perennial bunch grasses such as *Nassella pulchra* or *N. cernua* and/or tall perennial forbs such as *Eriogonum* spp. or *Corethrogyne filaginifolia*. Non-native annual component variable, but never strongly dominated by non-native herbs or grasses...

California perennial grassland Group

IA1b.1 Stands dominated or characterized by perennial native bunch grasses in the genus *Nassella* or *Melica*, often with a number of native and non-native annuals present...

***Nassella* spp. – *Melica* spp. Alliance (n=24)**

IA1b.1a *Melica californica* is typically co-dominant in the herbaceous layer though occasionally it will only be characteristically present and evenly distributed...

Melica californica Association (n=1)

IA1b.1b *Nassella cernua* is typically co-dominant in the herbaceous layer though occasionally it will only be characteristically present and evenly distributed...

Nassella cernua Provisional Association (n=7)

IA1b.1c *Nassella pulchra* is typically co-dominant in the herbaceous layer with non-native grasses such as *Taeniatherum caput-medusae*, *Bromus hordeaceus*, *Lolium perenne*, and *Avena* spp....

Nassella pulchra Association (n=14)

IA1b.1d *Nassella pulchra* is sub-dominant but characteristic in the herbaceous layer and may have as little as 2% overall cover. Non-native annual grasses such as *Brachypodium distachyon*, *Taeniatherum caput-medusae*, *Bromus hordeaceus*, *Lolium perenne*, and *Avena* spp. will be present and dominate the herbaceous layer...

Nassella pulchra – *Avena* spp. – *Bromus* spp. Association (n=2)

IA1b.2 *Achnatherum speciosum* is dominant in stands. Shrubs may be present with up to 5% absolute cover...

of the ***Achnatherum speciosum* Grassland Alliance (n=4)**
in the **Southern Great Basin semi-desert grassland Group**

IA1b.2a *Achnatherum speciosum* is dominant in the herbaceous layer and shrubs are present with up to 5% absolute cover. Stands are typically the result of fire that were formerly *Coleogyne filaginifolia*, *Eriogonum fasciculatum*, etc. Persistence is unknown but stands probably develop shrub dominance in <50 years, without fire or other disturbance. Stands are typically sandy...

Achnatherum speciosum Shrub Association (n=2)

IA1b.3 Herbaceous perennial forbs such as *Corethrogyne filaginifolia*, *Eriogonum elongatum*, and/or *E. nudum* dominate or characterize the stands, which often occur on shallow soils in the interface between grasslands and shrublands...

***Corethrogyne filaginifolia* – *Eriogonum (elongatum, nudum)* Alliance (n=17)**

IA1b.3a *Eriogonum nudum* is characteristic in the herbaceous layer with variable cover. Other herbs, including *Bromus hordeaceus*, may be co-dominant. The shrub layer is sparse...

Eriogonum nudum Association (n=3)

IA1b.3b *Eriogonum elongatum* is co-dominant in the herb layer with *Bromus tectorum* and other herbs on low hills and mounds...

Eriogonum elongatum Association (n=1)

IA1b.3c *Corethrogyne filaginifolia* is dominant in the herb layer with *Poa secunda* and annuals such as *Erodium cicutarium*, *Bromus madritensis*, *Chaenactis* spp., *Plagiobothrys* spp., and *Asclepias* spp. Found on gentle to moderately slopes with sandy soils possibly with scattered, emergent shrubs including *Eriogonum fasciculatum*, *Ericameria nauseosa*, and *Eriophyllum confertiflorum*...

Corethrogyne filaginifolia Association (n=9)

IA1b.3d *Lupinus excubitus* is dominant to co-dominant in the subshrub layer with *Eriogonum* spp. *Bromus tectorum* and *Chaenactis xantiana* are present in a diverse herbaceous layer. Stands occur on steep, dry sandy slopes...

Lupinus excubitus – *Mentzelia albicaulis* – *Eriogonum* spp. Association (n=3)

IA1b.4 Small stands of the tall *Leymus condensatus* in mesic sites in the southern ecological subsections between the Tehachapi and San Emigdio mountains. Some individuals appear to be closely related to the *Leymus cinereus*...

Leymus condensatus* Alliance

(Note: the few small stands sampled bear similarities to *L. cinereus* stands in the eastern Sierra, and this could also be placed in cool season grasslands along with Vancouverian types like *Poa secunda*, etc.)

IA.2 Herbaceous vegetation **strongly dominated** by non-native grasses and forbs in the genera *Avena*, *Brachypodium*, *Brassica*, *Briza*, *Bromus*, *Centaurea*, *Cynosurus*, *Erodium*, *Nassella*, and *Raphanus*. **Native herbaceous species have insignificant cover in these stands (generally < 10% relative cover)**, especially during the active growing season. Stands occur in foothills, rangelands, fallow fields, woodland openings, riparian areas, and disturbed settings...

Mediterranean California naturalized annual and perennial grassland Group

IA2.a Stands, individually or in combination, are strongly dominated by non-native annual species of the following genera: *Avena*, *Brachypodium*, or *Bromus*, and/or by leafy herbs of the genus *Erodium*...

***Avena* spp. – *Bromus* spp. Semi-Natural Alliance (n=109)**

IA2a.1 *Avena barbata* or *A. fatua* is strongly dominant in the herb layer typically with other non-native grasses and herbs such as *Bromus hordeaceus*, *Bromus diandrus*, *Erodium cicutarium*, and *Centaurea melitensis*...

Avena barbata – *Avena fatua* Association (n=12)

IA2a.2 *Avena* spp. and *Bromus hordeaceus* are co-dominating the herb layer and together are >60% relative cover. Very little total native herb cover present...

Avena barbata – *Bromus hordeaceus* Association (n=2)

IA2a.3 *Brachypodium distachyon* is strongly dominant to co-dominant in the herb layer with *Bromus hordeaceus* or other non-native annual grasses and herbs...

Brachypodium distachyon Association (n=6)

IA2a.4 *Bromus diandrus* is typically co-dominating with *Bromus hordeaceus* in the herb layer with other non-native grasses and herbs such as *Avena* spp., *Erodium botrys*, *Centaurea solstitialis* occurring as sub-dominants...

Bromus diandrus – Mixed herbs Association (n=15)

IA2a.5 *Trifolium hirtum* is typically strongly dominant to co-dominant with *Bromus hordeaceus* in the herb layer with sub-dominant *Avena* spp., *Bromus diandrus*, and *Erodium botrys*. *Lolium perenne* and *Vicia villosa* may or may not be present and co-dominant. *Taeniatherum caput-medusae* is absent or insignificant...

Bromus hordeaceus – (*Vicia villosa* – *Lolium perenne*) – *Trifolium hirtum* Association (n=15)

IA2a.6 *Bromus hordeaceus* is co-dominating with *Erodium* spp. and together typically make up >60% relative cover in the herb layer. *Bromus diandrus*, *Hypochaeris glabra*, and *Avena* spp. are often present as sub-dominants...

Bromus hordeaceus – *Erodium botrys* Association (n=43)

IA2a.7 *Bromus hordeaceus*, *Hordeum murinum*, and *Medicago polymorpha* together are typically strongly dominating the herb layer though *Medicago polymorpha* may or may not be present. Other non-natives such as *Erodium* spp., *Bromus diandrus*, and *Bromus madritensis* are often present as sub-dominants...

Bromus hordeaceus – *Hordeum* spp. – *Medicago polymorpha* Association (n=3)

IA2a.8 *Bromus hordeaceus* and *Taeniatherum caput-medusae* are co-dominating and together are strongly dominant in the herb layer. *Lolium perenne* is often present and may co-dominate. Co-dominance of *T. caput-medusae* and *L. perenne* are indicative of high clay soil content leading to soil moisture retention until mid-season...

Bromus hordeaceus – *Taeniatherum caput-medusae* Association (n=12)

IA2.b Annual grasslands dominated by the non-native *Lolium perenne*. Generally, stands occur on heavier (clay) soils than the previous alliance...

***Lolium perenne* Alliance (n=21)**

IA2b.1 *Lolium perenne* is strongly dominant to co-dominant in the herbaceous layer with other non-native grasses and herbs such as *Taeniatherum caput-medusae*, *Avena* spp., *Bromus hordeaceus*, *Bromus diandrus*, and *Carduus pycnocephalus*. Native species are typically less than 10% relative cover...

Lolium perenne Association (n=2)

IA2b.2 *Lolium perenne* is strongly dominant to co-dominant in the herbaceous layer with high native herb diversity (though low in cover) that often includes *Centaureum muehlenbergii* as well as *Clarkia purpurea*, *Brodiaea elegans*, *Navarretia pubescens*, *Castilleja attenuata*, *Madia gracilis*, *Calochortus luteus*, and *Nassella pulchra*...

Lolium perenne – (*Centaureum muehlenbergii*) Association (n=14)

IA2b.3 *Lolium perenne* is co-dominant in the herbaceous layer with *Hordeum marinum* and/or *Ranunculus californicus*. Other herbs present may include *Leontodon taraxacoides*, *Vicia villosa*, *Bromus hordeaceus*, and *Vulpia bromoides*...

Lolium perenne – *Hordeum marinum* – *Ranunculus californicus* Association (n=5)

IA2.c Tall to mid-sized (0.5-3 m height) non-native annual or biennial herb-dominated stands characterized by species in Brassicaceae such as *Brassica* spp., *Hirschfeldia incana*, or *Sisymbrium* spp. or by species in the genus *Centaurea*, including *C. solstitialis*, *C. stoebe* ssp. *micranthos*, and *C. calcitrapa*...

***Brassica nigra* – *Centaurea (solstitialis, melitensis)* Alliance (n=12)**

IA2c.1 *Brassica nigra* is strongly dominant in the tall herb layer with other non-native grasses and herbs such as *Hordeum murinum*, *Avena*, and *Silybum marianum* co-dominating the short herb layer...

Brassica nigra Association (n=4)

IA2c.2 *Centaurea solstitialis* is strongly dominant in the tall herb layer often with *Lolium perenne*. Other non-native grasses and herbs such as *Trifolium hirtum*, *Bromus hordeaceus*, *Medicago polymorpha* often co-dominate the short herb layer...

Centaurea solstitialis Association (n=8)

I.B Herbaceous vegetation characteristic of mesic or somewhat xeric upland settings in mountains or higher foothills, experiencing less summer drought and moisture stress than those types in section 1A (above). Includes cool season annual or perennial upland grassland associated with recent clearings or fires, persistent openings in upland mesic woodlands or shrublands (as found on northerly facing slopes), or of grazed and/or modified edges of meadows and seasonally irrigated pastures (similar to drier conditions of seasonally moist meadows in **1A**)...

Western North American Temperate Grassland and Meadow Macrogroup

IB.1 The non-native annual grasses *Bromus tectorum* and/or *Elymus caput-medusae*, strongly dominate stands. *B. tectorum* is an upland annual most frequently occurring above about 3000 ft in elevation on loamy to sandy soil. *E. caput-medusae* tolerates a wider range of temperatures, and a broader elevation range, but is most common on heavy soils. They are currently placed in the same alliance in the NVC. Most mappable stands will be of *B. tectorum*, in the southern Sierra Foothills study area...

***Bromus tectorum* – *Taeniatherum caput-medusae* Alliance (n=3)**
in the **Vancouverian and Rocky Mountain naturalized annual grassland Group**

IB1.a *Bromus tectorum* is dominating the herb layer with other non-native grasses and herbs such as *Croton setigerus*, *Erodium* spp., and *Hordeum murinum*...

Bromus tectorum Association (n=3)

IB.2 Stands are composed of native and non-native perennial turf-forming species or bunchgrasses...

IB2.a Grasslands strongly dominated by non-native perennial grasses of the genera: *Anthoxanthum*, *Festuca*, *Holcus*, or *Phalaris*. Most stands in the foothills are adjacent to moist, often irrigated pasturelands or meadows that have been grazed regularly by livestock...

Vancouverian and Rocky Mountain naturalized perennial grassland Group

IB2a.1 Grasslands dominated by medium to large bunchgrasses of the genus *Phalaris*...

***Phalaris aquatica* – *Phalaris arundinacea* Alliance (n=3)**

IB2a.1a *Phalaris aquatica* is co-dominant in the herbaceous layer with *Centaurea solstitialis* and/or *Bromus hordeaceus*...

Phalaris aquatica – *Bromus hordeaceus* – *Centaurea solstitialis* Association (n=3)

IB2a.2 Grasslands composed of mostly perennial turf-formers or sub-cespitose grasses...

IB2a.2a Non-native species of *Agrostis* or *Festuca* or *Poa pratensis* dominant...

***Poa pratensis* – *Agrostis gigantea* – *Agrostis stolonifera* Alliance (n=2)**
No Associations defined

IB2a.2b Grasslands dominated by either *Holcus lanatus*, *Anthoxanthum odoratum*, or both...

Holcus lanatus* – *Anthoxanthum odoratum* Alliance

IB2.b Grasslands characterized by native perennial species with at least 10% relative cover and with even distribution throughout the stands. They often contain co-dominant non-native annual or perennial species...

Western dry upland perennial grassland Group

IB2b.1 Mesic grasslands typically locally distributed within small openings in oak woodlands and adjacent to moist meadows. Stands characterized or dominated by *Bromus carinatus*, *Elymus glaucus*, and/or *Pteridium aquilinum*...

***Bromus carinatus* – *Elymus glaucus* Alliance (n=4)**

IB2b.1a *Pteridium aquilinum* is always present and typically strongly dominating the herb layer with other native grasses and herbs such as *Bromus carinatus*, *Elymus glaucus*, *Asclepias* spp., and *Collinsia heterophylla* though these species tend to be low in cover. Non-native grasses such as *Bromus tectorum* and *B. diandrus* are often present...

Pteridium aquilinum – Grass Association (n=3)

IB2b.1a *Elymus glaucus* is dominant to co-dominant in the herbaceous layer...

Elymus glaucus Association (n=1)

IB2b.2 Grasslands dominated or characterized by small bunchgrasses such as *Poa secunda* and/or *Elymus elymoides*, often with a greater variety of native and non-native annual species in-between. Stands are typical of relatively dry, low precipitation areas in the southern foothills or of rocky, sometimes nutrient-poor soils elsewhere...

***Aristida purpurea* – *Elymus elymoides* – *Poa secunda* Alliance (n=15)**

IB2b.2a *Poa secunda* and/or *Elymus elymoides* is characteristic to co-dominant in the herbaceous layer with *Eschscholzia californica*, *Clarkia cylindrica*, and/or *Platystemon californicus*. Non-native annual grasses and herbs such as *Erodium cicutarium*, *Bromus diandrus*, and *Bromus hordeaceus* often have higher cover. This type is more common in southern Sierra Nevada Foothills, less common in northern Sierra Nevada Foothills...

Poa secunda – (*Elymus* sp.) – *Clarkia cylindrica* Association (n=15)

GROUP II. Vegetation characterized by grasses, graminoids, or herbs growing in settings that retain moisture for longer periods than surrounding uplands. These conditions may result from temporary to permanent accumulation of water through water flow, seeps and springs, or ponding in seasonally flooded depressions, or in more persistently flooded marshes and shallow lakes. Sites include marshes, vernal pools, wet and moist meadows, irrigated pastures, and alkaline bottomland vegetation.

II.A Seasonally flooded or saturated soils with relatively high salt or alkaline chemistry, often occurring in large basins, or associated with springs emerging from alkaline or salty underlying geologic strata. Often whitish surface deposits or salt/alkaline-tolerant species associated. Most stands in the foothills are small, often near or below the minimum mapping unit...

IIA.1 Small stands dominated or co-dominated with *Distichlis spicata*. Occasionally associated with alkaline springs and seeps in the foothills...

Distichlis spicata Association (n=4)
of the ***Distichlis spicata* Alliance (n=4)**
in the **Temperate Pacific tidal salt and brackish meadow Group**

IIA.2 Stands dominated by the perennial fleshy-leafed herb *Suaeda moquinii* or *Isocoma acradenia*. Not common within the ecoregion, usually in small stands in saline settings in lower foothills belt...

***Suaeda moquinii* Alliance (n=1)**
in the **Southwestern North American Salt Basin and High Marsh Group**

IIA2.a *Isocoma acradenia* dominates an open shrub canopy, and other shrubs may be sub-dominant. The herb layer is usually well-developed, including natives and non-natives...

Isocoma acradenia Association (n=1)

IIA.3 Alkaline or brackish marsh and meadow stands characterized by non-fleshy-leaved herbs and graminoids...

Southwestern North American alkali marsh/seep vegetation Group

IIA3.a Stands of moist to wet alkaline or saline meadows characterized by broad-leafed flowering herbs including *Anemopsis californica*, *Helianthus* spp., and/or *Solidago* spp....

***Anemopsis californica* – *Helianthus nuttallii* – *Solidago spectabilis* Alliance (n=2)**

IIA3a.1 *Anemopsis californica* is strongly dominant in the herb layer...

Anemopsis californica Association (n=2)

IIA3.b *Sporobolus airoides* is dominant in the herbaceous layer of alkali or saline wetlands. Stands may occur at hot, warm, or cool springs; stands are typically small (below minimum mapping unit)...

Sporobolus airoides Association (n=2)

of the ***Sporobolus airoides* – *Muhlenbergia asperifolia* – *Spartina gracilis* Alliance (n=2)**

IIA3.c Stands of medium to tall grasses either dominated by the rhizomatous *Leymus triticoides* or by the bunchgrass *L. cinereus*. *Leymus* spp. may be sub-dominant when with non-native annual grasses. Stands are often associated with edges of seeps, marshes, and riparian terraces...

***Leymus cinereus* – *Leymus triticoides* Alliance (n=10)**

Note: *L. cinereus* and *L. condensatus*. (treated under couplet **IA1b.4**) are similar ecologically and morphologically, and may hybridize).

IIA3c.1 *Leymus cinereus* is dominant to co-dominant in the herbaceous layer with *Bromus hordeaceus*, *Claytonia perfoliata*, and *Leymus condensatus*...

Leymus cinereus Association (n=5)

IIA3c.2 *Leymus triticoides* is dominant in the herbaceous layer with *Bromus diandrus*, *Lactuca serriola*, and *Bromus tectorum*...

Leymus triticoides Association (n=4)

IIA3c.3 *Leymus triticoides* is co-dominant to sub-dominant in the herbaceous layer with non-native grasses and forbs such as *Bromus diandrus*, *Bromus hordeaceus*, *Lactuca serriola*, and *Avena* spp....

Leymus triticoides – *Bromus* spp. – *Avena* spp. Association (n=1)

IIA3.d Stands dominated by the moderately tall emergent American bulrush (*Schoenoplectus americanus*). Usually of brackish marshes which remain flooded or saturated through the growing season...

Schoenoplectus americanus Association (n=1)
of the ***Schoenoplectus americanus* Alliance (n=1)**

II.B Vegetation characteristic of fresh water of varying depth and persistence including, brief-inundation vernal pools, long-persisting shallow lakes, and seasonally saturated soils of wet meadows and seeps, and flooded emergent wetlands...

II.B.1 Vegetation characteristic of vernal moist or flooded swales, ponds, or pools; often underlain by a restrictive soil layer (e.g., claypan, hardpan, or volcanic flow). Characteristic species are native annuals which sort ecologically by different tolerances to inundation and pool depth. Individual stands are often small and form narrow bands, hence, the group level is the most likely mapped unit throughout the study area...

Californian mixed annual / perennial freshwater vernal pool / swale bottomland Group

II.B1.a Stands characterized by the prickly summer-annual genus *Centromadia*, usually of clay-rich soils flooded or saturated in for short periods in the winter...

Centromadia (pungens) Alliance (n=3)
No Associations defined

II B1.b Stands of deeper vernal pools, or stock ponds, with water persisting later into the dry season, and dominated or co-dominated by stands of *Eleocharis* spp....

Lasthenia glaberrima Alliance (n=9)

II B1b.1 *Eleocharis acicularis* and *Eryngium castrense* are both present and often co-dominant in the herbaceous layer...

Eleocharis acicularis – *Eryngium castrense* Association (n=6)

II B1b.2 *Eleocharis macrostachya* is dominant in the herbaceous layer in vernal pool settings often with *Hordeum marinum*, *Damasonium californicum*, and *Orcuttia tenuis*. For non-vernal pool settings see the *Eleocharis macrostachya* Association of the *Calamagrostis canadensis* – *Carex utriculata* Alliance...

Eleocharis macrostachya Vernal Pool Association (n=3)

II B1.c Stands of vernal pools of moderate depth and inundation characterized by *Lasthenia fremontii*, *Downingia bicornuta*, and other *Downingia* species...

Lasthenia fremontii – Downingia (bicornuta) Alliance (n=37)

II B1c.1 *Downingia cuspidata* and/or *Downingia bicornuta* is co-dominant to characteristically present in the herbaceous layer with *Navarretia leucocephala*, *Eleocharis macrostachya*, *Psilocarphus brevissimus*, and *Lasthenia californica*...

Downingia (bicornuta, cuspidata) Association (n=10)

II B1c.2 *Eryngium castrense* is co-dominant to characteristically present in the herbaceous layer with *Plagiobothrys stipitatus*, *Navarretia leucocephala*, *Psilocarphus* spp., and *Deschampsia danthonioides*. *Eleocharis macrostachya*, *Lasthenia fremontii*, *Downingia ornatissima*, and other *Downingia* spp. are typically absent or inconspicuous...

Eryngium (vaseyi, castrense) Association (n=12)

II B1c.3 *Lasthenia fremontii* is dominant to characteristically present in the herbaceous layer with *Deschampsia danthonioides*, *Limnanthes douglasii*, *Eryngium* spp., and *Navarretia leucocephala*...

Lasthenia fremontii Association (n=6)

II B1c.4 *Lasthenia fremontii* and *Downingia bicornuta* are together and characteristically present in the herbaceous layer with *Psilocarphus tenellus*, *Deschampsia danthonioides*, and *Plagiobothrys stipitatus*...

Lasthenia fremontii – *Downingia bicornuta* Association (n=2)

II B1c.5 *Downingia ornatissima* is characteristically present in the herbaceous layer with *Lasthenia fremontii*, *Deschampsia danthonioides*, *Navarretia leucocephala*, and *Eryngium castrense*...

Lasthenia fremontii – *Downingia ornatissima* Association (n=7)

II B1.d Stands of vernal pool margins and swales, generally in the northern Sierra Nevada foothills...

***Layia fremontii* – *Achyrrachaena mollis* Alliance (n=29)**

II B1d.1 *Layia fremontii* and/or *Achyrrachaena mollis* is co-dominant to characteristically present in the herbaceous layer with *Triphysaria eriantha*, *Lasthenia californica*, *Vulpia microstachys*, and *Taeniatherum caput-medusae*...

Layia fremontii – *Achyrrachaena mollis* Association (n=24)

II B1d.2 *Zigadenus fremontii* is characteristically present in the herbaceous layer with non-native grasses and forbs such as *Lolium perenne*, *Taeniatherum caput-medusae*, and *Geranium dissectum*...

Zigadenus fremontii – *Lolium perenne* Association (n=4)

II B1.e Stands of shallow vernal pools and pool margins throughout the Sierra foothills, characterized by *Montia fontana* and *Sidalcea calycosa*...

Montia fontana – *Sidalcea calycosa* Association (n=1)
of the ***Montia fontana* – *Sidalcea calycosa* Alliance (n=1)**

II B1.f Stands of swales and moist rocky vernal pool margins throughout the foothills with *Trifolium variegatum*. *T. variegatum* is dominant in the herbaceous layer or co-dominant with a variety of other native and non-native herbs...

***Trifolium variegatum* Alliance (n=47)**

II B1f.1 *Hypochaeris glabra* and/or *Leontodon saxatilis* are present to co-dominant with *Trifolium* spp. in the herbaceous layer. Other species present may include *Vulpia bromoides*, *Lupinus bicolor*, *Erodium botrys*, *Bromus hordeaceus*, and *Castilleja attenuata*...

(*Trifolium variegatum* – *Vulpia bromoides*) – *Hypochaeris glabra* – *Leontodon saxatilis*
Association (n= 8)

II B1f.2 *Trifolium variegatum* is dominant to strongly dominant in the herbaceous layer with *Lolium perenne*, *Juncus bufonius*, and *Mimulus guttatus*. *Juncus bufonius*, *Hypochaeris glabra*, *Leontodon taraxacoides*, *Vulpia bromoides*, and/or *Lolium perenne* may be present as sub-dominants. If *Juncus bufonius* co-dominates with *T. variegatum*, key to the *T. variegatum* – *J. bufonius* Association...

Trifolium variegatum Association (n=21)

II B1f.3 *Juncus bufonius* is dominant or co-dominant with *Trifolium variegatum*. *Hordeum*

marinum is characteristically present. This type may reflect wetter conditions or a longer period of inundation than the *T. variegatum* Association, and *Juncus bufonius* can be sub-dominant to *Trifolium variegatum* when other species of wetter conditions are present such as *Isoetes* spp., *Limnanthes alba*, *Eleocharis macrostachya* and/or *Lythrum hyssopifolia* ...

Trifolium variegatum – *Juncus bufonius* Association (n=18)

IIB.2 Stands of native herbs and graminoids not of small isolated or shallow pools, but of wet to moist meadows, and riparian margins, typically seasonally flooded or saturated and may dry mid-to late summer, and typically not of alkaline or saline areas...

Californian Warm Temperate Marsh/Seep Group

IIB2.a Stands of moist meadows or upper edges of marshes dominated by broad-leafed wetland herbs such as *Euthamia occidentalis* or *Artemisia douglasiana*...

Artemisia douglasiana Association (n=2)

of the ***Bidens cernua* – *Euthamia occidentalis* – *Ludwigia palustris* Alliance (n=2)**

IIB2.b Stands associated with moist to seasonally flooded alluvial terraces of rivers and streams, dominated by *Carex barbarae*, which forms a coarse turf often adjacent to riparian woody alliance stands...

Carex barbarae Association (n=2)
of the ***Carex barbarae* Alliance (n=2)**

IIB2.c Stands are open, usually associated with rocky or bouldery active stream channels, characterized and typically dominated by cespitose tufts of *Carex nudata*. *C. praegracilis* or *C. serratodens* may be co-dominating...

Carex nudata Association (n=2)
of the ***Carex nudata* Alliance (n=2)**

IIB2.d Stands characterized by *Juncus effusus*, *J. patens*, *Carex praegracilis*, *C. pansa*, *C. serratodens* and/or *C. densa*...

***Juncus (effusus, patens)* – *Carex (pansa, praegracilis)* Alliance (n=8)**

IIB2d.1 *Carex densa* is strongly dominant to co-dominant in the herb layer with *Eleocharis macrostachya*, *Lolium perenne*, and/or *Mimulus guttatus*...

Carex densa Association (n=2)

IIB2d.2 *Carex praegracilis* is strongly dominant in the herb layer...

Carex praegracilis Association (n=1)

IIB2d.3 Stands dominated by the tufted large rush *Juncus effusus*, of moist to wet meadows and swales...

Juncus effusus Association (n=3)

II B2d.4 Stands characterized by the turf forming to sub-cespitose serpentine wetland species, *Carex serratodens*, often restricted to serpentinite soils...

Carex serratodens Association (n=1)

II B2.e Stands characterized by *Eleocharis macrostachya*. Stands are not of vernal pools...

Eleocharis macrostachya Association (n=22)
of the ***Carex utriculata* – *Calamagrostis canadensis* Alliance (n=22)**

II B2.f Stands are characterized by persistently saturated or moist soil well into the summer months and dominated by turfs of “Iris-leafed” rushes such as *Juncus oxymeris*, or *J. xiphioides*...

Juncus (oxymeris, xiphioides) Alliance (n=4)

II B2f.1 *Juncus oxymeris* is present and characteristic in the herbaceous layer with *Symphyotrichum eatonii*, *Poa trivialis*, *Carex densa* and *Phalaris aquatica*...

Juncus oxymeris Association (n=2)

II B2f.2 *Juncus xiphioides* is present and characteristic in the herbaceous layer with *Eleocharis acicularis*, *Eryngium castrense*, and *Hordeum marinum*...

Juncus xiphioides Association*

II B2.g Stands are usually of moist meadows or edges of more permanently saturated meadow sites characterized by turfs of rhizomatous *Juncus* in the *Juncus arcticus* complex (including *J. balticus* and *J. mexicanus*)...

Juncus arcticus (var. balticus, mexicanus) Alliance (n=23)

II B2g.1 *Juncus balticus*, *Juncus mexicanus*, and/or *Juncus arcticus* is strongly dominant to co-dominant in the herbaceous layer with *Lolium perenne*, *Hordeum marinum*, and *Geranium dissectum*...

Juncus arcticus var. *balticus* – (var. *mexicanus*) Association (n=16)

II B2g.2 *Juncus arcticus* and *Carex praegracilis* are co-dominant in the herbaceous layer. Other species such as *Leymus triticoides*, *Distichlis spicata*, and *Solidago velutina* may also be present and are typically sub-dominant...

Juncus arcticus var. *balticus* – *Carex praegracilis* Association (n=4)

II B2.h Stands are characterized by conspicuous large tufts *Muhlenbergia rigens* often near seeps or moist banks of small streams or on riparian terraces. In some cases, may signify former Native American occupancy sites...

Muhlenbergia rigens Alliance (n=10)

II B2h.1 *Muhlenbergia rigens* is co-dominant in the herbaceous layer with *Bromus hordeaceus*, *Trifolium hirtum*, and/or *Lolium perenne*...

Muhlenbergia rigens Association (n=9)

II B2.i Stands characterized by horsetails (*Equisetum* spp.), usually in areas frequently disturbed by flooding, mowing, or other mechanical disturbances (often on levee margins, or on sand bars of streams)...

Equisetum (arvense, variegatum, hyemale) Alliance (n=1)

No Associations defined

II B2.j Stands dominated by the *Mimulus guttatus*, associated with seasonally wet or flowing streams, seeps, and moist rock outcrops. Most stands are small (below minimum mapping unit size)...

Mimulus guttatus – Cirsium spp. – Stachys spp. Alliance (n=20)

II B2j.1 *Mimulus guttatus* is typically co-dominant in the herbaceous layer with other moist herbs such as *Lolium perenne*, *Polypogon monspeliensis*, *Trifolium variegatum*, and *Juncus bufonius*. Often associated with stream sides or perennial springs...

Mimulus guttatus Association (n=10)

II B2j.2 *Mimulus guttatus* is co-dominant in the herbaceous layer with *Vulpia microstachys*. Other herbs present may include *Lotus unifoliolatus*, *Pseudobahia heermannii*, and *Eschscholzia californica*. This type is often found in moist, rock outcrop settings or on serpentine where soils may dry out more quickly than the stream side settings and perennial springs that the *Mimulus guttatus* Association above often occurs in...

Mimulus guttatus – Vulpia microstachys Association (n=7)

II B2.k Stands are dominated by coarse broad-leafed annual or biennial herbs including *Xanthium strumarium*, *Melilotus officinalis*, and *Polypogon monspeliensis* associated with wetland borders such as river margins, reservoir margins, or managed marshes with fluctuating water levels...

Polygonum lapathifolium – Xanthium strumarium Alliance (n=8)

II B2k.1 *Xanthium strumarium* is characteristic and often dominant in the herbaceous layer....

Xanthium strumarium Association (n=4)

II B2.l The perennial herb *Artemisia dracunculus* is dominant to co-dominant with an assortment of other annual and perennial herbs, including *Achillea millefolium*, *Bromus diandrus*, *Clarkia cylindrica*, and *Claytonia perfoliata*. Stands are small and associated with sandy riparian terraces and alluvial benches along streams, rivers, and meadow edges.

Artemisia dracunculus Association (n=4)
of the ***Artemisia dracunculus Alliance (n=4)***

in the **California annual herb/grass Group**

IIB.3 Stands are characterized by strong dominance of non-native ruderal grasses often in human-disturbed sites that are moist to wet areas...

Naturalized warm-temperate riparian and wetland Group

IIB3.a *Cynodon dactylon* is dominant in the herbaceous layer. Other non-native and disturbance related species are abundant. Non-native cover is typically >80% relative cover. Stands are usually found in wet areas and riparian margins. Other wetland graminoids (*Juncus* spp., *Carex* spp.) may also be present...

Cynodon dactylon Association (n=1)
of the ***Cynodon dactylon* – *Crypsis* spp. – *Paspalum* spp. Alliance (n=1)**

IIB.4 Vegetation of regularly flooded freshwater sites including marshes with emergent vegetation, and shallow ponds and lakes, with floating or submerged vegetation...

IIB4.a Stands dominated by the moderately tall emergent American bulrush (*Schoenoplectus americanus*). Usually of brackish marshes which remain flooded or saturated through the growing season.

Schoenoplectus americanus Association (n=1)
of the ***Schoenoplectus americanus* Alliance (n=1)**
in the **Southwestern North American alkali marsh/seep vegetation Group**

IIB4.b Stands of marshes with persistent standing water through much of the growing season...

Western North American Freshwater Marsh Macrogroup
Arid West freshwater emergent marsh Group

IIB4b.1 *Schoenoplectus acutus* and/or *Schoenoplectus californicus* is dominant in the herbaceous layer or co-dominant when with *Typha* spp....

Schoenoplectus (acutus, californicus) Alliance (n=7)

IIB4b.1a *Schoenoplectus acutus* is dominant in the herbaceous layer...

Schoenoplectus acutus Association (n=5)

IIB4b.1b *Schoenoplectus acutus* is co-dominant in the herbaceous layer with *Typha* spp...

Schoenoplectus acutus – *Typha domingensis* Association (n=2)

IIB4b.2 *Typha domingensis* and/or *T. latifolia* dominant in the herbaceous layer. If *Schoenoplectus acutus* is present it is sub-dominant...

Typha (domingensis, latifolia) Association (n=7)
of the ***Typha (angustifolia, domingensis, latifolia) Alliance (n=7)***

IIB4.c Stands are characterized by the shorter emergent or aquatic grass *Glyceria x occidentalis*, which appears to be of hybrid origin and occupies some shallow ponds and other wetlands scattered in the Sierra Nevada Foothills. May be below minimum mapping unit size...

Western Cordilleran montane-boreal summer-saturated meadow Group
Glyceria x occidentalis* Provisional Alliance

IIB4.d Stands of vegetation dominated by aquatic plants, having leaves or stems supported at least in part by the water column...

Western North American Freshwater Aquatic Vegetation Macrogroup

IIB4d.1 Stands dominated by floating or attached mats of introduced *Ludwigia* spp....

Ludwigia (hexapetala, peploides) Association (n=2)
of the ***Ludwigia (hexapetala, peploides)* – *Eichhornia crassipes* Alliance (n=2)**
in the **Naturalized temperate Pacific freshwater vegetation Group**

IIB4d.2 *Azolla filiculoides* or *Azolla mexicana* (*A. microphylla*) dominates or characterizes stands on water or wet ground surfaces. If *Lemna* is co-dominant, key to this alliance...

Azolla (filiculoides, microphylla)* Alliance
in the **Western North American Temperate Freshwater Aquatic Vegetation Group**

IIB4d.3 Stands characterized by native floating or submerged-leaved species such as *Ranunculus aquatilis* or *Callitriche* spp. Generally, below minimum mapping unit size...

***Ranunculus aquatilis* – *Callitriche palustris* – *Callitriche heterophylla* Alliance (n=2)**
in the **Western North American Temperate Freshwater Aquatic Vegetation Group**

IIB4d.3a *Ranunculus aquatilis* is co-dominant with *Callitriche heterophylla*...

Ranunculus aquatilis Association (n=2)

IIB4d.4 *Lemna* spp. is dominant in stands. Other aquatic species are often present at low cover...

***Lemna (minor)* and Relatives Alliance (n=1)**
No Associations defined

Group III. Sparsely vegetated (<10% absolute cover) stands occurring on steep boulder covered slopes or on steep canyon slopes. *Ericameria cuneata* is dominant or co-dominant with *Toxicodendron diversilobum*, *Diplacus aurantiacus* or *Eriodictyon californicum*. A high cover of lichen, moss and/or *Selaginella* spp. is usually present.

Californian Cliff, Scree & Rock Vegetation Group

APPENDIX F - Glossary

The following terms with their respective definitions have been established in developing the vegetation classification, keys, and descriptions.

- **Constancy, Cover-Abundance, and Related Terms** – Used in the key, descriptions and the vegetation constancy tables (codes from tables in parentheses):
 - **Constancy** (Con) – Number of occurrences divided by the number of samples X 100%
 - **Diagnostic** – A species or group of species whose relative constancy or abundance differentiates one vegetation type from another; the term can include character, constant, differential, and indicator species (Jennings et al. 2006).
 - **Strongly dominant** – A species in the dominant lifeform stratum has 60% or greater relative cover.
 - **Dominant** – A species in the dominant lifeform stratum has 50% or greater relative cover.
 - **Co-dominant** – Each species has between 30% and 60% relative cover.
 - **Characteristic** – Present in at least 80% of the samples for that vegetation type, with no restriction on cover.
 - **Abundant** – Present in 50 to 75% of the samples, with at least 50% relative cover.
 - **Usually/Often** – Present in 50 to 75% of the samples, with no restriction on cover.
 - **Sometimes** – Present in 25 to 50% of the samples, with no restriction on cover.
 - **Average** (Avg) and **Relative Cover** – Average cover for a taxon in a vegetation type is calculated as the sum of its 'absolute' cover values divided by the total sample size; relative cover is calculated as the comparative sum of cover values for one taxon compared to the sum of cover values of other taxa, in which proportional numbers are derived (see **Cover** section for more details).
 - **Minimum** (Min) and **Maximum** (Max) – The minimum and maximum cover values that a taxon had from the surveys of a vegetation type. Values could be an absolute cover value (e.g., 1%) and/or a mid-point value of a cover class (e.g., 2.5% for a cover class of 1–5 %) depending on data available
- **Cover** – The primary metric used to quantify the abundance of a particular species or a particular vegetation layer within a plot. It was measured by estimating the aerial extent of the living plants, or the "bird's-eye view" looking from above for each category. Cover in this mapping project uses the concept of "porosity" or foliar cover rather than "opacity" or crown cover. Thus, field crews are trained to estimate the amount of light versus shade produced by the canopy of a plant or a stratum by taking into account the amount of shade it casts excluding the openings it may have in the interstitial spaces (e.g., between leaves or branches). This is assumed to provide a more realistic estimate of the actual amount of shade cast by the individual or stratum which, in turn, relates to the actual amount of light available to individual species or strata beneath it. However, as a result, cover estimates can vary substantially between leaf-on versus leaf-off conditions. Stands dominated by deciduous species (e.g., *Populus tremuloides*, *Toxicodendron diversilobum*) should be sampled during leaf-on since they will have substantially less cover when leaves are absent and may key to another type. Various subcategories of cover for species and vegetation are defined as follows:

- **Absolute cover** – Refers to the actual percentage of the ground (surface of the plot or stand) that is covered by a species or group of species. For example, *Pinus jeffreyi* covers between 5% and 10% of the stand. Absolute cover of all species or groups if added in a stand or plot may total greater or less than 100% because it is not a proportional number.
- **Relative cover** – Refers to the amount of the surface of the plot or stand sampled that is covered by one species (or physiognomic group) as compared to (relative to) the amount of surface of the plot or stand covered by all species (in that group). Thus, 50% relative cover means that half of the total cover of all species or physiognomic groups is composed of the single species or group in question. Relative cover values are proportional numbers and, if added, total 100% for each stand (sample).
- **Dense/Continuous cover** – Used to describe individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where there is greater than 66 percent absolute cover.
- **Intermittent cover** – Used to describe individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where there is 33-66 percent absolute cover.
- **Open cover** – Used to describe individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where the cover is less than 33 percent absolute cover.
- **Sparse cover** – Used to describe individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where the *average* cover value is <2% absolute cover (though the range in cover could be <1-9% cover).
- **Emergent** – A plant (or vegetation layer) is considered emergent if it includes plants that rises above a predominant vegetation layer, but that are sparse in cover. It is considered as a member of the next tallest layer, but typically has an absolute cover < 10%.
- **Lifeform terms:**
 - **Tree** – Is a one-stemmed woody plant that normally grows to be greater than 5 meters tall. In some cases trees may be multiple-stemmed (ramifying) after fire or other disturbance, but size of mature plants is typically greater than 5 m and undisturbed individuals of these species are usually single stemmed.
 - **Shrub** – Is normally a multi-stemmed woody plant that generally has several erect, spreading, or prostrate stems and that is usually between 0.2 meters and 5 meters tall, giving it a bushy appearance. Definitions are blurred at the low and the high ends of the height scales. At the tall end, shrubs may approach trees based on disturbance frequencies (e.g., old-growth re-sprouting shrub species such as *Cercocarpus ledifolius*, etc., may frequently attain “tree size”). At the low end, woody perennial herbs or sub-shrubs of various species are often difficult to categorize into a single life-form; usually sub-shrubs (per USDA-NRCS 2011) were categorized in the “shrub” category.
 - **Subshrub (or Dwarf shrub)**: A multi-stemmed plant with noticeably woody stems less than 0.5 meter tall. May be easily confused with a perennial herb or small shrub. We lump them into the “shrub” category in stand tables and descriptions of vegetation types.
 - **Herb** – Is any vascular plant species that has no main woody stem-development, and includes grasses, forbs, and perennial species that die-back seasonally.
 - **Cryptogam** - Is a nonvascular plant or plant-like organism without specialized water or fluid conducting vascular tissue (i.e., xylem and phloem). Includes mosses, lichens, liverworts, hornworts, and algae.

- **Stand** – Is the basic physical unit of vegetation in a landscape. It has no set size. Some vegetation stands are very small such as wetland seeps, and some may be several square kilometers in size such as desert or forest types. A stand is defined by two main unifying characteristics:
 - It has *compositional* integrity. Throughout the site, the combination of species is similar. The stand is differentiated from adjacent stands by a discernable boundary that may be abrupt or gradual.
 - It has *structural* integrity. It has a similar history or environmental setting, affording relatively similar horizontal and vertical spacing of plant species. For example, a hillside forest formerly dominated by the same species, but that has burned on the upper part of the slope and not the lower is divided into two stands. Likewise, a sparse woodland occupying a slope with shallow rocky soils is considered a different stand from an adjacent slope of a denser woodland/forest with deep moist soil and the same species.
- **Dominance by layer/stratum:** Tree, shrub, and herbaceous layers are considered physiognomically distinct. Alliances are usually named by the dominant and/or characteristic species of the tallest characteristic layer (see tree-characterized, shrub-characterized, and herb-characterized vegetation definitions below). Average covers within the dominant layer reflect the "modal" concept of the health/age/environment of a particular vegetation type. For example, a higher average cover of woody plants within a stand not recently affected by disturbance reflects a mode of general availability of water, nutrition, and equitable climate, while lower average cover under similar conditions would reflect lower availability of these things.
- **Vegetation:**
 - **Woodland and forest vegetation:** In the National Vegetation Classification, a woodland is defined as a tree-dominated stand of vegetation with between 25 and 60 percent cover of trees and a forest is defined as a tree-dominated stand of vegetation with 60 percent or greater cover of trees.
 - **Shrubland vegetation:** Shrubs (including dwarf-shrubs) are evenly distributed throughout the stand, providing a consistent (even if sparse) structural component, and one or both of the following criteria are met: (1) Shrubs influence the distribution or population dynamics of other plant species; (2) Shrubs play an important role in ecological processes within the stand. Shrub alliances typically have at least 10% absolute shrub cover.
 - **Herbaceous vegetation:** Herbs are evenly distributed throughout the stand, providing a consistent (even if sparse) structural component, and play an important role in ecological processes within the stand, and the stand cannot be characterized as a tree or shrub stand.
 - **Nonvascular vegetation:** Nonvascular organisms provide a consistent (even if sparse) structural component and play an important role in ecological processes within the stand.
 - **Semi-natural/ruderal vegetation:** Stands characterized by naturalized non-native species. Examples include *Tamarix* spp., and *Brassica* spp. Note: the terminology for semi-natural versus ruderal plant communities is still under discussion with ESA Vegetation Panel and Hierarchy Review Working Group, and in the last 5 years the classification names have gone back and forth between these two terms.
- **National Vegetation Classification Hierarchy Levels:**
 - **Class** – A vegetation classification unit of high rank (1st level) defined by a broad combination of

dominant general growth forms adapted to basic moisture, temperature, and/or substrate or aquatic conditions (FGDC 2008).

- **Subclass** – A vegetation classification unit of high rank (2nd level) defined by a combination of general dominant and diagnostic growth forms that reflect global mega- or macroclimatic factors driven primarily by latitude and continental position, or that reflect overriding substrate or aquatic conditions (FGDC 2008).
- **Formation** – A vegetation classification unit of high rank (3rd level) defined by a Combination of dominant and diagnostic growth forms that reflect global macroclimatic conditions as modified by altitude, seasonality of precipitation, substrates, and hydrologic conditions (FGDC 2008).
- **Division** – A vegetation classification unit of intermediate rank (4th level) defined by a combination of dominant and diagnostic growth forms and a broad set of diagnostic plant species that reflect biogeographic differences in composition and continental differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes (FGDC 2008).
- **Macrogroup** – A vegetation classification unit of intermediate rank (5th level) defined by a moderate set of diagnostic plant species and diagnostic growth forms that reflect biogeographic differences in composition and sub-continental to regional differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes (FGDC 2008).
- **Group** – A vegetation classification unit of intermediate rank (6th level) defined by combinations of relatively narrow sets of diagnostic plant species (including dominants and co-dominants), broadly similar composition, and diagnostic growth forms that reflect biogeographic differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes (FGDC 2008).
- **Alliance** – A classification unit of vegetation of low rank (7th level), containing one or more associations and defined by one or more diagnostic species, often of high cover, in the uppermost layer or the layer with the highest canopy cover. Alliances reflect physiognomy as well as regional to subregional climates, substrates, hydrology, and disturbance regimes (Jennings et al. 2006, FGDC 2008).
- **Association** – A vegetation classification unit of low rank (8th level) defined by a diagnostic species, a characteristic range of species composition, physiognomy, and distinctive habitat conditions (Jennings et al. 2006). Associations reflect local topo-edaphic climates, substrates, hydrology, and disturbance regimes.
- **Other Classification Terms:**
 - **Provisional Type** – A vegetation type that is not yet formally described, but expected to be an addition to the existing list of USNVC types for a project area. The type may be represented by plot samples (e.g. <10 samples), while it may or may not be particularly common or because it is localized in extent; however, it could be documented in additional location(s) outside of the study area.
- **Conservation Rank** – Listed by the state Nature Conservancy Heritage Programs, including the California Department of Fish and Wildlife's Vegetation Classification and Mapping Program, these are the "Global" and "State" ranks, as seen below:
 - **G1 and S1** – Critically Imperiled—At very high risk of extinction due to extreme rarity. Often 5 or fewer viable occurrences and/or up to 518 hectares.
 - **G2 and S2** – Imperiled—At high risk of extinction due to very restricted range, very few occurrences, steep declines, or other factors. Often 6–20 viable occurrences, and/or 518–2,590 hectares

- **G3 and S3** – Vulnerable—At moderate risk of extinction due to a restricted range, relatively few populations, recent and widespread declines, or other factors. Often 21–100 viable occurrences and/or 2,590–12,950 hectares.
- **G4 and S4** – Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors. Often greater than 100 viable occurrences and/or more than 12,950 hectares.
- **G5 and S5** – Secure—Common; widespread and abundant.
- **Abbreviations and Other Characters:**
 - **Parentheses “()”** – When parentheses are used around a species name within a vegetation type name, it indicates that the species is often present as an indicator of that association or alliance, but it does not meet a threshold of 75% or more constancy. The parentheses may be used around the full scientific name or only around the species epithet. An example is the *Juniperus occidentalis* / (*Poa secunda* – *Festuca idahoensis* – *Pseudoroegneria spicata*) Woodland Association. If parentheses are only around the species epithet, it means that the genus is consistently present but another species could also be present from that genus. An example is the *Artemisia arbuscula* – *Eriogonum* (*microthecum*, *sphaerocephalum*) Shrubland Association, where the genus may be represented by one or more species found within the parentheses.
 - **Em dash “–”** – Separates taxa in a community name that are within the same stratum.
 - **Slash “/”** – Separates taxa in a community name that are in different strata

APPENDIX G - Contingency Tables for the Southern Sierra Nevada Study Area

The following contingency table is for the Southern Sierra Nevada Foothills study area, giving the user a regional perspective of the types encountered in the region. Contingency tables are only for the mapped Alliance and Association levels of the classification.

Contingency Table for the Southern Sierra Nevada Study Area

Appendix G		Field Assessed Type (Users)	
Map PI Code	PI Type (Producers)		
1110	Umbellularia californica Alliance	1110	Umbellularia californica Alliance
1111	Quercus wislizeni – Quercus parvula (tree) Alliance	1111	Pinus sabiniana Alliance
1210	Pinus sabiniana Alliance	1210	Pinus sabiniana Alliance
1212	Juniperus californica Alliance	1212	Juniperus californica Alliance
1214	Hesperocyparis forbesii – Hesperocyparis nevadensis Alliance	1214	Hesperocyparis forbesii – Hesperocyparis nevadensis Alliance
1310	Ascotylus californica Alliance	1310	Ascotylus californica Alliance
1311	Quercus douglasii Alliance	1311	Quercus douglasii Alliance
1312	Quercus kelloggii Alliance	1312	Quercus kelloggii Alliance
1313	Quercus lobata Alliance	1313	Quercus lobata Alliance
1410	Quercus chrysolepis Alliance	1410	Quercus chrysolepis Alliance
2212	Pinus ponderosa – Calocedrus decurrens – Pseudotsuga menziesii Alliance	2212	Pinus ponderosa – Calocedrus decurrens – Pseudotsuga menziesii Alliance
2214	Abies concolor Alliance	2214	Abies concolor Alliance
2215	Pinus jeffreyi Alliance	2215	Pinus jeffreyi Alliance
2216	Pseudotsuga macrocarpa Alliance	2216	Pseudotsuga macrocarpa Alliance
2310	Pinus monophylla – Juniperus orthosperma Alliance	2310	Pinus monophylla – Juniperus orthosperma Alliance
2311	Populus fremontii – Fraxinus velutina – Salix gooddingii Alliance	2311	Populus fremontii – Fraxinus velutina – Salix gooddingii Alliance
3113	Juglans hindsii and Hybrids Semi-Natural Alliance	3113	Juglans hindsii and Hybrids Semi-Natural Alliance
3114	Salix gooddingii – Salix laevigata Alliance	3114	Salix gooddingii – Salix laevigata Alliance
3210	Alnus rhombifolia Alliance	3210	Alnus rhombifolia Alliance
3211	Fraxinus latifolia Alliance	3211	Fraxinus latifolia Alliance
3310	Platanus racemosa – Quercus agrifolia Alliance	3310	Platanus racemosa – Quercus agrifolia Alliance
3314	Quercus lobata Riparian Alliance	3314	Quercus lobata Riparian Alliance
4111	Adenostoma fasciculatum Alliance	4111	Adenostoma fasciculatum Alliance
4112	Arctostaphylos viscidula Alliance	4112	Arctostaphylos viscidula Alliance
4113	Ceanothus cuneatus Alliance	4113	Ceanothus cuneatus Alliance
4118	Arctostaphylos glauca Alliance	4118	Arctostaphylos glauca Alliance
4210	Quercus laevis Alliance	4210	Quercus laevis Alliance
4211	Cercocarpus montanus Alliance	4211	Cercocarpus montanus Alliance
4410	Quercus wislizeni (Short Stature) Mapping Unit	4410	Quercus wislizeni (Short Stature) Mapping Unit
4412	Arctostaphylos pungens – Arctostaphylos pinalei Alliance	4412	Arctostaphylos pungens – Arctostaphylos pinalei Alliance
4413	Ceanothus leucodermis Alliance	4413	Ceanothus leucodermis Alliance
4501	Frangula californica ssp. tomentella Association	4501	Frangula californica ssp. tomentella Association
4710	Eriogonum linearifolium – Oenothera biennis Alliance	4710	Eriogonum linearifolium – Oenothera biennis Alliance
4720	Lotus scoparius – Lupinus albus – Eriodictyon spp. Alliance	4720	Lotus scoparius – Lupinus albus – Eriodictyon spp. Alliance
4810	Eriogonum fasciculatum Alliance	4810	Eriogonum fasciculatum Alliance
4820	Eriogonum virgatum – Eriogonum heermannii – Buddleja stans Alliance	4820	Eriogonum virgatum – Eriogonum heermannii – Buddleja stans Alliance
5111	Atriplex canescens Alliance	5111	Atriplex canescens Alliance
5212	Eriogonum linearifolium – Oenothera biennis Alliance	5212	Eriogonum linearifolium – Oenothera biennis Alliance
5311	Adiantum tridentatum Alliance	5311	Adiantum tridentatum Alliance
5417	Ephedra viridis Alliance	5417	Ephedra viridis Alliance
5428	Eriogonum fasciculatum – Viguiera parishii Alliance	5428	Eriogonum fasciculatum – Viguiera parishii Alliance
5431	Achnatherum spicatum Alliance	5431	Achnatherum spicatum Alliance
5500	Mojavean semi-desert wash scrub Group	5500	Mojavean semi-desert wash scrub Group
5510	Lycium parviflorum Alliance	5510	Lycium parviflorum Alliance
5710	Atriplex polycarpa Alliance	5710	Atriplex polycarpa Alliance
6111	Quercus garryana (shrub) Alliance	6111	Quercus garryana (shrub) Alliance
6210	Baccharis salicifolia Alliance	6210	Baccharis salicifolia Alliance
6211	Salix exigua Alliance	6211	Salix exigua Alliance
6213	Rubus armen – Rubus parviflorus Alliance	6213	Rubus armen – Rubus parviflorus Alliance
6214	Cephaelis occidentalis Association	6214	Cephaelis occidentalis Association
6217	Salix lasiolepis Alliance	6217	Salix lasiolepis Alliance
6218	Rhus trilobata Sierran Association	6218	Rhus trilobata Sierran Association
6301	Toxicodendron diversilobum Alliance	6301	Toxicodendron diversilobum Alliance
6420	Ribes quercetorum Association	6420	Ribes quercetorum Association
6510	Quercus john-rukei Alliance	6510	Quercus john-rukei Alliance
6520	Ceanothus greggii – Fremontodendron californicum Alliance	6520	Ceanothus greggii – Fremontodendron californicum Alliance
7100	California Annual and Perennial Grassland Macrogroup	7100	California Annual and Perennial Grassland Macrogroup
7101	Mediterranean California naturalized annual and perennial grassland Group	7101	Mediterranean California naturalized annual and perennial grassland Group
7102	Vancouverian & Rocky Mtn naturalized perennial grassland Group	7102	Vancouverian & Rocky Mtn naturalized perennial grassland Group
7115	Vulpia microstachys – Setaria hirsuta Association	7115	Vulpia microstachys – Setaria hirsuta Association
7200	California warm temperate marsh Group	7200	California warm temperate marsh Group
7216	Junco arcticus (var. balticus, medianus) Alliance	7216	Junco arcticus (var. balticus, medianus) Alliance
7310	Typha angustifolia, domingensis, latifolia Alliance	7310	Typha angustifolia, domingensis, latifolia Alliance
7500	Naturalized warm-temperate riparian and wetland Group	7500	Naturalized warm-temperate riparian and wetland Group
7600	CA mixed annual/perennial freshwater wetland pool/wetland bottomland Group	7600	CA mixed annual/perennial freshwater wetland pool/wetland bottomland Group
8110	Distichlis spicata Alliance	8110	Distichlis spicata Alliance
8200	Southeastern North American alkali marsh/step vegetation Group	8200	Southeastern North American alkali marsh/step vegetation Group
9401	Cliffs/Rock Outcrop Mapping Unit	9401	Cliffs/Rock Outcrop Mapping Unit
9402	River and Lacustrine Flats & Streambeds Mapping Unit	9402	River and Lacustrine Flats & Streambeds Mapping Unit
9500	Exotic Trees and Planted Trees Mapping Unit	9500	Exotic Trees and Planted Trees Mapping Unit
9901	Eucalyptus – Alnus ssp. – Robinia pseudoacacia Semi-Natural Alliance	9901	Eucalyptus – Alnus ssp. – Robinia pseudoacacia Semi-Natural Alliance
9900	Standing Dead Trees High Cover Mapping Unit	9900	Standing Dead Trees High Cover Mapping Unit
Grand Total		Grand Total	

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