ATTACHMENT 5

Vegetation Mapping – Eastern Goleta Valley Community Plan Area

FINAL VEGETATION MAPPING REPORT

March 2018

Prepared by

John Menke, Deborah Johnson, and Anne Hepburn
Aerial Information Systems, Inc.

Prepared for:

The County of Santa Barbara Planning & Development Department

Acknowledgements

Our task in identifying and mapping vegetation on the southern slopes of the Santa Ynez Mountains north of Santa Barbara proved to be both a challenging and thought-provoking effort in distinguishing a complex mosaic of chaparral, woodland, and riparian habitats.

The study area contains slightly over 15,000 acres of steep, mostly inaccessible terrain with a highly diverse array of plant communities on a variety of terrain features. In order to access as much of this landscape as feasible, photo interpreters interacted with people representing county and state agencies, as well as private landowners that enabled them to create a detailed vegetation map of the entire region.

We would like to thank the Long Range Planning Division of the County of Santa Barbara Planning and Development Department for making the project possible, including David Lackie, Julie Harris, Brett Buyan, and Steven Counts Imara. Special thanks go out to Julie Harris who provided planning and guidance throughout the entire effort and to Brett Buyan for his support with GIS data and data transfer.

We are indebted to Evan Keeler-Wolf who provided help in identifying vegetation types using innovative technologies on the public lands. We are also fortunate to have worked with CDFW staff, especially Todd Keeler-Wolf, Senior State Ecologist and Rachelle Boul, Environmental Scientist from CDFW's Vegetation Classification and Mapping Program (VegCAMP). We are grateful to the private landowners who facilitated access to their lands and shared with us their knowledge and local expertise of the region.

Finally, special thanks to all the GIS staff, including Mike Nelson and Ben Johnson for their time and effort in creating the Vegetation Map and updated Environmentally Sensitive Habitat and Riparian Corridor Map for the Eastern Goleta Valley Community Plan Area.

TABLE OF CONTENTS

FIGURES

TABLES

This Page Intentionally Blank

I. Introduction

Aerial Information Systems, Inc. (AIS) was contracted by the Long Range Planning Division (LRP) of the County of Santa Barbara Planning and Development Department to prepare an update of the Environmentally Sensitive Habitat (ESH) and Riparian Corridor (RC) Overlay Map for the non-urbanized portion of the Eastern Goleta Valley Community Plan area (EGVCP). As part of the project, AIS also created a dataset of existing vegetation conditions by interpreting vegetation stands as depicted on current digital aerial imagery to the alliance-level, where possible, using the National Vegetation Classification Standards (NVCS). The newly created vegetation data was then used to derive, in part, updated ESH and RC boundaries for the study area based on EGVCP policy direction. In addition to containing the vegetation type, the final product contains nineteen (19) additional data fields (attributes) that further describe and quantify the overall character of the vegetation. Combining any number of these fields with the floristically defined attribute (alliance) will prove to be a powerful tool in evaluating the overall quality and important structural features of the vegetation that will lead to a comprehensive correlation between these habitats and their wildlife potential.

The EGVCP ESH/RC Overlay Map Update will provide property owners, county staff, and the public with better information regarding the approximate locations of environmentally sensitive habitats and riparian corridors to implement and enforce the ESH Overlay and RC overlay regulations of the County Land Use and Development Code for the EGVCP area. The completed vegetation map is consistent with the California Department of Fish & Wildlife (CDFW) classification methodology and mapping standards for the state of California. These standards correlate to the National Vegetation Classification Standards (NVCS) by establishing a consistent approach to on-site ground observation and data gathering, subsequent classification and analysis of that data and using that data in a consistent approach to creating a vegetation map.

The mapping area ranges from the summit ridge of the Santa Ynez Mountains and extends downslope to the south into the urban fringe, covering approximately 15,377 acres of old growth and recently burned chaparral, riparian and upland forest and woodlands, as well as extensive areas of abandoned and active avocado groves and other land use. Small areas of drought deciduous coastal scrub and annual grasslands also occur in the lower elevations of the study area adjacent to built-up and agricultural lands. The map was prepared for the County of Santa Barbara over a baseline digital image flown in the summer of 2015. Significant changes to the landscape were updated using more recently acquired imagery in 2016 by the US Department of Agriculture – Farm Service Agency's National Agricultural Imagery Program (NAIP).

Vegetation units were mapped using the NVCS to the alliance-level where possible, and in several incidences, to the finer Association level (*See Appendix A for more detail*) as described in the second edition of the Manual of California Vegetation (MCV2) (Sawyer et al, 2009).

The mapping was supported by ground-based field-reconnaissance data gathering efforts using a protocol developed in previous California mapping projects by AIS and the California Native Plant

Society (CNPS). These ground-based data have been uploaded as ancillary information, which were then used to aid the photo interpretation process.

The EGVCP Vegetation Map will help inform users in their effort to study fluctuations in both mature old growth and recently burned chaparral communities, the health and disturbance severity of vegetation, and the distribution and frequency of the different alliances mapped within the study area. These data are key to conservation of biological diversity in the Plan area, especially given the impacts of increasing periods of drought and the effects of climate change. In addition, the completed map is necessary in order to address changes in vegetation makeup due to increased fire frequency and extent throughout the mapping area.

Study Area – General Overview

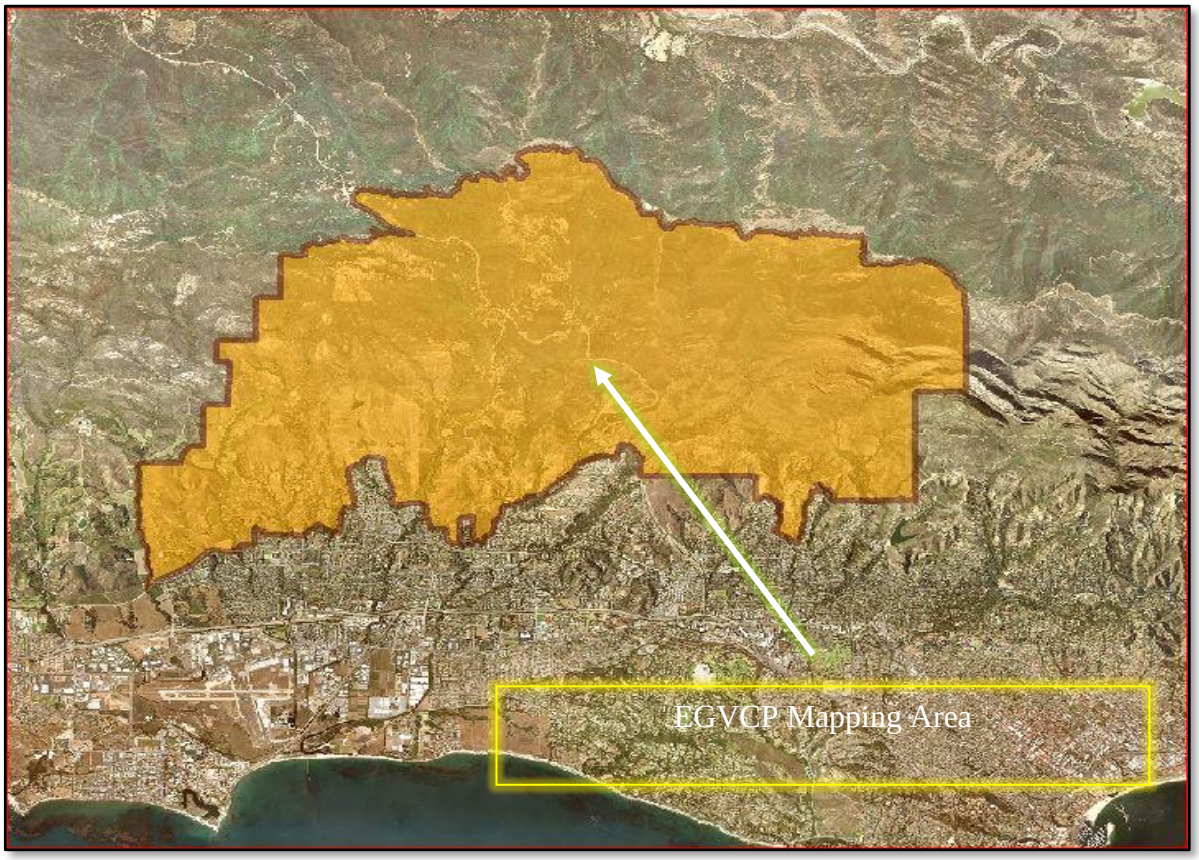


Figure 1: Mapping Area
The mapping area represents the non-urbanized portion of the Eastern Goleta Valley Community Plan area.

The EGVCP mapping effort **(Figure 1)** contains approximately 15,377 acres of cismontane chaparral and broadleaf upland and riparian woodland lying entirely within the California Floristic Province. The mapping area lies wholly within the Jepson Manual's Transverse Ranges Subregion and is represented here by the Santa Ynez Mountains within the Western Transverse Ranges District. The northern portions of the mapping area, in areas over 2,500 feet, share some floristic characteristics of the Outer South Coast Ranges Subregion to the north and west where several

mapped polygons contain small components of *Notholithocarpus densiflorus, Arbutus menziesii,* and *Quercus chrysolepis.* **(Figure 2).**

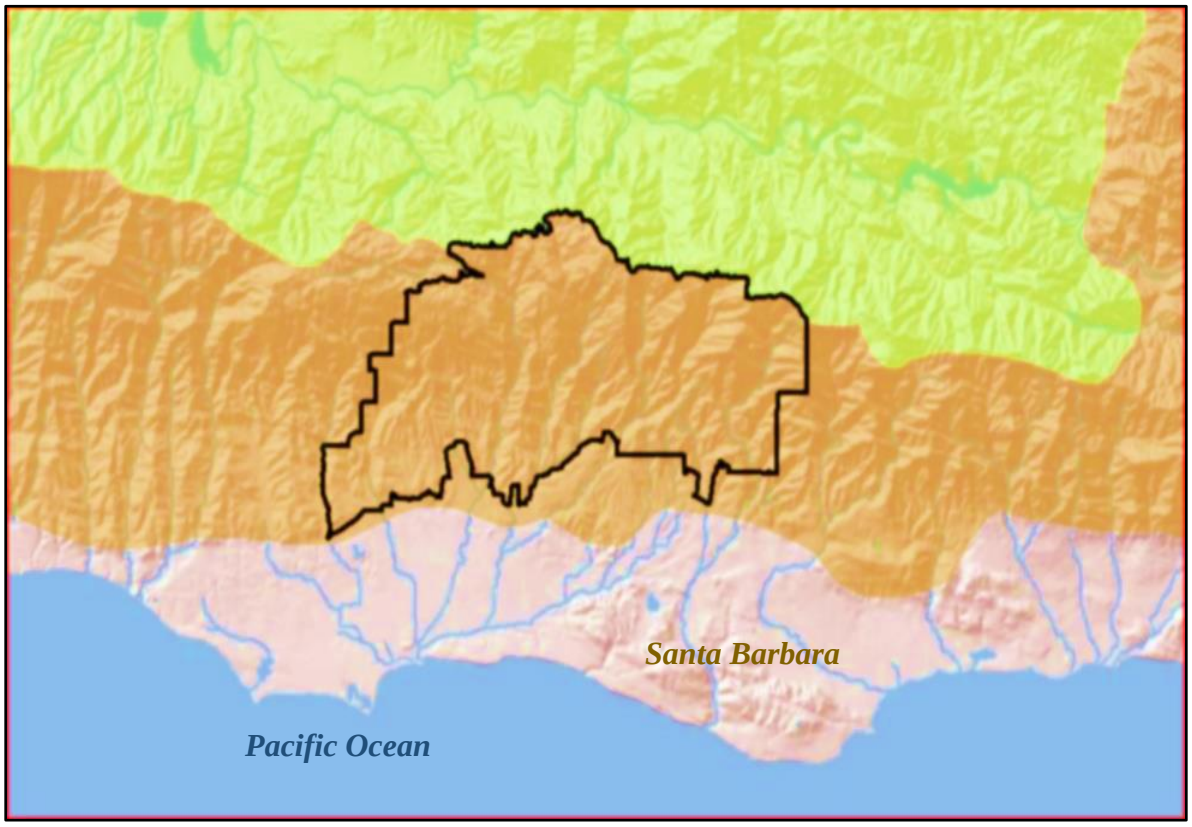
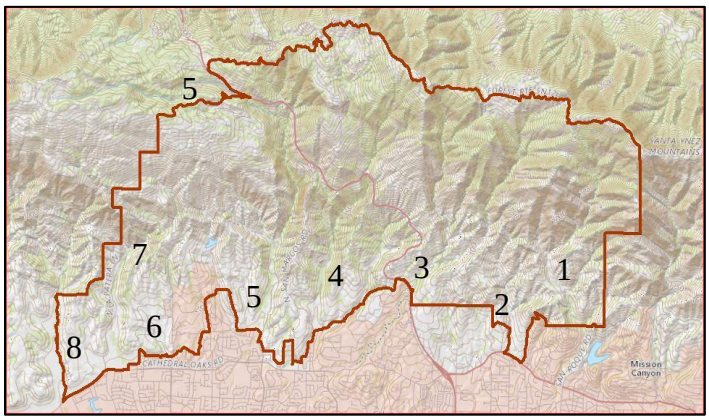


Figure 2: Floristic Subregions
The three floristic subregions are adapted from the Jepson Manual: Higher Plants of California. The mapping area lies entirely within the Transverse Ranges Subregion (denoted in tan). The main ridgeline of the Santa Ynez Mountains (which forms the mapping areas northern border) divides the Transverse Ranges from the southern margin of the Outer South Coastal Ranges Subregion (denoted in green). To the south, following the immediate coastal plain, the South Coastal Subregion is represented here in pink.

The study encompasses a portion of the Santa Ynez Mountains in eastern Santa Barbara County and includes most of the south-trending slopes up to the main ridgeline. Elevations average about 3,000 feet along the ridge down to near sea level where the study interfaces with the urban fringe. The highest point in the study area lies just west of La Cumbre Peak, at 3,965-foot elevation. The region lies within the drier margins of a summer dry season Mediterranean climate, averaging approximately 18" of precipitation in the lower elevations increasing to nearly 30" along portions of the uppermost ridges and favored canyons based on data from the Western Regional Climate Center. Summers are hot in the upper elevations, (Köppen climate classification Csa - averaging over 72 degrees), and warm in the lower elevations closer to the coast, (Köppen climate classification Csb -averaging less than 72 degrees).

The mapping area is bisected by eight major watersheds; from east to west, they include San Roque Canyon, Barger Canyon, San Antonio Creek, Maria Ygnacio Creek, San Jose Creek, Las Vegas Creek, San Pedro Creek, and Carneros Creek. Of these watersheds, only San Jose Creek

extends upward beyond the upper reaches of the study area where it bends due west and parallels a secondary east-west trending ridgeline south of West Camino Cielo Road, (**Figure 3)**.



1. San Roque Canyon
2. Barger Canyon
3. San Antonio Creek
4. Maria Ygnacio Creek
5. San Jose Creek
6. Las Vegas Creek
7. San Pedro Creek
8. Carneros Creek

Figure 3: Major Watersheds

Within the past decade, two major burns have occurred in the mapping area, the Gap Fire in July of 2008 measuring approximately 2,160 acres within the mapping area and the May 2009 Jesusita fire, covering about 4,050 acres in the southeastern portion of the mapping area. These two burns have greatly reduced the acreage of older stands of chaparral across much of the region. The cover density of mapped stands of chaparral within the area of the two burns averages over 20% less than adjacent areas that have not recently burned. **(Figure 4).**

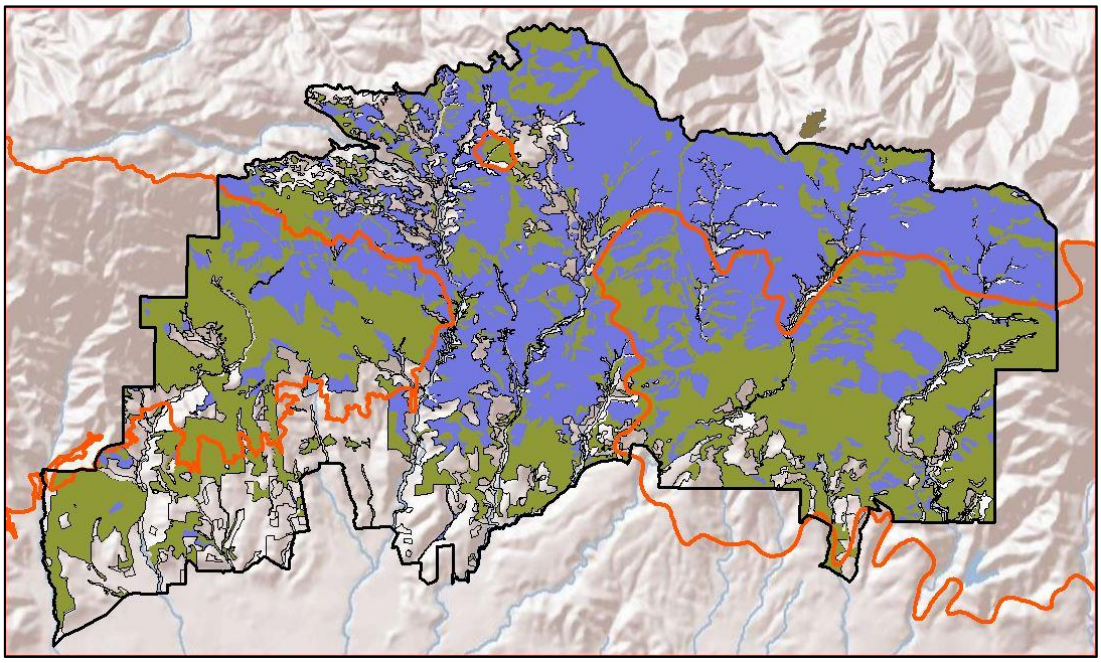


Figure 4: Locations of Recent Burns
Depicts the two major fires that have occurred since 2008 (represented by the orange line) in relation to shrub cover under 50% (in green) and higher cover over 50% (in blue). Stands denoted with a lower cover to the south of the burn line in the south central and southwestern portion of the mapping area are mostly drought deciduous shrubs that typically contain a lower shrub cover.

II. EGVCP Vegetation Mapping Methodology

The EGVCP vegetation mapping procedures implemented for this project have been tried and substantiated during our long history of mapping vegetation throughout the state and elsewhere. These steps have been proven to ensure that a successful project outcome will follow. The mapping effort began with the compilation of a preliminary mapping classification that used the classifications from nearby mapping efforts including those completed for the National Park Service covering the Santa Monica Mountains and Channel Islands in addition to a potential list of alliances known to occur in southern Santa Barbara County. Then the project staff of experienced photo interpreters conducted a field reconnaissance visit to prepare for the photo interpretation effort. Using geographic information systems (GIS) technology, they applied their knowledge and observations of cismontane California floristic communities to create a map of vegetation types. Codes representing a suite of other attributes were assigned to the vegetation polygons. Several quality control procedures and a review of the data by county staff were implemented prior to finalizing the geodatabase. A more detailed discussion of these methodology components follows.

Project Materials

Baseline Imagery for Photo interpretation

Normally, baseline imagery is derived from the most recently acquired NAIP digital image sets, due to its spatial reliability and ease of access to the public. NAIP imagery is widely distributed and is provided at no cost to the users. However, for this project, the county acquired a 2015 image dataset with a significantly higher resolution ranging from 6" in the more urbanized south to 1' at the higher elevations in the northern 2/3 of the mapping area. It was determined that since the two image datasets (countywide high-resolution imagery and NAIP imagery) were closely registered to one another, the higher resolution imagery would provide the baseline for interpretation. The more recent 2016 NAIP imagery was used for any changes that may have occurred in vegetation or land use from the 2015 baseline image dataset. Both sets of imagery capture conditions in the mapping area during severe drought conditions and will not reflect recent partial recovery from these conditions in 2017.

In addition to the 2015 high-resolution imagery, the county provided ancillary sets of high-resolution imagery including one captured in 2008, which reflects conditions of the chaparral and riparian vegetation prior to the May 2009 Jesusita fire and proved helpful to photo interpreters in correlating pre-burned vegetation signatures to current conditions.[1] A second ancillary set of imagery acquired in 2006 aided photo interpreters in the recently burned areas in the western section of the study area; however, the color balance of this particular dataset was less consistent in evaluating vegetation types.

[1] ***Note:*** *Delineations are registered to the 2015 imagery. In mountainous terrain, there are minor positional discrepancies between the 2015 and 2008 datasets. In these areas, the delineations will appear offset from the 2008 imagery in places. Users of the data should evaluate the map to the 2015 imagery for positional accuracy of the delineations.*

Although the 2015 imagery serves as the baseline dataset, other image datasets aided photo interpreters in defining floristic types and delineating vegetation stands. Photo interpreters also had access to earlier NAIP imagery as well as online datasets, which proved helpful to the mapping effort.

Online Imagery

In nearly all instances, additional online imagery was needed to help finalize vegetation attribution decisions. On these occasions, online image sets spanning one to as many as five separate years from Google Earth (GE) were used. In addition, the World Imagery layer available through ArcGIS Online was also used where needed. The date of the online imagery from Environmental Systems Research Institute (Esri) is May 2010. Polygon delineations could be overlain directly onto the online imagery acquired through Esri; however, GE imagery was viewed on an adjacent screen.

The table below shows all image datasets used in the mapping effort. Those denoted with an asterisk are accessed through online technology.

Table 1: Image Datasets

Image Name	Year Created	Resolution	Color
SB County (Base)	2015	6" – 1'	Natural Color
SB County	2008	1'	Natural Color
SB County	2006	1'	Natural Color
NAIP	2016	½ Meter	CIR* & Natural Color
NAIP	2014	1-Meter	CIR & Natural Color
*Google Earth	2008 - 2016	variable	Natural Color
*Esri World	2016	½ Meter	Natural Color

***CIR = Color-Infrared**

Ancillary Data

The following is a list of other datasets used by the photo interpreter in the mapping process.

Digital Sources Provided by Santa Barbara County

- Project Study Area
  - EGVCP Boundary
  - Existing ESH & RC Overlays
  - 2016 Assessor Parcel Data

- Vegetation Maps and Data
    - California Natural Diversity Database (CNDDB) Points & Polygons
    - City of Santa Barbara Master Environmental Assessment Data
        - Sensitive Species Points
        - Upland & Riparian Vegetation Map (Southeast corner only)
- Streets & Trails
- California Fire Perimeters
    - Fire13_2.gdb
- Existing Vegetation (Eveg) polygon feature class CALVEG
- Soils
    - Santa Barbara County, California, South Coastal Portion
- NWI Wetlands
    - CA_wetlands.gdb
- Contour Data (10 meter & 5 foot contour intervals)

Other Digital Sources

- Geology
    - Geology (Geodatabase downloaded from http://datagateway.nrcs.usda.gov/).
- ESRI ArcGIS online
    - Topo Maps
    - USA Topography Maps

The use of USGS contour data derived from digital elevation models and supplementary information from the ancillary datasets such as the ones listed above are important sources of data for the photo interpreter. Vegetation communities have a wide range of image signature characteristics and overlapping signatures between differing vegetation communities can be extensive. It is therefore necessary for the photo interpreter to have a thorough understanding of the topographical setting (slope steepness, direction of the slope, shape of the slope, position of the vegetation stand on the slope, etc.) in addition to modal elevation in which the vegetation communities occur. These biogeographic variables along with substrate characteristics, and flooding frequency and severity are but just a few of the features that help in defining where a stand of vegetation occurs in the landscape.

Mapping Classification

For this mapping effort, no plot data collection or subsequent classification analyses were conducted. The EGVCP Mapping Classification represents a subset of the alliances known to occur in southern Santa Barbara County, which was assembled by the California Department of Fish & Wildlife (CDFW) prior to the start of the project. This dataset was used to derive the preliminary project vegetation mapping descriptions and other pertinent information. After the initial field reconnaissance trip with CDFW & county personnel, the preliminary mapping classification was adjusted to include new types encountered in the field. Alliances that were not encountered during reconnaissance and were not expected to occur in the study area were pared down from the original preliminary list. All added and deleted types have been verified and accepted by the

CDFW. The final list of alliances and associations is based on the second edition of the Manual of California Vegetation (Sawyer, Keeler-Wolf & Evens, 2009).

The vegetation classification and descriptions for the EGVCP were based on numerous vegetation surveys in biogeographically similar areas. The gathering and subsequent analyses of these data follow the Federal Geographic Data Committee (FGDC) as well as National Vegetation Classification Standard (NVCS).

Mapped types in the EGVCP study were characterized for the most part to the alliance-level in the NVCS hierarchy and at times to the finer association-level where possible. Photo interpreters assigned vegetation stands to more generalized categories in the classification hierarchy (e.g., group or macrogroup) when they were unable to assign vegetation to a specific alliance due to image resolution (including most herbaceous types) or in cases where vegetation was recently burned. The mapping classification was updated throughout the production and final phase of the project, with the final mapping classification (see Appendix A) reflecting the finest level that the photo interpreter can identify and map from existing imagery and ancillary data.

Field Reconnaissance

Field reconnaissance efforts serve two major functions. First, they enable photo interpreters to relate the vegetation ground conditions at each observation site to the signatures on the aerial imagery. Second, with guidance from ecologists in the field, the photo interpreters become familiar with the flora, vegetation assemblages, and local ecology of the study area. At the same time, ecologists gain an understanding from the photo interpreters' perspective about assessing vegetation through the framework of map creation.

Prior to the first reconnaissance effort in June 2017, the photo interpreters reviewed imagery on-screen to identify and select potential reconnaissance sites. Accessibility and regulations on differing administrative lands (USFS, State, County and City administered and private property) were ascertained prior to the effort and helped to determine the potential sites to visit. In order to maximize the limited field time, sites were selected in close proximity to roads and trails. Photo interpreters also reviewed the study area for terrain and environmental features, in addition to probable vegetation types that may be found along the proposed field reconnaissance routes. Questionable photo signatures were noted so that those sites could potentially be visited during the field reconnaissance trip. A set of hardcopy medium-scale maps were created encompassing all the sites; the potential site locations and information noted during the review and selection process were downloaded onto Android Tablets using Esri Collector Applications software to assist in field data collection and navigation.

A total of 312 reconnaissance points (both base and distance observations) in portions of five unique watersheds were collected during the five-day June 2017 reconnaissance effort as depicted by the green dots, **Figure 5**. The field crew consisted of two photo interpreters from AIS, the Senior State Ecologist and an Environmental Scientist from CDFW. Data was collected from representative sites throughout as much of the study area as possible.

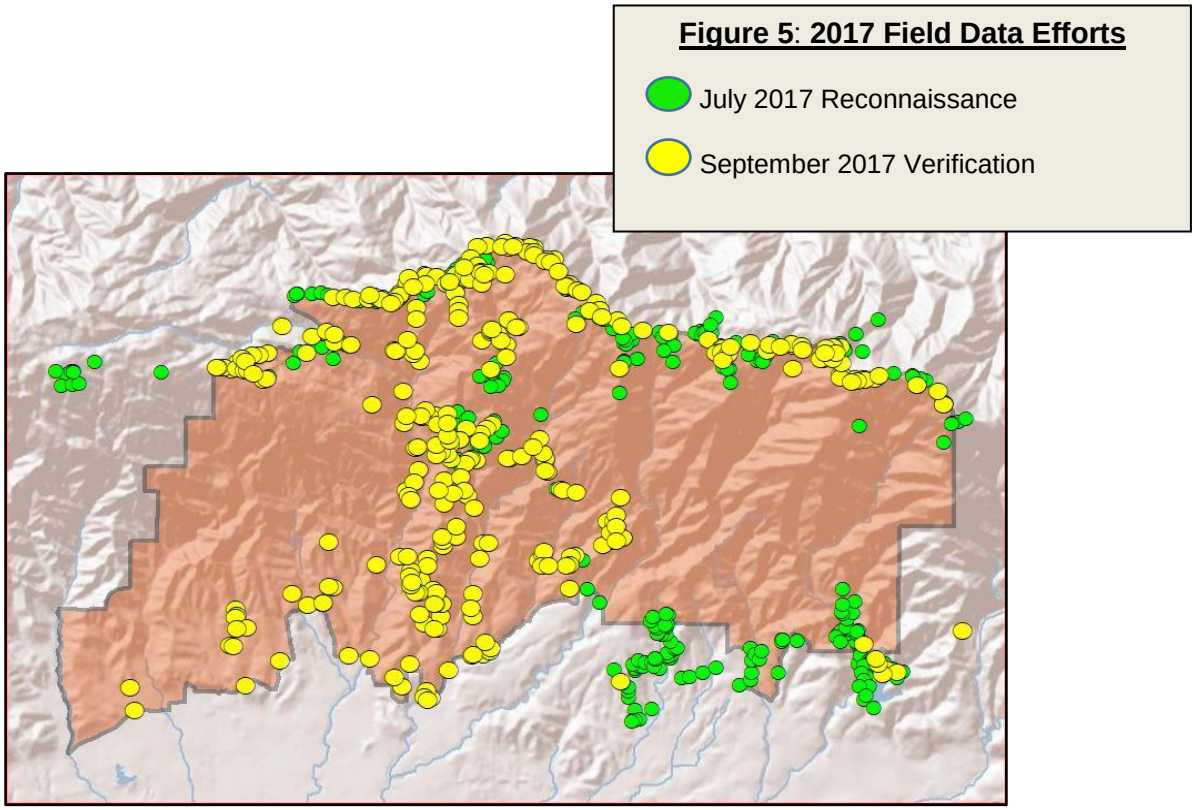


Figure 5: Locations of Field Reconnaissance and Verification Sites

During reconnaissance, the crew traversed portions of five major watersheds within the study, stopping at sites that crewmembers deemed significant to study. Areas encountered in transit as well as areas of floristic or biogeographical significance were visited in the field as observation points. Additional observation points were often taken to mark the transition between vegetation types, with the intent of helping photo interpreters to determine the edges of stands. A single observation point may have contained information about more than one stand. It was also possible for a given stand to be assessed in multiple places. Numerous stands of vegetation were remotely observed at a distance with the aid of binoculars. The location of these remote stands was determined using a compass and laser rangefinder. The field crew members from AIS recorded location coordinates for each site visited into a GPS unit and logged pertinent information on field sheets.

The crew took digital color ground photos at many observation points. The photo number and other information about the photo were recorded onto a field sheet and later input into computer files for easy reference during the mapping process. The field data (GPS waypoints and site descriptions) and linked ground photos were essential for correlating conditions seen on the aerial imagery to conditions on the ground.

Photo Interpretation and Mapping Process

Photo interpretation and mapping is a two-pronged process that occurs simultaneously while creating the vegetation database. Both processes are described in more detail below.

Photo Interpretation Process

Photo interpretation is the process of identifying map units based on their photo signature. All land cover features have a range of photo signatures. 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 on a digital image or map. In context with the photo signature characteristics, the photo interpreters use field data, descriptions, and keys from adjacent projects (i.e. Santa Monica Mountains National Recreation Area and Channel Islands National Park) which help identify and delineate these boundaries. In addition, existing datasets depicting topography, climate, and past vegetation data gathering efforts also aided photo interpreters in their delineations and floristic assignments during the production effort.

It should be noted that vegetation stature as well as the scale and resolution of the aerial imagery determine the visibility of individual plants. Trees and shrubs are usually visible as individuals on high-resolution digital imagery. However, grasses and forb-dominated vegetation (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 photo interpretation decision-making process. Knowledge of these factors, and how plant communities respond to them, guides a photo interpreter in choosing from among other plant types with similar photo signatures. Ultimately, 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 color, clarity and ground conditions.

The detailed descriptions of each vegetation type mapped in the study area are found in Appendix D, and include examples of the types of information the photo interpreters incorporate into their understanding of the models. Some examples of these models include how one alliance may favor broad floodplains, while another is found at the immediate fringe of narrow well-defined channels. Some alliances may flourish on disturbed sites, while others cannot tolerate multiple frequencies of high intensity disturbance events such as fire. Moreover, some alliances are ubiquitous and found in a variety of settings.

These descriptions also discuss the importance of various plant species in the alliance. However, in many cases, complicated relationships exist between the relative covers of plants, such as in alliances named for indicator species that have lower percent cover than other species present. Thus, both environmental settings and rules regarding relative cover factor into the intelligent delineation of vegetation polygons.

Mapping Process

Just as the use of biogeographical models by experienced photo interpreters contributed to the production of a high-quality vegetation map, the use of reliable procedures allowed the map to be

produced in a highly efficient manner. For example, the study area was divided into two modules varying in size between 7,000 and 8,000 acres each. This facilitated project workflow by enabling several staff members to work on the mapping effort simultaneously.

Using an on-screen heads-up digitizing method, the photo interpreters had at their disposal a suite of standard and in-house customized ArcMap tools for use in the creation of polygons. To maintain consistency among the photo interpreters, the high-resolution imagery was viewed at scales ranging from 1:500 to 1:4,000 during the mapping process. 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, photo interpreters also referenced supplemental imagery, field reconnaissance data, and other ancillary data. These sources were displayed in the ArcMap session as needed.

Mapping Process

Each polygon is coded for nineteen different attributes, including the vegetation type (Map Unit), cover class densities for trees, shrubs and herbaceous life forms, different types of disturbances, land use and rarity rankings. Table 2 below lists all the attributes for each polygon that are described later in the report. The values for each attribute are defined in Appendix B.

Table 2: Mapping Attributes for EGVCP Vegetation

Mapping Attributes (attribute names are shown as they appear in the final database)
MapUnit
ConiferCover
HardwoodCover
TotalTreeCover
ShrubCover
HerbaceousCover
Exotics
AnthropogenicAlteredDisturbance
Roadedness
DevelopmentDisturbance
Notes
LandUse
MethodID
Height
CWHRSizeClass
CWHRType
CWHRName
StateRarityRankings
GlobalRarityRankings

The codes for most of the mapping attributes were assigned during the mapping process. The values for the attributes were entered into the database as numeric values, which are easier to input and manipulate than alphanumeric codes. Numeric code values also allow for the hierarchical grouping of like vegetation communities, assisting the mapper to know at a glance, which alliances are found in a particular hierarchical grouping. A custom menu was developed by AIS staff that enabled code values to be assigned to their corresponding spatial delineations efficiently while minimizing the possibilities for entry errors.

Some attributes, such as the California Wildlife Habitat Relationship (CWHR) Name, Type, and Size Class values, as well as rarity rankings, were assigned later to each polygon by using crosswalks that were based upon the alliance type of the polygon.

The two modules were edge-matched and checked for invalid codes, illogical relationships between attributes, unnecessary polygon divisions, as well as topologic and other GIS related inaccuracies. Once finished, the modules were joined into one seamless geodatabase. The geodatabase was subject to further processing and review by a senior staff member before being delivered to the client. Quality control procedures implemented during the mapping effort and before final delivery of the data improved the consistency and accuracy of the overall geodatabase.

Mapping Criteria

As discussed above, appropriate tools, reference sources, photo interpretation knowledge, and understanding of vegetation communities are all essential in creating a quality vegetation map. However, without the establishment and refinement of mapping criteria, a given vegetation map could be riddled with discrepancies, as different photo interpreters approach the task with different assumptions and styles. Guidelines and rules regarding exceptions, special situations, and minimum mapping units are discussed and disseminated to all staff members before and during the mapping effort, which helps to create a clear and consistent product. Establishing criteria also makes the mapping process more efficient, as individual photo interpreters do not have to pause too long to consider how best to capture the more commonly occurring complicated or problematic situations that are encountered.

The specific criteria for each interpreted attribute contained in the final database are discussed in the next section below under the appropriate heading.

Mapping Attributes

Map Unit Attribute

This 5-digit code corresponds to a vegetation type (e.g. mapping unit, alliance, association, group, or macrogroup) or miscellaneous class (e.g. urban disturbance, water) in the Vegetation Mapping Classification. The Map Unit attribute is assigned a value to each polygon in the geodatabase.

Each vegetation type is described in Appendix D; the Vegetation Mapping Classification is presented in Appendix A; and a summary table of vegetation acreage by map unit code is presented in Appendix C.

Vegetation Mapping Considerations – Minimum Mapping Unit

For vegetation mapping, a minimum polygon size is an important consideration when creating and viewing a vegetation geodatabase. A minimum mapping unit (MMU) is established to ensure the map contains polygons of a workable, meaningful size. The choice of a MMU is influenced by the clarity of the imagery, the detail of the mapping classification, the purpose of the data, and time and budget constraints.

The MMU can vary for different categories of features being mapped. The California Statewide mapping criteria has established different MMUs depending on the area being mapped (e.g., MMUs in Desert areas are different from those in the Sierra Foothills). For this project, there were several established MMUs: 1 acre for upland types, 0.25 acres for special & wetland features and 5 acres for cover-class and other attribute changes, **Figure 6.**

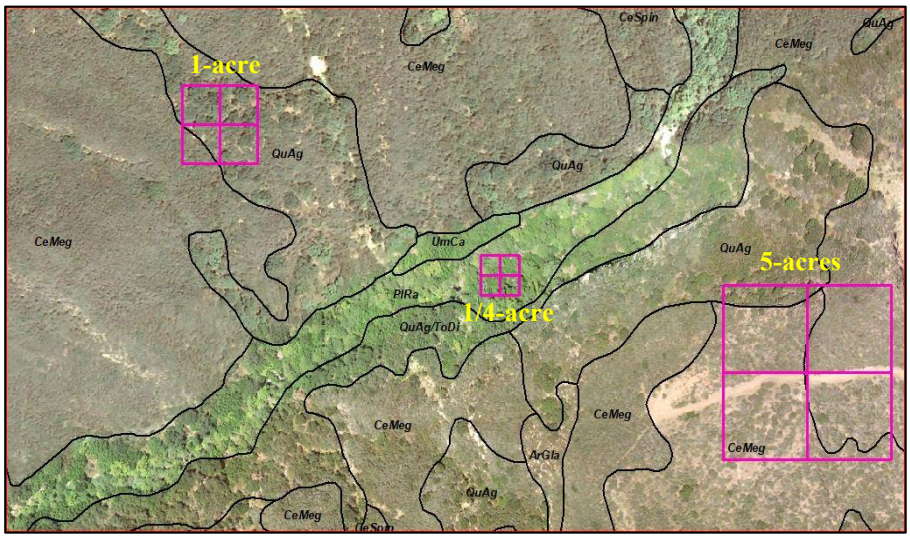


Figure 6: Minimum Mapping Units
Stands of upland and riparian vegetation are depicted in the image above denoting variable MMU's from ¼ to 5 acres. The ¼-acre square is depicted in a riparian setting, the 1-acre square is noted within an upland woodland with chaparral, and the 5-acre square shows an area of two side-by-side identical floristic types being split based on cover density.

The establishment of an MMU requires the need for guidelines when aggregating vegetation that occurs below that defined 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 used when a vegetation unit below MMU is aggregated with the vegetation type that surrounds it. This is known as a mapping or vegetation inclusion. Finally, if a vegetation 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 environmentally similar adjacent type.

In addition to establishing MMU size, guidelines were established for the minimum width (MW) of a map polygon. The rule of thumb was to make the MW slightly under half the width of an MMU square. For the 0.25 acre MMU, the MW is approximately 45 feet and for the 1-acre MMU, the MW is approximately 90 feet. 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. This scenario occurs frequently when a narrow stream or riparian polygon was mapped below MMU or MW. In these circumstances, below MW portions were included in order to maintain the continuity of the stream or riparian vegetation.

Another type of MMU mapping consideration pertains to small areas of sparsely vegetated terrain. Polygons assigned to a floristic type in the NVCS often contain small patches of sparsely vegetated surfaces that are often too small to separate out. These small areas are generally not separated out as unique features unless they met the minimum mapping resolution. The most common examples of these features include rock outcroppings in shrub dominated communities and small riverine flats or wash channels in riparian stands of vegetation.

Vegetation mapping to more generalized levels of the hierarchy

When the photo interpreter could not confidently classify a polygon at the alliance or association-level, or the vegetation was a mix that did not fit into an existing described alliance, association, or mapping unit, the polygon was assigned to a more generalized (higher-level) group or macrogroup unit within the classification hierarchy.

Approximately 190 acres of mixed scrub have been assigned to more generalized levels in the hierarchy (mostly in recently burned xeric and mesic California chaparral groups). For understandable reasons, it is difficult to distinguish alliance-level categories using existing imagery or ascertain any meaningful biogeographical models to help determine recently burned patches within the xeric or mesic chaparral types. Within the abovementioned Chaparral groups, mappers found it necessary to generalize up from alliance-level assignments less than 0.5% of the time. See **Figures 7A & 7B.**

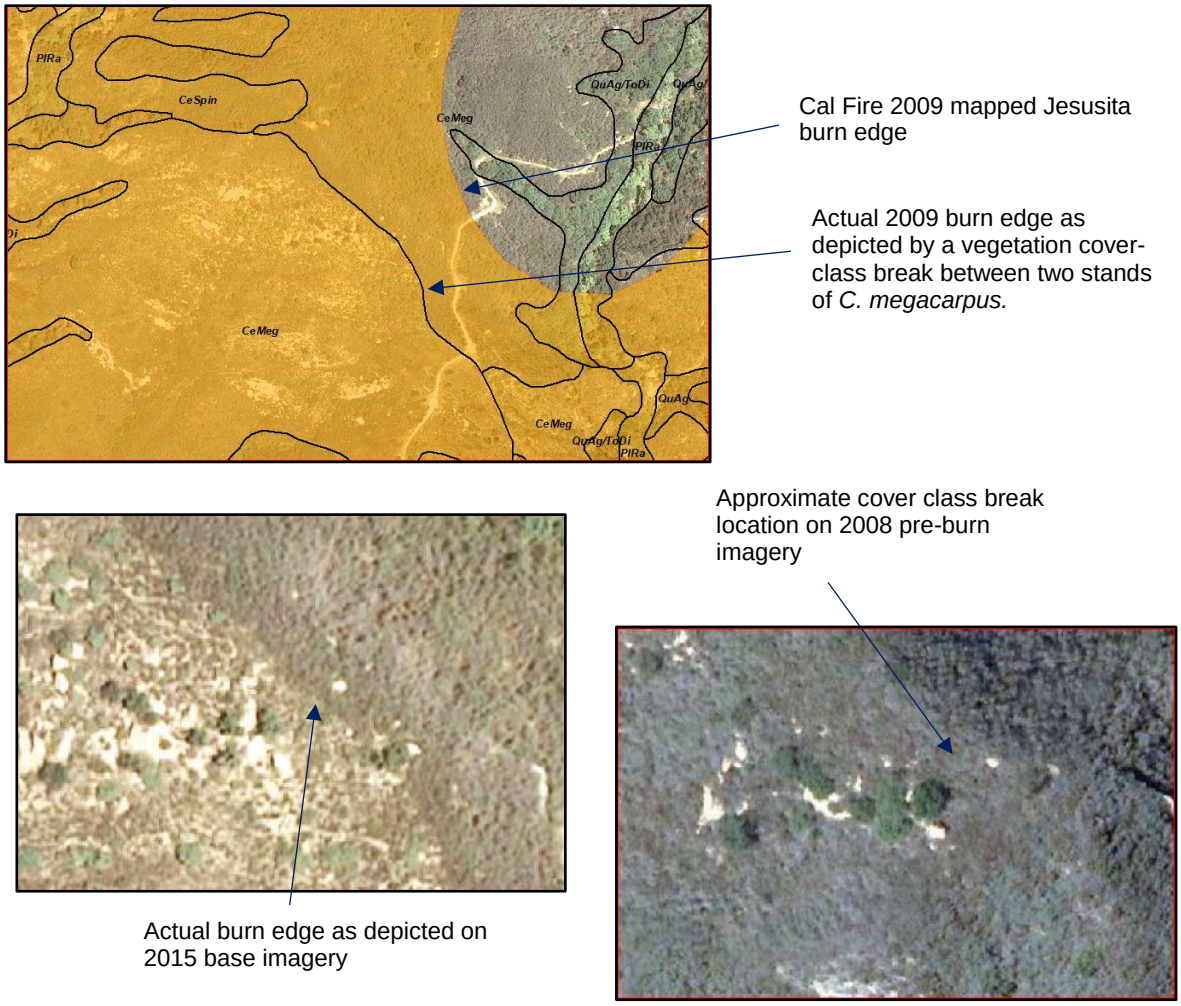


Figure 7A: Mapping a Burn Area to Alliance Level

Figure 7A (above) depicts an example where the photo interpreter is able to map burned vegetation to the alliance-level. The burn area is shown in orange. Note that this burn edge is more accurately delineated as a cover break on the vegetation map between two stands of *Ceanothus megacarpus*. In this situation, the photo interpreter uses the 2008 imagery to confirm vegetation at the finer alliance-level.

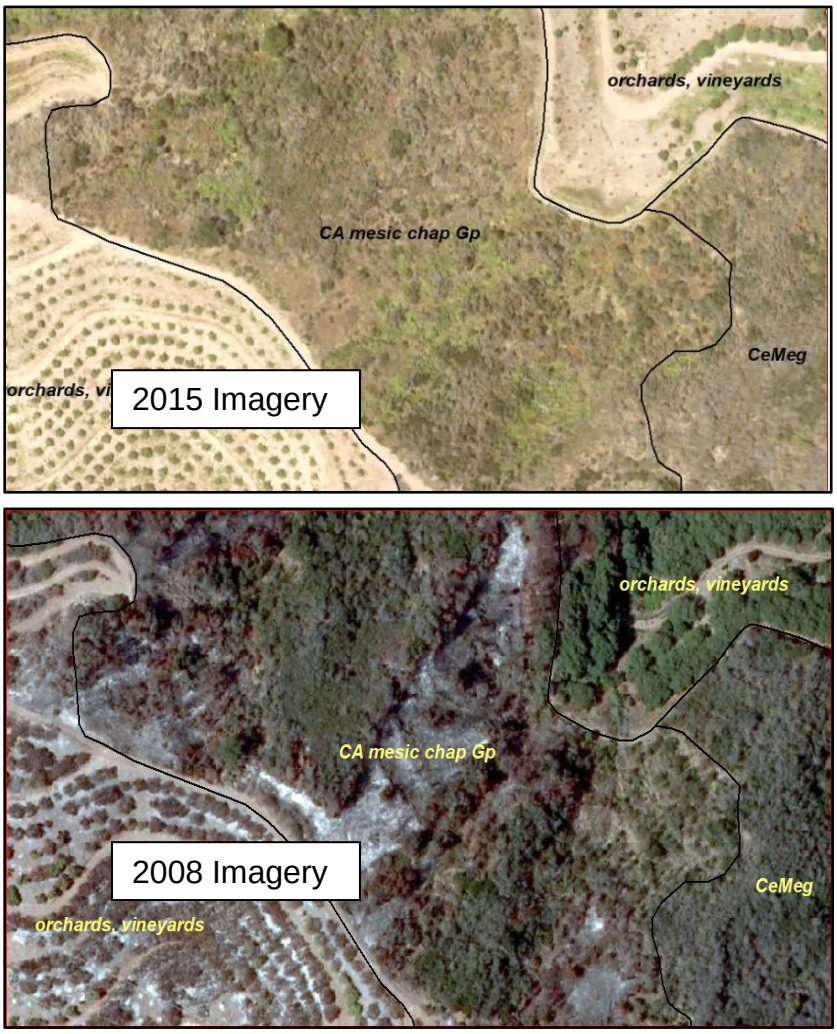


Figure 7B: Mapping a Burn to Group Level
Figure 7B (above) depicts an example where photo interpreters cannot reliably map below the group-level. Vegetation in this stand is depicted on the 2015 imagery in a 7-year post-burn recovery environment; the stands heterogeneity is too high to classify to an alliance-level in this example. Existing 2008 imagery depicts portions of the stand immediately after the 2008 Gap Fire and therefore does not provide any additional information in identifying components to the stand. The mapped polygon is therefore classified to the California Mesic Chaparral Group.

Finer Scale Association-Level Vegetation Mapping

Although mapping to the alliance-level of detail is this project's standard, photo interpreters mapped the following vegetation type to a finer level of the classification known as the floristic association. This association is more thoroughly described in Appendix D of this report:

Within the *Quercus agrifolia* (Coast Live Oak Woodlands) Alliance

- 11121 *Quercus agrifolia / Toxicodendron diversilobum* Association

The abovementioned association is of particular interest in that it more accurately reflects the boundaries of the Riparian Corridors (RC's) and can be used to aid in the creation of the RC overlay.

In addition to the abovementioned association, photo interpreters designated in the Notes attribute of the geodatabase, polygons that could be potentially mapped to the *Ceanothus megacarpus – Malosma laurina* Association by noting the presence of *Malosma laurina*. Presence/absence of this maritime chaparral species is known in other mapping projects to follow the approximate boundary of more frequently occurring freezes.

The following summarizes vegetation mapped to hierarchical units other than the alliance Level:

- Riparian vegetation (18 acres – group-level designations)
- Chaparral vegetation (190 acres - group & macrogroup designations)
- Coastal scrub vegetation (60 acres – group & macrogroup designations)
- Association-level classification (892 acres)
- Potential association-level based on Notes attribute – (*Malosma laurina* co-dominating the stand- 290 acres)

Percent Cover Attributes

The percent cover attributes include the following:

- Conifer Cover
- Hardwood Cover
- Total Tree Cover
- Shrub Cover
- Herbaceous Cover

Percent cover, also referred to as cover density, is a quantitative estimate of the aerial extent of the living plants for each vegetation layer mapped within a stand. Absolute percent cover based on a birds-eye view (what a photo interpreter can see from the sky looking down), is the primary metric used to quantify the importance or abundance of a life form and/or species.

It should be noted that the cover of a stand could be considered a more significant attribute than the floristic assignment depending on the end use of the map. A mapped boundary dividing a break between a shrub cover density of 60% to a cover density of 10% can be more important than a boundary separating closely related floristic types (such as between a *Quercus berberidifolia* Alliance and a *Quercus berberidifolia – Adenostoma fasciculata* Alliance).

More often than not, the cover of a stand will change following one or more severe burn events. Therefore, in studying a change that has occurred in vegetation stands between

vegetation maps completed at different times, in most cases, it is more likely that the vegetative *cover* will change rather than the actual vegetation *type* change.

The percent cover was estimated separately for conifer, hardwood, shrub, and herbaceous layers. Cover was assessed and then assigned to the nearest percent for the tree and shrub layers and recorded in the database. The herbaceous layer was assigned to four cover class categories and one for "Not Evaluated". These values are listed in Appendix B.

To determine the vegetative cover, photo interpreters assigned percentages to the different life forms visible on the imagery, including nonvegetated areas. The cover percentages may in the future be converted into the appropriate cover categories for each of the life forms being mapped. For example, if a total hardwood cover in the stand was 3-4%, then it may be assigned the range of 1-5% (hardwood cover-class category 2).

Users of the map should note that assigning values to the nearest percent total cover provides a tool for maintaining consistency between photo interpreters in evaluating stand cover. Assigning cover to the nearest percent also enables the users of the map to create cover class breaks into categories that suite their particular needs or interests. There is inherent error in evaluating cover to this fine a level; therefore, nearest percent cover estimates should be used with a 5% buffer on either side of the exact number assigned to the stand.

Although cover classes were assigned to the nearest percent cover, photo interpreters formed separate polygons when there were changes in cover of at least 10% within a vegetation mapping type. A given vegetation polygon would have been subdivided due to cover differences regardless of which strata the cover difference occurred. For example, two adjacent polygons in the geodatabase may have had the same shrub vegetation type assigned but different cover categories for conifers (for example, 1-5% versus 5-15%).

Most standardized vegetation mapping efforts have a set of criteria regarding percent cover. The EGVCP vegetation mapping effort follows the same criteria as those developed for other projects where cover estimates are to the nearest percent. The Sierra Nevada Foothills mapping effort is an example of this type of cover estimation.

Percent Cover Mapping Considerations

It is important to note that the photo interpreters could only accurately quantify the vegetation that is visible on the aerial imagery. Therefore, in this project, only "bird's eye" total cover was mapped. Thus, the cover of understory layers, which were obscured by overstory layers were not included in this analysis. For this reason, total cover of understory vegetation may be underestimated, especially if their extent was hidden under the crowns of trees, and may differ from assessments done on the ground.

Stands of riparian vegetation, along with adjacent unburned chaparral or woodlands, often occur in dense cover over 60%. Where the overstory cover exceeded 40%, 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 given a value of "Not evaluated". This same criterion has been used in numerous statewide mapping efforts. For example, if a conifer tier cover exceeded 40%, then the other tiers below (hardwood and shrub) were not evaluated for cover. If the conifer tier cover was <40% but together with the hardwood tier the combined cover was >40%, then the shrub cover was not estimated. Appendix B includes tables that present the ranges of percent cover used for each of these categories.

The date that the aerial photography mission is flown influences the percent cover assigned to vegetation types. Subsequent field reconnaissance and field verification efforts 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 leaf phenology (cold-season deciduous, drought deciduous, facultatively deciduous) can affect plant cover determination. Leaf-on conditions obscure the understory. Imagery of leaf-off conditions would allow photo interpretation of the understory, but make it difficult to identify the overstory species since there is no foliage present.

- Annual variability - The differences in environmental conditions at the time the imagery was captured (wet vs. drought years, flooding, etc.) vs. the timing of the on-site field visits may result in different assessments or perceptions of percent cover for the same stand.

Disturbance Related Attributes

For this project, four disturbance related categories were evaluated for each polygon. Polygons were not created or divided based on differences on any one or multiple attributes within these categories. The values for the disturbance attributes are described in Appendix B.

Exotics Attribute

This is assigned a code to each existing polygon reflecting the level of impact by exotic invasive species, especially grasses and forbs from the Mediterranean naturalized annual and perennial grasslands group.

Roadedness Disturbance Attribute

This attribute is assigned a code to each existing polygon reflecting the level of impact by paved or unpaved roads, OHV trails, railroads, and berms. Impact is defined by the proportion of any polygon that is contiguously without these features.

Anthropogenically Altered Disturbance Attribute

This attribute is assigned a code to each existing polygon reflecting the level of impact on vegetation through tillage, scraping, mining or other disturbances that remove or reduce vegetation cover.

Development Disturbance Attribute

This attribute 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 and mining structures. It also includes non-fixed structures such as trailers, large amounts of illegally dumped junk or collapsed buildings.

Notes Attribute

This attribute is considered a catchall for significant information regarding a polygon and generally contains "value added" information that cannot be statistically quantified by the photo interpreter. An example of this "value added" information occurs when the photo interpreter notes predominant species present in the stand other than the vegetation type being mapped. Polygons are not created or split based on this field.

Examples of important information that can be derived from this attribute are noted below:

- Stands assigned to the group or macrogroup levels are often denoted with the date of the associated burn that prevented photo interpreters from identifying species-level vegetation dominance.
- Stands of *Ceanothus megacarpus* in post fire settings were often noted with a co-dominance of *Malosma laurina.* This is a described association, so with minimal post analysis, all polygons with these notes may be later cross-walked to an association-level value.
- Pertinent site-specific information of a ground assessed stand during reconnaissance such as avocado orchards that have since been removed.

State Rarity Rankings Attribute

This attribute identifies the State of California Natural Diversity Database's (CNDDB) rarity rankings for the alliances using the NatureServe's Heritage Program methodology. The categories are listed in Appendix B.

Global Rarity Rankings Attribute

This attribute reflects an assessment of the condition of the species or ecological community across its global range. The categories are listed in Appendix B.

Height Attribute

This attribute identifies nine modal height categories applied to woody vegetation (trees & shrubs). Height is estimated for the stature of vegetation as defined by the alliance. For a tree statured alliance, modal height is estimated only for the trees, not shrubs. For a shrub-defined alliance, modal height is estimated for the shrub layer; emergent sparse tree cover is not taken into consideration. A value of "Not evaluated" is given to those mapping types that are not trees or shrubs. The categories are listed in Appendix B.

CWHR Name Attribute

This attribute correlates the mapped alliance type to the California Wildlife Habitat Relationship (CWHR) System name. It classifies existing vegetation types important to wildlife. The system was developed to recognize and logically categorize major vegetative complexes at a scale sufficient to predict wildlife-habitat relationships. Detailed information regarding the CWHR system can be found on CDFW's web site, https://www.wildlife.ca.gov/Data/CWHR. The categories are listed in Appendix B.

CWHR Type Attribute

This attribute is the 3-digit acronym of the CWHR Name, per CWHR criteria. The categories are listed in Appendix B.

CWHR Size Class Attribute

This attribute is held as a placeholder for future analysis. Currently, there are no direct correlations in either tree height or alliance designation that will consistently and reliably determine the modal size of a stand, diameter at breast height (DBH). It is currently not possible to determine size categories using existing imagery without ground assessing all polygons. Currently, the only value for this attribute is "Not evaluated".

Land Use Attribute

This attribute indicates the appropriate land use category within a polygon and is a different attribute than Map Unit. It is assigned to every polygon, regardless if it is coded as a vegetated or miscellaneous class. Miscellaneous classes are Vegetation Type (Map Unit) categories reserved for land use types such as agriculture, urban disturbance, and water features, which are attributes of vegetation polygons. A two-tiered coding system (Vegetation Type and Land Use) is used to allow for the coding of a given polygon as both a natural vegetation type and a land use type if the situation warrants it. A polygon that has

been assigned a Miscellaneous Class land use code value in the Vegetation Type (Map Unit) attribute is automatically populated with a corresponding land use code value in the Land Use attribute. The value of Not Assigned / Not Assessed is given to polygons without an associated land use.

The land use types are taken from the Southern California Land Use Consortium/ Southern California Association of Government's Land Use Classification developed by AIS (Johnson and Reyes, 1990), which was based on the Anderson, et al. (1976) land use classification system. Land Use values are found in Appendix B and descriptions of them are located in Appendix D.

Method ID Attribute

This attribute is used to indicate how the Map Unit coding decision is reached for a polygon by identifying what type of field data (if any) is used to determine the vegetation type assignment. For polygons that do not have any corresponding point data, the value of "photo interpretation" is assigned. The categories are in Appendix B.

Field Verification

During the photo interpretation process, it is common for photo interpreters to encounter areas that have questionable or confusing photo signatures. These polygons were flagged for ground observation (referred to as field check sites) for the verification effort. The primary goal of field verification is to sample as many different types as possible to ground truth the vegetation delineations and code attribute assignments of the mapped polygons. Types that are more common were sampled at a higher rate than rare types. Frequently occurring types were sampled over a wide range of their distribution.

The September 2017 field verification trip followed the initial draft completion of the vegetation map in late August. For this field effort, two AIS photo interpreters sampled portions of 356 polygons, located by the points in yellow, **Figure 5.** Every effort was made to evaluate polygons that did not contain previously assigned reconnaissance points. Large polygons were occasionally sampled in different areas from where reconnaissance points were collected. Verification included numerous areas in the southwestern portion of the study area that were not previously visited during the reconnaissance effort.

The following is a summary of the confusion within or between types that needed further correction and/or refinement in the office based on the findings from the verification effort:

1. Over-mapping of *Quercus berberidifolia* and *Q. berberidifolia – Adenostoma fasciculata* Alliances. Confusion was in grassy settings where the incorrect designation of the oak was mistaken for *Arctostaphylos glandulosa.* This occurred mainly just below the summit of the Santa Ynez mountains.
2. Mapping stands at lower elevations to the *Malosma laurina* Alliance turned out to be *Rhus integrifolia* a number of times during the field verification.

3. Stands assigned to the *Artemisia californica – Eriogonum fasciculatum* dual shrub Alliance were noted in the field more frequently as the single-species *Artemisia californica* Alliance.
4. Stands of *Selaginella spp.* were verified in several locations east of Painted Cave Road not sampled during the July reconnaissance effort.
5. One fairly large stand of *Genista monspessulana* was over-mapped into an adjacent stand of post fire chaparral and coastal scrub west of the Communication Range along East Camino Cielo Road.
6. Stands mapped to *Cercocarpus betuloides* Alliance were over-mapped in areas found to be dominated or co-dominated by *Prunus ilicifolia* and to a lesser extent by *Heteromeles arbutifolia.* In many of these stands, *C. betuloides* was not present or formed only a minor component to the shrub canopy.

Quality Control and Delivery of the Final Product

Quality control steps were implemented throughout the duration of the project in order to make sure the map followed set guidelines and consistency among the photo interpreters. Once the initial photo interpretation phase was completed, a comprehensive quality control was performed by a different photo interpreter. Checks were then run for invalid attribute codes, and topology and other GIS related problems.

Quality control checks for illogical coding combinations were also run on the polygon attributes. An example of an illogical coding combination is a California sagebrush designated polygon with a high conifer component in the conifer cover attribute. After the final changes from the verification effort were implemented into the geodatabase, one last round of quality control checks were run on the geodatabase before it was delivered to the county.

Accuracy Assessment

Due to budgetary constraints, no formal accuracy assessment was performed on the vegetation database. However, given our numerous vegetation mapping projects covering south and central California chaparral & woodland Alliances and our high accuracy assessment scores from adjacent and nearby projects, there is an inherent confidence factor built-in to the database already.

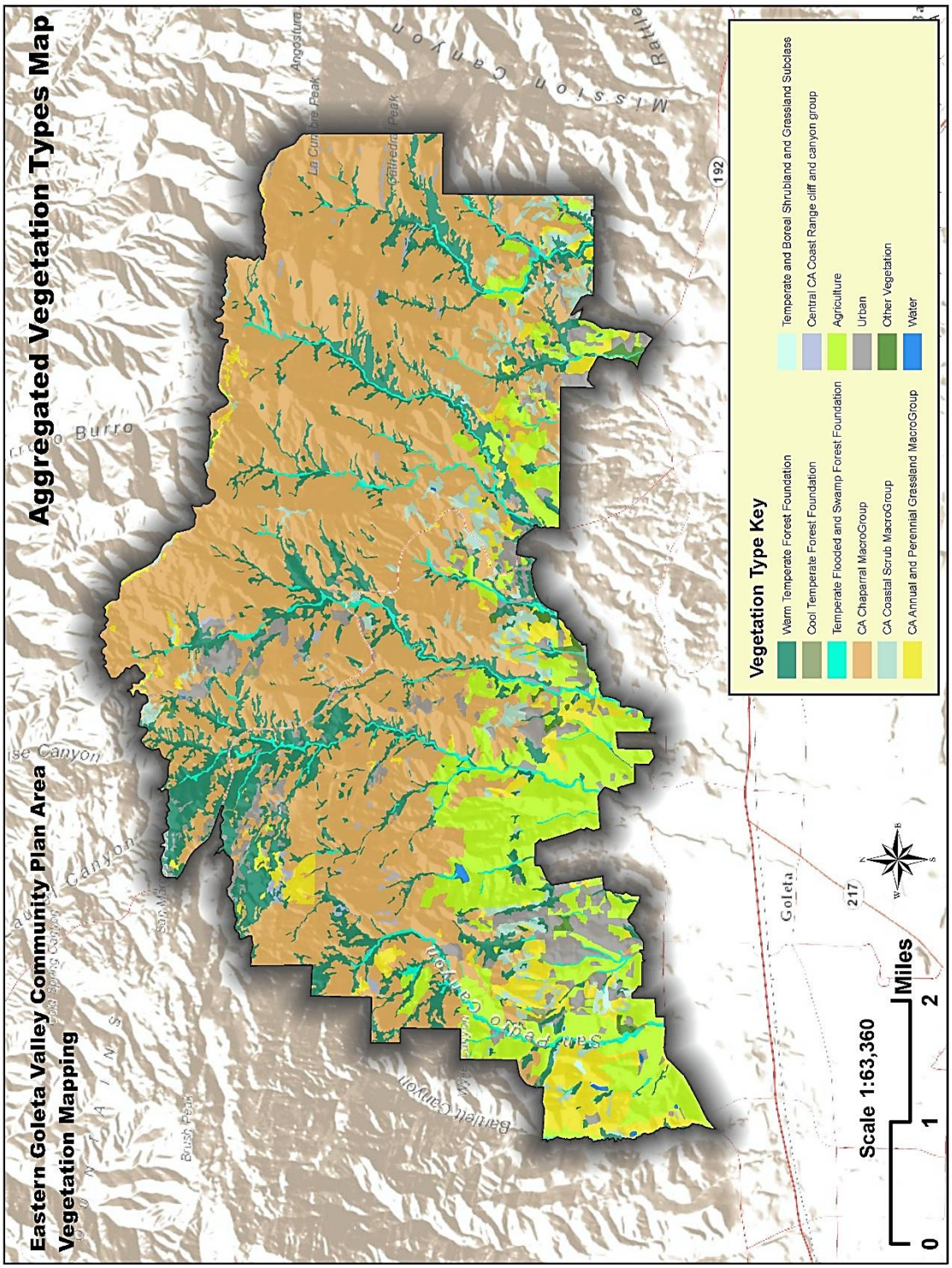


Figure 8: Vegetation Map of the Study Area by Aggregated Types

III. References

AECOM; Aerial Information System, Inc.; California Native Plant Society (2016), Vegetation Classification for the Nature Reserve of Orange County, UC Irvine Dash, Dataset, https://doi.org/10.7280/D1F30C

Anderson, J.R., E.E. Hardy, and J.T. Roach. 1976. A land-use classification system for use with remote-sensor data. US Geological Survey Circular 671, 16 p.

Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken, editors. 2012. The Jepson Manual Vascular Plants of California, second edition. University of California Press, Berkeley.

California Department of Forestry & Fire Protection (CAL FIRE), contract counties, U.S. Forest Service, Bureau of Land Management and National Park Service. 2016 burn perimeters & descriptions

California Department of Forestry & Fire Protection (CAL FIRE), CWHR Classification System http://frap.fire.ca.gov/projects/frap_veg/classification

California Department of Fish and Wildlife, California Natural Diversity Database

California Department of Fish and Wildlife, California Wildlife Habitat Relationships https://www.wildlife.ca.gov/Data/CWHR

Esri, Digital Globe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community. Maps used as backdrops in this report.

Federal Geographic Data Committee (FGDC). 2008. National Vegetation Classification Standard, Version 2 FGDC-STD-005-2008 (version 2). Vegetation Subcommittee, Federal Geographic Data Committee, FGDC Secretariat, U.S. Geological Survey. Reston, VA. 55 pp. + Appendices.

E. Reyes, A. Glass, D. Johnson, and J. Reyes. 2007. 2007 California Vegetation Map in Support of the Santa Monica Mountains NRA. Final Report. Prepared for Environmental Systems Research Institute (Esri). Aerial Information Systems, Inc., Redlands CA.

Johnson (Limon), D. and E. Reyes. 1990 (rev. 1993, 2000, 2005). Southern California Land Use Consortium (SCALUC)/Southern California Association of Governments (SCAG) aerial land use study – land use code descriptions and key signatures, Level III/IV. Aerial Information Systems, Redlands, California. Unpublished.

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

US Fish & Wildlife Service National Wetlands Inventory. Santa Barbara County 2013.

Western Regional Climate Center – Cooperative Climatological Data Summaries. Southern California. Reno, Nevada. http://www.wrcc.dri.edu/summary/Climsmsca.html

This Page Intentionally Blank

APPENDIX A: EGVCP Mapping Classification

SANTA BARBARA COUNTY- EASTERN GOLETA VALLEY PLANNING AREA FINAL MAPPING CLASSIFICATION HIERARCHY

Updated October 26, 2017

Hierarchy based on the National Vegetation Classification Standard (NVCS)
Minimum Mapping Units: **XXXXX** = 1-acre MMU; **XXXXX** = ¼-acre MMU (Riparian, wetland, and special types) Mapping Units in red font were mapped for the project.

Class (NVCS Classification Code)
SubClass (NVCS Classification Code)
Formation (NVCS Classification Code)
Division (NVCS Classification Code)
Macrogroup (NVCS Classification Code)
Group (NVCS Classification Code)
Alliance
Association

Mesomorphic Tree Vegetation (Forest and Woodland) Class (1)
10000 Temperate Forest SubClass (1.C)
Warm Temperate Forest Formation (1.C1)
Madrean Forest and Woodland Division (1.C.1.c)
11000 California Forest and Woodland Macrogroup (MG009)
11100 Californian broadleaf forest and woodland Group (6)
11120 *Quercus agrifolia* Woodland Alliance
11121 *Quercus agrifolia / Toxicodendron diversilobum* riparian Association
11150 *Umbellularia californica* Forest Alliance
11200 Californian evergreen coniferous forest and woodland Group (21)
11210 *Pinus coulteri* Woodland Alliance
11220 *Pinus sabiniana* Woodland Alliance

Cool Temperate Forest Formation (1.C.2)
Western North America Cool Temperate Forest Division (1.C.2.b)
12000 Californian–Vancouverian Montane and Foothill Forest Macrogroup (MG023)
12200 Upland Vancouverian mixed woodland and forest Group (49)
12210 *Acer macrophyllum* Forest Alliance

North American Introduced Evergreen Broadleaf and Conifer Forest Division (1.C.2.x)

13000 Introduced North American Mediterranean woodland and forest Macrogroup (MG27)

13100 Introduced North American Mediterranean woodland and forest Group (106)

13110 *Eucalyptus* (*globulus, camaldulensis*) Woodland Semi-Natural Alliance

13120 *Schinus (molle, terebinthifolius) - Myoporum laetum* Woodland Semi-Natural Alliance

Temperate Flooded and Swamp Forest Formation (1.C.3)

Western North America Flooded and Swamp Forest Division (1.C.3.b)

14000 Western Cordilleran montane–boreal riparian scrub Macrogroup (MG034)

14100 Vancouverian riparian deciduous forest Group (136)

Western North America Warm Temperate Flooded and Swamp Forest Division (1.C.3.c)

15000 Southwestern North American Riparian, Flooded and Swamp Forest Macrogroup (MG036)

15100 Southwestern North American riparian evergreen and deciduous woodland Group (143)

15110 *Platanus racemosa* Woodland Alliance

15200 Southwestern North American riparian/wash scrub Group (151)

15240 *Salix lasiolepis* Shrubland Alliance

Mesomorphic Shrub and Herb Vegetation (Shrubland and Grassland) Class (2)

20000 Mediterranean Scrub and Grassland SubClass (2.B)

Mediterranean Scrub Formation (2.B.1)

California Scrub Division (2.B.1.a)

21000 California Chaparral Macrogroup (MG043)

21100 Californian xeric chaparral Group (171)

21110 *Adenostoma fasciculatum* Shrubland Alliance

21140 *Arctostaphylos glauca* Shrubland Alliance

21150 *Ceanothus crassifolius* Shrubland Alliance

21170 *Ceanothus megacarpus* Shrubland Alliance

21180 *Eriodictyon crassifolium* Provisional Shrubland Alliance

21200 Californian maritime chaparral Group (184)

21210 *Malosma laurina* Shrubland Alliance

21220 *Rhus integrifolia* Shrubland Alliance

21300 Californian mesic chaparral Group (202)

21310 *Ceanothus spinosus* Shrubland Alliance

21320 *Cercocarpus montanus* Shrubland Alliance

21340 *Quercus berberidifolia* Shrubland Alliance

21350 *Quercus berberidifolia - Adenostoma fasciculatum* Shrubland Alliance

21360 *Prunus ilicifolia* Shrubland Alliance

21400 Californian pre-montane chaparral Group (214)

21410 *Arctostaphylos glandulosa* Shrubland Alliance

21430 *Quercus wislizeni* (shrub) Shrubland Alliance

22000 California Coastal Scrub Macrogroup (MG044)

22100 Central and South Coastal Californian coastal sage scrub Group (222)

22110 *Artemisia californica* Shrubland Alliance

22120 *Artemisia californica - Eriogonum fasciculatum* Shrubland Alliance

22130 *Artemisia californica - Salvia mellifera* Shrubland Alliance

22140 *Diplacus aurantiacus* Shrubland Alliance

22150 *Eriogonum fasciculatum* Shrubland Alliance

22160 *Eriogonum fasciculatum - Salvia apiana* Shrubland Alliance

22190 *Salvia mellifera* Shrubland Alliance

22200 *Salvia leucophylla* Shrubland Alliance

22300 Central and south coastal California seral scrub Group (238)

22330 *Malacothamnus fasciculatus* Shrubland Alliance

22400 Naturalized non-native Mediterranean scrub Group (248)

22410 Broom (*Cytisus scoparius* and Others) Shrubland Semi-Natural Alliance

Mediterranean Grassland and Forb Meadow Formation (2.B.2)

California Grassland and Meadow Division (2.B.2.a)

23000 California Annual and Perennial Grassland Macrogroup (MG045)

23300 Mediterranean California naturalized annual and perennial grassland Group (267)

23310 *Brassica nigra* and other mustards Herbaceous Semi-Natural Alliance

23320 *Pennisetum setaceum* Herbaceous Semi-Natural Alliance

30000 Temperate and Boreal Shrubland and Grassland SubClass (2.C)

Temperate Grassland, Meadow, and Shrubland Formation (2.C.1)

Vancouverian and Rocky Mountain Grassland and Shrubland Division (2.C.1.a)

31000 Vancouverian Lowland Grassland and Shrubland Macrogroup (MG050)

31100 Vancouverian coastal deciduous scrub Group (347)

31110 *Toxicodendron diversilobum* Shrubland Alliance

Temperate and Boreal Scrub and Herb Coastal Vegetation Formation (2.C.3)

Pacific Coast Scrub and Herb Littoral Vegetation Division (2.C.3.b)

32000 Vancouverian Coastal Dune and Bluff Macrogroup (MG058)

32100 California Coastal evergreen bluff and dune scrub Group (380)

32110 *Baccharis pilularis* Shrubland Alliance

Temperate and Boreal Freshwater Marsh Formation (2.C.5)

Western North American Freshwater Marsh Division (2.C.5.b)

33000 Western North American Freshwater Marsh Macrogroup (MG073)

33100 Arid West freshwater emergent marsh Group (404)

33110 *Typha (angustifolia, domingensis, latifolia)* Herbaceous Alliance

33120 *Schoenoplectus* (*acutus*, *californicus*) Herbaceous Mapping Unit

34000 Western North America Wet Meadow and Low Shrub Carr Macrogroup (MG075)

34100 Californian warm temperate marsh/seep Group (448)

Lithomorphic Vegetation (Nonvascular and Sparse Vascular Rock Vegetation) Class (6)

50000 Mediterranean, Temperate, and Boreal Nonvascular and Sparse Vegetation SubClass (6.B)

Mediterranean Cliff, Scree, and Rock Vegetation Formation (6.B.1)

Mediterranean California Cliff, Scree & Rock Vegetation Division (6.B.1.a)

51000 California Cliff, Scree, and Other Rock Vegetation Macrogroup (MG110)

51100 Central California Coast Ranges cliff and canyon Group (652)

51110 *Selaginella bigelovii* Herbaceous Alliance

MISCELLANEOUS CLASSES

90000 Miscellaneous Classes

- **92000** Agriculture (w/in the current 5-year cycle within Cropland; incl. nurseries and equestrian use)
  - **92100** Woody Agriculture (orchards, vineyards) (Stressed or "abandoned" avocado orchards are situational)
  - **92200** Non-woody Row and Field Agriculture
- **93000** Built-up & Urban Disturbance
  - **93200** Anthropogenic areas of little or no vegetation
- **95000** Exotic Trees
  - **95020** Plantation Pine (Planted pines)
- **98000** Water
  - **98010** Seasonal or Perennial Stream Channel
  - **98030** Small Earthen-dammed Ponds & Natural Lakes
  - **98050** Water Impoundment Feature

This Page Intentionally Blank

APPENDIX B: Attributes in the EGVCP Vegetation Map

Map Unit
The values for this attribute are found in the EGVCP Vegetation Mapping Classification (Appendix A).

Conifer Cover
0-99%
999 = Not evaluated

Hardwood Cover
0 -99%
999 = Not evaluated

Total Tree Cover
0-99%
999 = Not evaluated

Shrub Cover
0-99%
999 = Not evaluated

Herbaceous Cover
1 = None or Not Observable, 0-2%
2 = >2-10%
3 = >10-40%
4 = >40%
9 = Not Evaluated

Exotics Modifier
0 = None/Not Observable
1 = Low Cover Exotics
2 = Moderate Cover Exotics
3 = High Cover Exotics
9 = Not Evaluated

Anthropogenically Altered Disturbances
0 = None/Not Observable
1 = Low (>0-33% of polygon affected)
2 = Moderate (>33-66% of polygon affected)
3 = High (>66% of polygon affected)
9 = Not Evaluated

Roadedness
0 = None/Not Observable
1 = Low (> 2/3 contiguous Without Roads)
2 = Moderate (1/3 – 2/3 Contiguous Without Roads)
3 = High (< 1/3 Contiguous Without Roads)
9 = Not Evaluated

Development Disturbance
0 = None/Not Observable
1 = Low (>0 – 2% of polygon affected)
2 = Moderate (>2 - 5% of polygon affected)
3 = High (>5% of polygon affected)
9 = Not Evaluated

Notes
Contains text added at discretion of photo interpreter to add extra information about the vegetation polygon as well as the results of the field checks.

Land Use
0 = Not Assigned/Not Assessed
1000 = Urban
2000 = Agriculture
    2100 = Non-woody Row & Field Crops
    2200 = Orchard & Vineyards
        2210 = Orchards
    2300 = Nursery
    2700 = Equestrian Use
9800 = Undifferentiated Water
    9810 = Water Impoundment Feature

Method ID

1 = Rapid Assessment Plot Data
2 = Relévé Plot Data
3 = Field Verification
4 = Photo Interpretation
5 = Adjacent Stand Information or Ground Photo
6 = Reconnaissance
7 = Other Information
8 = Older Plot Data
9 = Older Reconnaissance Data
10 = Accuracy Assessment
60 = Additional Reconnaissance Information

Height (based on stature of Alliance)

1 = > ½ meter
2 = > ½ - 1 meter
3 = > 1-2 meters
4 = > 2-5 meters
5 = > 5-10 meters
6 = > 10-15 meters
7 = > 15-20 meters
8 = > 20-35 meters
9 = > 35-50 meters
10 = >50 meters
999 = Not Evaluated

Global Rarity Rankings

Note: *All rankings listed for definition purposes, however only G3 and higher were mapped as ESH or RC for this project.*

G1 = Less than 6 viable element occurrences (EOs) OR less than 1,000 individuals OR less than 2,000 acres.
G2 = 6-20 EOs OR 1,000-3,000 individuals OR 2,000-10,000 acres.
G3 = 21-80 EOs OR 3,000-10,000 individuals OR 10,000-50,000 acres.
G4 = Apparently secure; this rank is clearly lower than G3 but factors exist to cause some concern; i.e., there is some threat, or somewhat narrow habitat.
G5 = Population or stand demonstrably secure to ineradicable due to being commonly found in the world.
NA = Not Applicable

State Rarity Rankings

Note: *All rankings listed for definition purposes, however only S3 and higher were mapped as ESH or RC for this project.*

S1 = <6 viable occurrences and/or up to 518 hectares
S1? = <6 viable occurrences and/or up to 518 hectares; Inexact or uncertain numeric rank.
S2 = 6-20 viable occurrences and/or >518 – 2,590 hectares
S2? = 6-20 viable occurrences and/or >518 – 2,590 hectares; Inexact or uncertain numeric rank.
S3 = 21-100 viable occurrences and/or >2,590-12,950 hectares
S3? = 21-100 viable occurrences and/or >2,590-12,950 hectares; Inexact or uncertain numeric rank.
S4 = >100 viable occurrences and/or > 12,950 hectares
S4? = >100 viable occurrences and/or > 12,950 hectares; Inexact or uncertain numeric rank.
S5 = Demonstrably secure because of its statewide abundance
S5? = Demonstrably secure because of its statewide abundance; Inexact or uncertain numeric rank.
NA = Not Applicable

CWHR Size Class

1-n = Size Class
999 = Not Evaluated

CWHR Habitat Type Classes (Relates CWHR Type to CWHR Name)

CWHR TYPE	CWHR NAME
AGR	Agriculture
AGS	Annual Grassland
BOP	Blue Oak-Foothill Pine
COW	Coastal Oak Woodland
CRC	Chamise-Redshank Chaparral
CRP	Cropland
CSC	Coastal Scrub
EUC	Eucalyptus
FEW	Freshwater Emergent Wetland
MCH	Mixed Chaparral
MHC	Montane Hardwood-Conifer
MRI	Montane Riparian
NA	Not Applicable
OVN	Orchard and Vineyard
PGS	Perennial Grassland
URB	Urban
VRI	Valley Foothill Riparian
WAT	Water

APPENDIX C: Area Report by Floristic Type

Map Unit	Mapping Classification Name	Total Acres	Map Unit Frequency	Average Polygon Size	Global Rarity Ranking	State Rarity Ranking
11100	Californian broadleaf forest and woodland Group	7.7	1	7.7	NA	NA
11120	Quercus agrifolia Woodland Alliance	1,070.4	304	3.5	G5	S4
11121	Quercus agrifolia/Toxicodendron diversilobum riparian Association	892.2	163	5.5	G5	S4
11150	Umbellularia californica Forest Alliance	194.1	88	2.2	G4	S3
11210	Pinus coulteri Woodland Alliance	9.1	3	3.0	G4	S4
11220	Pinus sabiniana Woodland Alliance	3.5	1	3.5	G4	S4
12210	Acer macrophyllum Forest Alliance	2.3	1	2.3	G4	S3
13110	Eucalyptus (globulus, camaldulensis) Woodland Semi-Natural Alliance	52.1	32	1.6	NA	NA
13120	Schinus (molle, terebinthifolius) - Myoporum laetum Woodland Semi-Natural Alliance	12.2	1	12.2	NA	NA
14100	Vancouverian riparian deciduous forest Group	0.5	1	0.5	NA	NA
15100	Southwestern North American riparian evergreen and deciduous woodland Group	14.7	7	2.1	NA	NA
15110	Platanus racemosa Woodland Alliance	356.5	87	4.1	G3	S3
15200	Southwestern North American riparian/wash scrub Group	2.8	6	0.5	NA	NA
15240	Salix lasiolepis Shrubland Alliance	47.6	41	1.2	G4	S4
21000	California Chaparral Macrogroup	33.7	10	3.4	NA	NA

Map Unit	Mapping Classification Name	Total Acres	Map Unit Frequency	Average Polygon Size	Global Rarity Ranking	State Rarity Ranking
21100	Californian xeric chaparral Group	69.0	23	3.0	NA	NA
21110	Adenostoma fasciculatum Shrubland Alliance	219.3	57	3.8	G5	S5
21140	Arctostaphylos glauca Shrubland Alliance	1,064.4	90	11.8	G4	S4
21150	Ceanothus crassifolius Shrubland Alliance	76.4	8	9.6	G4	S4
21170	Ceanothus megacarpus Shrubland Alliance	5,232.3	277	18.9	G4	S4
21180	Eriodictyon crassifolium Provisional Shrubland Alliance	2.4	2	1.2	G3	S3
21210	Malosma laurina Shrubland Alliance	60.2	17	3.5	G4	S4
21220	Rhus integrifolia Shrubland Alliance	23.9	4	6.0	G3	S3
21300	Californian mesic chaparral Group	87.3	23	3.8	NA	NA
21310	Ceanothus spinosus Shrubland Alliance	655.4	180	3.6	G4	S4
21320	Cercocarpus montanus Shrubland Alliance	40.3	8	5.0	G5	S4
21340	Quercus berberidifolia Shrubland Alliance	162.3	32	5.1	G4	S4
21350	Quercus berberidifolia - Adenostoma fasciculatum Shrubland Alliance	168.1	27	6.2	G4	S4
21360	Prunus ilicifolia Shrubland Alliance	57.3	11	5.2	G3	S3
21410	Arctostaphylos glandulosa Shrubland Alliance	348.9	39	8.9	G4	S4
21430	Quercus wislizeni (shrub) Shrubland Alliance	7.9	5	1.6	G4	S4
22000	California Coastal Scrub Macrogroup	9.9	2	4.9	NA	NA
22100	Central and South Coastal Californian coastal sage scrub Group	50.1	21	2.4	NA	NA
22110	Artemisia californica Shrubland Alliance	112.4	31	3.6	G5	S5

Map Unit	Mapping Classification Name	Total Acres	Map Unit Frequency	Average Polygon Size	Global Rarity Ranking	State Rarity Ranking
22120	Artemisia californica - Eriogonum fasciculatum Shrubland Alliance	16.0	10	1.6	G4	S4
22130	Artemisia californica - Salvia mellifera Shrubland Alliance	70.1	18	3.9	G4	S4
22140	Diplacus aurantiacus Shrubland Alliance	2.4	1	2.4	G3	S3?
22150	Eriogonum fasciculatum Shrubland Alliance	20.3	7	2.9	G5	S5
22160	Eriogonum fasciculatum - Salvia apiana Shrubland Alliance	1.8	1	1.8	G4	S4
22190	Salvia mellifera Shrubland Alliance	32.9	7	4.7	G4	S4
22200	Salvia leucophylla Shrubland Alliance	9.4	4	2.4	G4	S4
22330	Malacothamnus fasciculatus Shrubland Alliance	158.2	46	3.4	G4	S4
22410	Broom (Cytisus scoparius and Others) Shrubland Semi-Natural Alliance	4.5	1	4.5	NA	NA
23300	Mediterranean California naturalized annual and perennial grassland Group	813.9	101	8.1	NA	NA
23310	Brassica nigra and other mustards Herbaceous Semi-Natural Alliance	34.4	5	6.9	NA	NA
23320	Pennisetum setaceum Herbaceous Semi-Natural Alliance	3.7	3	1.2	NA	NA
31100	Vancouverian coastal deciduous scrub Group	1.6	1	1.6	NA	NA
31110	Toxicodendron diversilobum Shrubland Alliance	2.5	2	1.2	G4	S4
32110	Baccharis pilularis Shrubland Alliance	17.7	4	4.4	G5	S5
33100	Arid West freshwater emergent marsh Group	0.2	1	0.2	NA	NA
33120	Schoenoplectus (acutus, californicus) Mapping Unit	1.1	3	0.4	G5	S4?

Map Unit	Mapping Classification Name	Total Acres	Map Unit Frequency	Average Polygon Size	Global Rarity Ranking	State Rarity Ranking
34100	Californian warm temperate marsh/seep Group	0.2	1	0.2	NA	NA
51100	Central California Coast Ranges cliff and canyon Group	70.5	49	1.4	NA	NA
51110	Selaginella bigelovii Herbaceous Alliance	14.4	6	2.4	G4	S3
92000	Agriculture (within the current 5-year cycle within cropland; includes nurseries and equestrian use)	85.9	19	4.5	NA	NA
92100	Woody Agriculture (orchards, vineyards)	1,936.7	70	27.7	NA	NA
92200	Non-woody Row and Field Agriculture	33.3	6	5.5	NA	NA
93000	Built-up & Urban Disturbance	744.9	148	5.0	NA	NA
93200	Anthropogenic areas of little or no vegetation	69.2	30	2.3	NA	NA
95000	Exotic Trees	60.8	13	4.7	NA	NA
95020	Plantation Pine (Planted pines)	6.8	4	1.7	NA	NA
98010	Seasonal or Perennial Stream Channel	2.1	4	0.5	NA	NA
98030	Small Earthen-dammed Ponds & Natural Lakes	11.5	10	1.2	NA	NA
98050	Water Impoundment Feature	6.6	9	0.7	NA	NA
	Grand Total	**15,380.6**	**2,187**	**7.0**	**NA**	**NA**

APPENDIX D: EGVCP Map Unit and Land Use Descriptions

Explanation of the Mapping Descriptions

This section of the report contains descriptions for each of the vegetation types (Alliances, Associations, and Map Units) used in the Map Unit attribute in the final geodatabase for this project. The land use types that are defined in the Land Use attribute of the final geodatabase are described at the end of the appendix.

Vegetation Type (coded as the Map Unit attribute)

Most vegetation types have a detailed description containing the following components:

- **Distribution Maps:** The distribution maps show the mapped polygons of the vegetation types within the study area and give the user an overall range of the species distribution in the study. Depictions of mapped types are enhanced to help the reader see the locations.

- **Aerial Image Screenshot:** These are digital images (using the 2008 or 2015 natural color high-resolution county imagery) showing aerial views of the vegetation stands. The screenshot gives the reader a sense of the overall photo signature. Most examples display only a portion of the defined stand, depicting a representative or modal area. When the stand occupies only a portion of the imagery, an arrow denotes its location.

- **Ground photos:** These are digital pictures taken during the reconnaissance effort. They are a snapshot in time showing the plants in their landscape. They usually represent only a portion of the actual mapped stand. Most, but not all, of the vegetation mapping descriptions contain a ground shot.

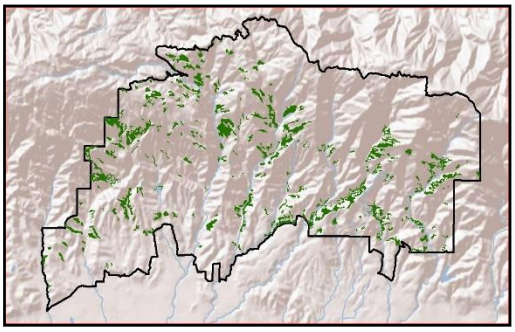
- **Descriptions:** The descriptions discuss the expected locations, cover characteristics, species composition and other pertinent information. Species cover characteristics and relative abundance conforms to those presented in the second edition of *The Manual of California Vegetation* (MCV), but are also specifically tailored to the EGVCP Vegetation Study. For example, where *Umbellularia californica* is described in the MCV as occurring in a wide variety of settings, the descriptions in this document are more restrictive because within the mapping area, they are more likely to be restricted to the most mesic settings immediately adjacent to or within riparian vegetation.

  Specific rules regarding definitive cover and floristic characteristics of the stand are derived from the second edition of the Manual of California Vegetation (Sawyer et al, 2009) floristic descriptions, and to a lesser extent, the Santa Monica Mountains (Reyes et al, 2007) and Orange County (AIS, 2015) Final Vegetation Mapping Reports.

- **Photo Interpretation Signature:** These descriptions help the reader identify the vegetation from an aerial perspective. Since most of the Alliance-level assignments were interpreted from the 2015 or 2008 County imagery, signature descriptions are based on these datasets, unless otherwise noted.

Some vegetation types have a very limited presence in the study area at sizes above the MMU. For these types, it was not possible to formulate the standard in-depth descriptions. Instead, they are represented only with a short description of their location within the study area. These are noted at the end of the vegetation descriptions within this Appendix.

11120 *Quercus agrifolia* Woodland Alliance (Coast live oak woodlands)



1070 Acres Mapped

This example depicts a gently sloping area just west of the mapping area south of Camino Cielo Road. The elevation here is approximately 2,600 feet. The stand contains a sparse cover of oak in a rocky setting with understory chaparral. The stand is recovering from the 2008 Gap Fire.

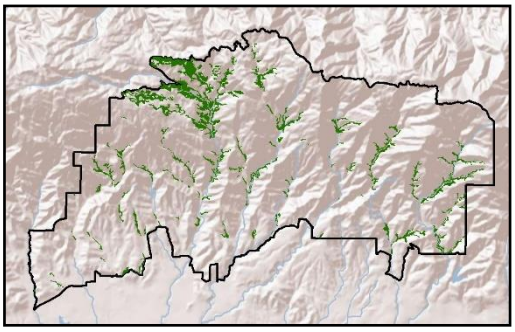
DESCRIPTION:

The *Quercus agrifolia* Alliance is widespread along the drier margins of riparian settings throughout the mapping area and in upland settings especially in the forest service lands west of state route 154 and the upper reaches of the San Pedro Canyon watershed. More mesic riparian stands mix with riparian vegetation such as *Platanus racemosa* and *Umbellularia californica.* Cover is usually moderate to high, lower cover stands are interspersed with rocky outcroppings or have an understory of chaparral. Mapped where *Quercus agrifolia* dominates the hardwood canopy, or co-dominates the canopy with *Umbellularia californica* in riparian settings with *Toxicodendron diversilobum.*

PHOTO INTERPRETATION SIGNATURE:

Quercus agrifolia forms a uniform signature within the stand except where narrow riparian vegetation occurs or where the canopy is interrupted by rock outcroppings. In all but the densest woodland settings, crowns are generally rounded and form multiple sub-crowning, especially in mature trees. Crown edges form distinct margins. Signature color ranges from medium to dark tones of green depending mainly on the leaf age and health.

11121 *Quercus agrifolia* / *Toxicodendron diversilobum* riparian Association (Coast live oak / Poison Oak)



892 Acres Mapped

This example follows adjacent to a narrow band of sycamore (lighter green signature) along San Roque Canyon Creek in the southeastern portion of the study. The stand contains a dense cover of oak in a riparian setting with an understory of poison oak.

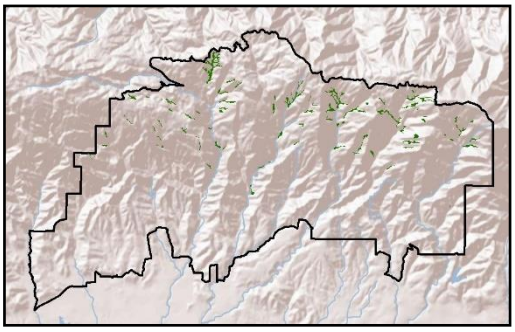
DESCRIPTION:

The *Quercus agrifolia / Toxicodendron diversilobum* Association is found in riparian settings along all the major watersheds throughout the mapping area. Canopy cover is high averaging over 40% tree cover with stands containing as much as 70% cover. Post burn stands have lower cover. Stands frequently have a minor component of *Platanus racemosa* and/or *Umbellularia californica.* This association closely follows all or portions of the riparian and ESH corridor overlay. Mapped where *Q. agrifolia* dominates the canopy with a variable understory of *T. diversilobum.*

PHOTO INTERPRETATION SIGNATURE:

Quercus agrifolia / *Toxicodendron diversilobum* Association is not discernable through typical photo signature attributes. This association is modeled using proximity to and elevation above the adjacent stream along with assessing the structural characteristics of the stand, (cover is typically high, over 50% in most settings).

11150 *Umbellularia californica* Forest Alliance (California bay forests)



194 Acres Mapped

This example depicts a gently sloping area just west of the mapping area south of Camino Cielo Road. The stand was partially burned in the 2008 Gap Fire. Recovering mesic chaparral surrounds most of the stand.

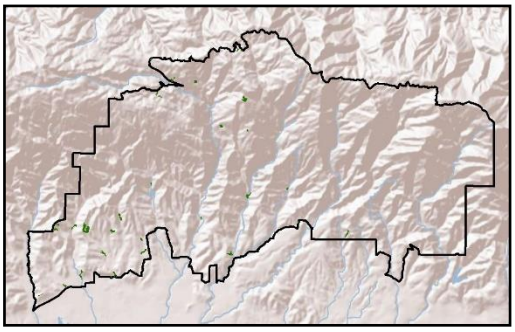
DESCRIPTION:

The *Umbellularia californica* Alliance is found in riparian settings and upper watershed canyons forming narrow bands where it usually strongly dominates the tree layer. Canopy cover is high averaging over 50% tree cover with stands containing as much as 70% cover. Post burn recovering stands are also dense but the canopy is not as tall. Occasionally, stands contain a very narrow band of *Platanus racemosa* running through the middle. The drier margins frequently are bounded by the *Q. agrifolia / T. diversilobum* association. This alliance closely follows all or portions of the riparian corridor and ESH overlays. Mapped where *U. californica* dominates the canopy cover.

PHOTO INTERPRETATION SIGNATURE:

The *Umbellularia californica* Alliance has a consistent light green color and most of the time is easily distinguishable from adjacent drier stands of *Q. agrifolia.* Individual crowns are narrow and conical forming a stipple-like texture. In steep narrow canyons, stands are occasionally too narrow to separate out from other riparian types.

13110 – *Eucalyptus (Globulus, camaldulensis)* Woodland Semi Natural Alliance (Eucalyptus groves)



52 Acres Mapped

This example lies just west of Painted Cave Road just below the development and is about 4 acres in size.

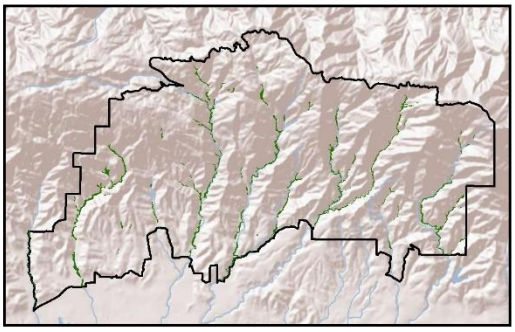
DESCRIPTION:

The *Eucalyptus* Alliance is found in widely scattered locations along urban fringes and isolated developments. Stands are often pure, but occasionally mix with native riparian species. *Eucalyptus* frequently occurs in patches too small to map; stands within the study area are generally under 5 acres in size. Mapped where *Eucalyptus* spp. dominates the canopy.

PHOTO INTERPRETATION SIGNATURE:

The *Eucalyptus* Alliance has a variable signature color but most often maintains a light yellow-green color. Stands are recognizable based on their crown shape and size, as well as color and texture.

15110 – *Platanus racemosa* Woodland Alliance (California sycamore woodlands)



357 Acres Mapped

This example follows a tributary along the upper portions of San Antonio Creek at the 2,100-foot level. It mixes here with bay along the drier fringes of the riparian corridor.

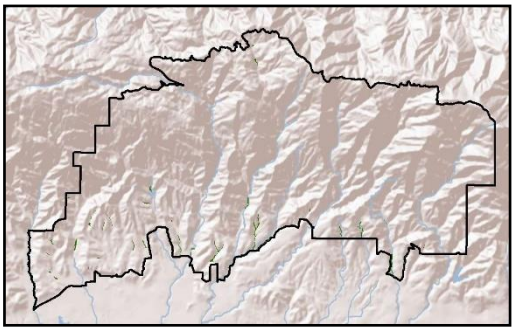
DESCRIPTION:

The *Platanus racemosa* Alliance is found adjacent to seasonally flooded stream channels along all the major watersheds within the mapping area. Stands can be strongly dominated with *P. racemosa,* or they may co-dominate with *Quercus agrifolia* or *Umbellularia californica*. Trees in the stand often occur in cover greater than 60%.

PHOTO INTERPRETATION SIGNATURE:

The *Platanus racemosa* Alliance has a yellow-green signature lighter in hue than both *Q. agrifolia* and *U. californica.* In stands where all three species are in close proximity, it is always closest to the stream channel.

15240 – *Salix lasiolepis* Shrubland Alliance (Arroyo willow thickets)



48 Acres Mapped

The aerial imagery example is located in a small stream in an avocado orchard. The ground photo is taken of an area north of Maria Ygnacia Lane, in which *S. lasiolepis* is a component of a *Platanus racemosa* stand.

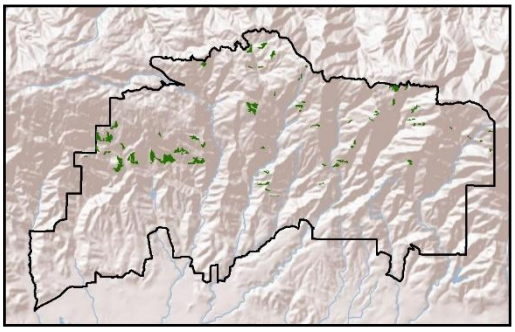
DESCRIPTION:

The *Salix lasiolepis* Alliance is found in small watersheds occupied by seasonally flooded stream channels primarily within the lower third of the mapping area. Mapped in dense thicket like settings where *Salix lasiolepis* strongly dominates the tall shrub layer. Emergent *Quercus agrifolia* and *Platanus racemosa* occur in a few of the mapped stands.

PHOTO INTERPRETATION SIGNATURE:

The *Salix lasiolepis* Alliance yields a medium green signature varying minimally along the riparian corridor. Overall stand height is fairly uniform yielding a medium to coarse texture that is consistent across the stand.

21110 – *Adenostoma fasciculata* Shrubland Alliance (Chamise chaparral)



219 Acres Mapped

This example occurs on a mid-to-lower slope, gentle rolling topography just above a small draw adjacent to the north. The stand is strongly dominated with *A. fasciculata*, with color variability tied to the health of the individual plants.

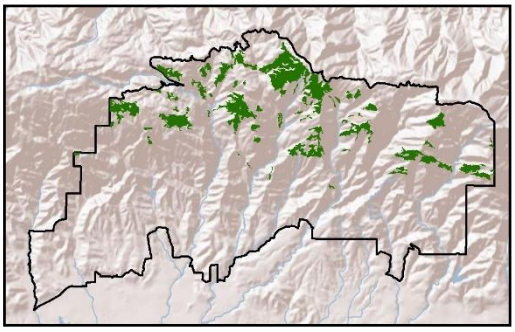
DESCRIPTION:

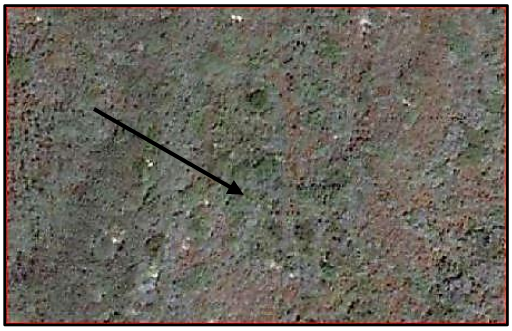
The *Adenostoma fasciculata* Alliance is uncommon but widely scattered throughout the upper two thirds of the mapping area. Mapped where *A. fasciculata* generally dominates the stand, usually with high cover. Other species including *Ceanothus megacarpus, C. crassifolius, C. spinosus, Arctostaphylos glauca,* and/or *A. glandulosa* are frequently a sub-dominant component to the shrub layer. Stands may contain a co-dominance of *Malosma laurina* at lower elevations. Except in the lowest elevations, nearly all xeric chaparral alliances in the region have a component of *A. fasciculata.*

PHOTO INTERPRETATION SIGNATURE:

The *Adenostoma fasciculata* Alliance has a wide range of color, texture and patterning depending on fire history, stress, and age of the stand. Colors vary considerably on differing image datasets. Stands at higher elevations tend to reflect uniform and copious amounts of inflorescence on the individual plants often yielding an orange to dark brown color.

21140 – *Arctostaphylos glauca* Shrubland Alliance (Bigberry manzanita chaparral)





1064 Acres Mapped

This example occurs on gentle to moderately sloping topography at an elevation of 3,200 feet. The stand is co-dominated by *A. fasciculata*, depicted here with an orange color. Small amounts of *Q. berberidifolia* (brighter green) are noted in the center of the picture.

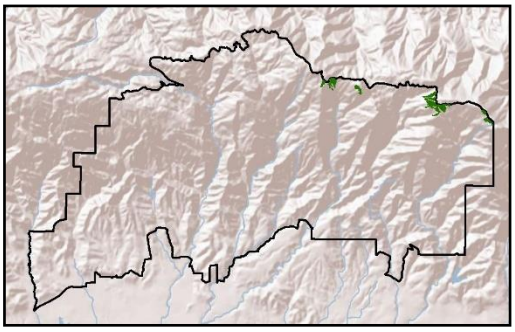
DESCRIPTION:

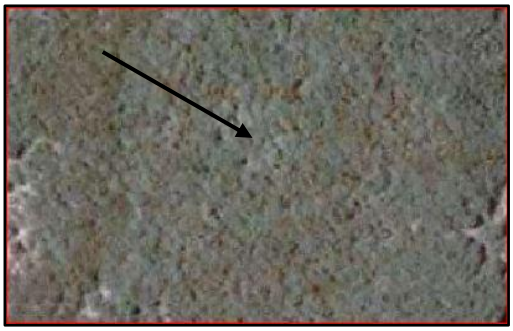
The *Arctostaphylos glauca* Alliance is frequently found in the northern third of the study at elevations over 1,500 feet. Often mapped on gently to moderately sloping spurs and ridgelines fanning outward toward the lower elevations of the stand. Mapped where *A. glauca* at times dominates the stand but more frequently co-dominates with *Adenostoma fasciculata.* The shrub layer is usually quite dense with lower cover in the post fire settings of 2008 & 2009.

PHOTO INTERPRETATION SIGNATURE:

The *Arctostaphylos glauca* Alliance (as with other manzanita stands) is best characterized by its lumpy texture, as opposed to the more stipple-like texture in stands where *A. fasciculata* dominates. Color varies considerably depending on slope settings. These settings can emphasize either the color characteristics of the branching or leaf structure. Post fire stands tend to have a smoother less lumpy signature. Signature complexity is increased by the frequency of stands co-dominating with *A. fasciculata.*

21150 – *Ceanothus crassifolius* Shrubland Alliance (Hoaryleaf ceanothus chaparral)





76 Acres Mapped

This example occurs on the upper most slopes just below the main ridge at the 3,400-foot elevation. This stand is dominated by *C. crassifolius* with a minor component of *Arctostaphylos* and *Adenostoma*.

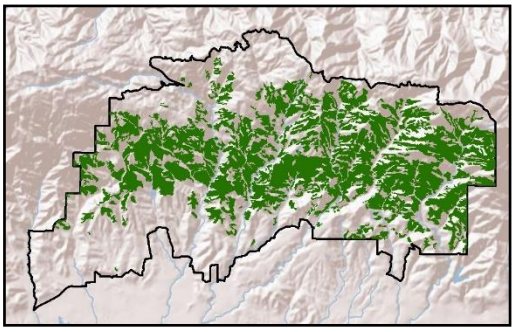
DESCRIPTION:

The *Ceanothus crassifolius* Alliance is limited to the upper most elevations in the study, primarily along East Camino Cielo Road. Stands occur on gentle upper slopes and spur lines just off the main ridgeline. Mapped where *C. crassifolius* dominates the stand, or co-dominates with *Adenostoma fasciculata* and/or *Arctostaphylos glandulosa.* Shrub cover is quite high averaging over 70%.

PHOTO INTERPRETATION SIGNATURE:

The *Ceanothus crassifolius* Alliance is extremely difficult to interpret. It can partially be modeled, where it was observed in stands only in the highest elevations. Otherwise, it tends to mix with *Arctostaphylos glandulosa*, which yields a dark brown signature at this elevation. *C. crassifolius* texture is intermediate between *Adenostoma fasciculata* and *Arctostaphylos* spp*.* Color is very similar to *C. megacarpus* but tends to be a bit darker. Not observed (or positively identified) in recently burned settings.

21170 – *Ceanothus megacarpus* Shrubland Alliance (Bigpod ceanothus chaparral)



5232 Acres Mapped

This example occurs on a steep south-facing slope at 2,300-foot elevation. The stand is strongly dominated by *Ceanothus megacarpus.* Cover in this pre-burn photo is over 70%.

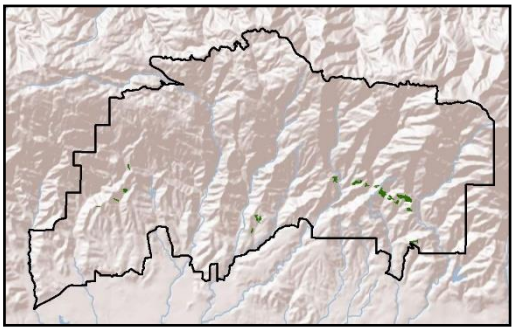
DESCRIPTION:

The *Ceanothus megacarpus* Alliance is widespread throughout, and covers over a third of the total acreage within the mapping area. Stands are found on steep, xeric slopes as well as gently sloping topography. Shrub cover is variable, with densest stands over 70%. Post burn stands (stands burned in 2008 or 2009) average about 20% less cover. Mapped where *Ceanothus megacarpus* dominates the stand, or co-dominates with *A. fasciculata.* In lower elevations, these stands may co-dominate with *Malosma laurina* and at times coastal scrub species. More mesic stands may co-dominate with *Heteromeles arbutifolia* and/or *Ceanothus spinosus.*

PHOTO INTERPRETATION SIGNATURE:

The *Ceanothus megacarpus* Alliance has a medium-hue gray color. Stands frequently interface with more mesic types where green or brownish color component increases. This widely distributed type has a broad range of color & texture depending on stand age and health. Stands on more recent imagery show a leaf-off component in severe drought stress.

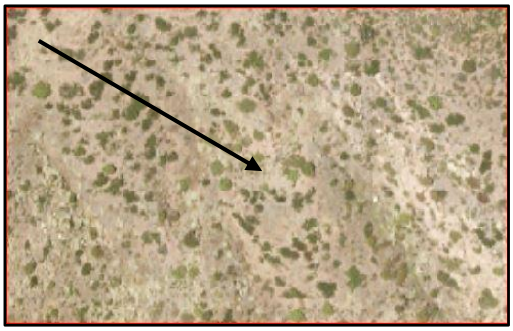
21210 – *Malosma laurina* Shrubland Alliance (Laurel sumac scrub)



60 Acres Mapped

This example occurs on a steep southeast-facing slope at 1,000-foot elevation. The stand is strongly dominated by *Malosma laurina* in an open setting over annual grasses. *Ceanothus megacarpus* is a minor component to the stand.

There is no ground photo available of *Malosma laurina.*



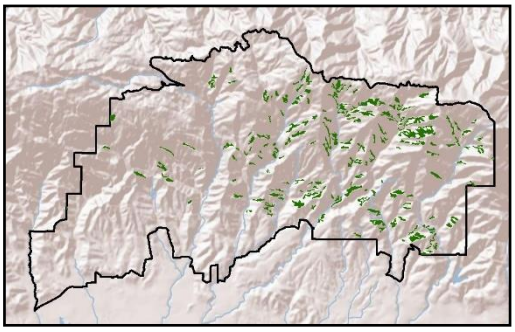
DESCRIPTION:

The *Malosma laurina* Alliance is uncommon and limited to elevations below 1,500 feet. It is mapped on steep, post fire, south trending slopes. Mapped where *Malosma laurina* dominates or strongly dominates the shrub layer in open grassy settings. *M. laurina* is a frequently occurring co-dominate shrub in lower elevation stands of xeric chaparral, especially *Ceanothus megacarpus.*

PHOTO INTERPRETATION SIGNATURE:

The *Malosma laurina* signature is easily recognizable on most imagery and can be modeled out from similar looking shrubs (*Heteromeles arbutifolia* or *Prunus ilicifolia)* by location, *M. laurina* occurs on significantly more xeric sites. Difficulties arise in relative cover as this type is mapped only where *M. laurina* dominates the shrub layer. The alliance is not distinguishable from *Rhus integrifolia*, but generally occurs at higher elevations.

21310 – *Ceanothus spinosus* Shrubland Alliance (Greenbark ceanothus scrub)



655 Acres Mapped

This example occurs on a steep southwest facing canyon bottom at 2,000-foot elevation. The stand is dominated by *Ceanothus spinosus,* and transitions to *C. megacarpus* upslope toward the northwest corner of the image. To the southwest, *Umbellularia californica* occupies a small portion of the imagery.

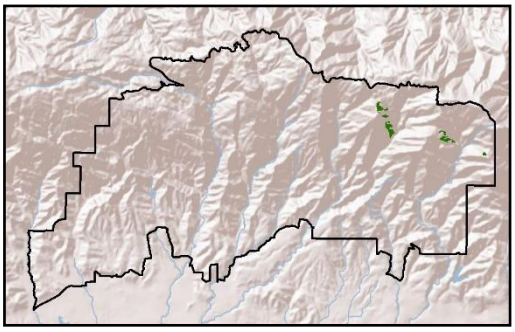
DESCRIPTION:

The *Ceanothus spinosus* Alliance is generally mapped in steep, low slope positions on a variety of aspects. Larger stands are more likely to trend further upslope on northerly aspects. Mapped throughout all but the southwest portions of the study area in small to medium sized stands where *C. spinosus* dominates or co-dominates with other mesic species such as *Heteromeles arbutifolia.* Drier margins frequently contain a component of *Adenostoma fasciculata* or *C. megacarpus.*

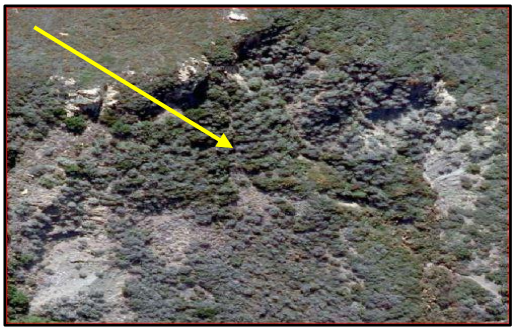
PHOTO INTERPRETATION SIGNATURE:

The *Ceanothus spinosus* signature yields a golden tinge to a variable color from brown to medium green. Plants noted in the field were drought stressed and much of the smaller branches had lost their green color. Texture is highly variable and coarse, low-stature hardwood components add to the coarseness.

21320 – *Cercocarpus montanus* Shrubland Alliance (Birchleaf mountain mahogany chaparral)



40 Acres Mapped



This example occurs on a very steep east facing (picture rotated so north is facing to the right) side-slope at 3,000-foot elevation. The stand is dominated by *Cercocarpus montanus* in an open rocky setting with small gravelly talus deposits throughout. *Hesperoyucca whipplei* is scattered in the openings.

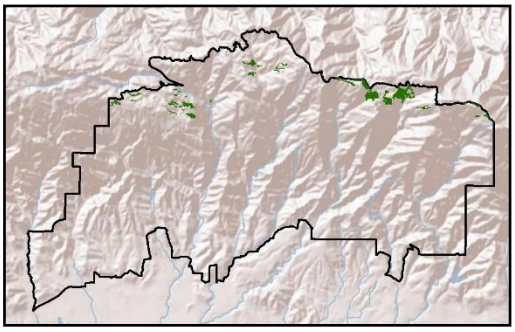
DESCRIPTION:

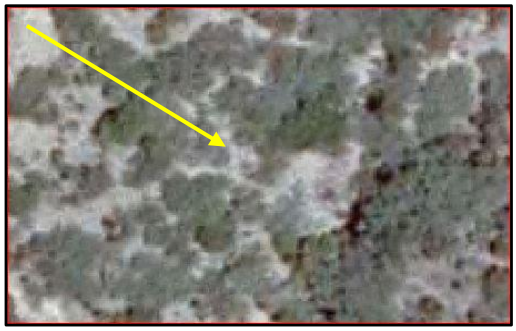
The *Cercocarpus montanus* Alliance is mapped on very steep, slopes on a variety of aspects and topographic positions, though stands appear to be best developed on east and west facing slopes. Mapped sparingly in the study area, many stands noted in reconnaissance were quite small. This alliance is mapped where *C. montanus* dominates or co-dominates the shrub layer in relative open cover with other chaparral species such as *Heteromeles arbutifolia, Prunus ilicifolia* and *Ceanothus spp. Hesperoyucca whipplei* frequently occurs in the rocky openings.

PHOTO INTERPRETATION SIGNATURE:

The *Cercocarpus montanus* signature is similar in color and texture to *Ceanothus megacarpus* (ashy gray color). Very steep slopes and rocky openings aid in determining where this alliance is most likely to occur.

21340 – *Quercus berberidifolia* Shrubland Alliance (Scrub oak chaparral)





162 Acres Mapped

This example occurs on a gently rolling terrain at 3,000-foot elevation along the Santa Ynez ridgeline. *Quercus berberidifolia* dominates the shrub canopy with some *Adenostoma fasciculata* in an open, grassy setting.

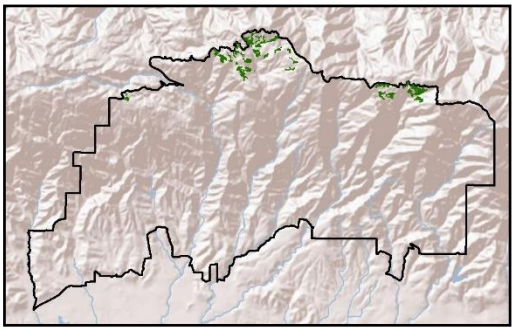
DESCRIPTION:

The *Quercus berberidifolia* Alliance is mapped on gently to moderately sloping terrain, primarily in the northern third of the study area. In grassy settings, stand cover can be below 40%. However, it is more frequently found in steeper densely vegetated locations, occupying the lower portions of northerly facing slopes. Mapped where *Quercus berberidifolia* dominates the stand (more frequently in open cover) or where it co-dominates in dense cover with other mesic chaparral species such as *Heteromeles arbutifolia, Ceanothus spinosus* and/or Prunus ilicifolia.

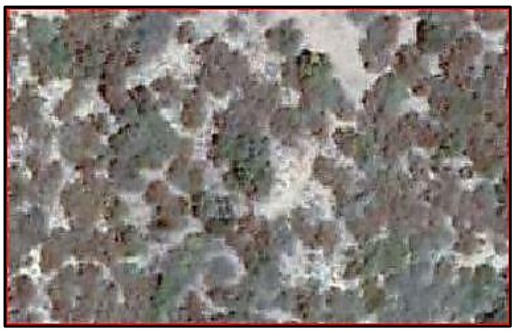
PHOTO INTERPRETATION SIGNATURE:

Quercus berberidifolia is similar in color to *Ceanothus megacarpus* and *C. crassifolius* but has a slighter greener hue, especially at higher elevations. Stands dominated by *Q. berberidifolia* have a larger crown size than other chaparral species and overall gives a more lumpy texture, somewhat similar to *Arctostaphylos glauca.* Topographic characteristics (slope aspect, position, shape and steepness) are useful in determining the more likely places where this alliance may occur.

21350 – *Quercus berberidifolia – Adenostoma fasciculata* Shrubland Alliance (Scrub oak-chamise chaparral)



168 Acres Mapped



This example occurs on gently rolling terrain at 2,900-foot elevation along the Santa Ynez ridgeline near the Communication Repeater Station. *Quercus berberidifolia* and *Adenostoma fasciculata* co-dominate the shrub canopy an open, grassy setting. The two species yield distinct color differences on both the picture and image.

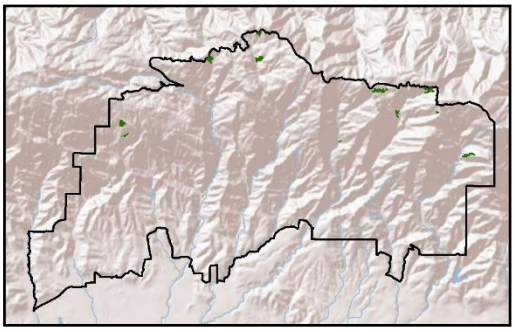
DESCRIPTION:

The *Quercus berberidifolia – Adenostoma fasciculata* Alliance is mapped on gently-to-moderately sloping terrain, clustered in two distinct areas along the northern most portions of the study. In the mapping area, stands are mapped either in open grassy settings or in dense cover. Stands occurring in dense cover often transition between the two single-species alliances, but are generally too small and narrow to map in these circumstances. Mapped where *Quercus berberidifolia* and *Adenostoma fasciculata* co-dominate the stand.

PHOTO INTERPRETATION SIGNATURE:

The *Quercus berberidifolia – Adenostoma fasciculata* Alliance is found in elevations where *A. fasciculata* yields a distinct orange-brown hue on the 2008 imagery. The co-dominating *Q. berberidifolia* is distinct, with a dull greenish signature.

21360 – *Prunus ilicifolia* Shrubland Alliance (Holly leaf cherry chaparral)



57 Acres Mapped

This example occurs on a very steep and rocky, west facing slope at about 2,700-foot elevation. *Prunus ilicifolia* dominates the stand with some *Ceanothus spinosus* and *C. megacarpus.* The stand is surrounded by dense *C. megacarpus.*

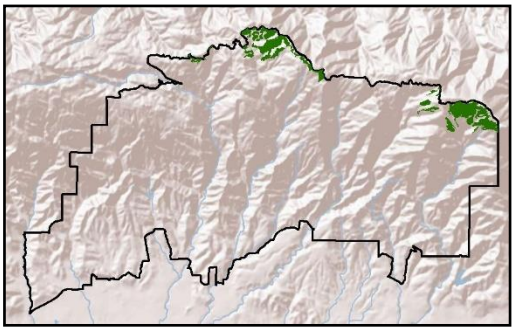
DESCRIPTION:

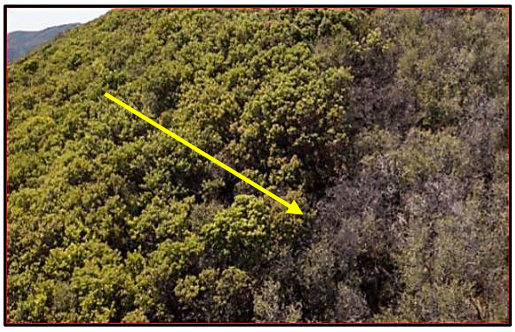
The *Prunus ilicifolia* Alliance is mapped sparingly on steep slopes with scattered rock outcrops in scattered locations in the northern third of the study area. Stands are mapped where *Prunus ilicifolia* dominates the shrub layer, often with small components of *Heteromeles arbutifolia,* or *Ceanothus spinosus. Prunus ilicifolia* is often a component to other mesic chaparral types including *Ceanothus spinosus* and *Quercus berberidifolia* or *Cercocarpus montanus.*

PHOTO INTERPRETATION SIGNATURE:

The *Prunus ilicifolia* signature is similar to other large-leafed green chaparral shrubs such as *Malosma laurina* and *Heteromeles arbutifolia.* They generally occur as a stand in higher elevation settings than *M. laurina* and are less often likely to include a coastal scrub component. In the mapping area, they are more likely to form stands than *H. arbutifolia.* Otherwise, all three alliances are usually indistinguishable from each other on imagery.

21410 – *Arctostaphylos glandulosa* Shrubland Alliance (Eastwood manzanita chaparral)





349 Acres Mapped

This stand of pure *Arctostaphylos glandulosa* forms a distinct break from *Ceanothus megacarpus* (the *Ceanothus* is visible on the right third of the photo & image – see arrow). The stand is located on a gently sloping south facing broad upper slope at about 3000-foot. The image signature shows the classic variability in emphasizing both the branching in certain areas & leaf color in others.

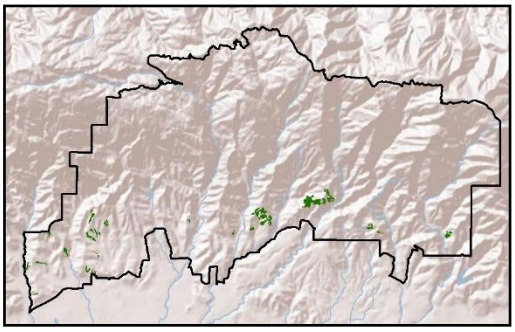
DESCRIPTION:

The *Arctostaphylos glandulosa* Alliance is limited to several large stands in the northeast corner of the mapping area and in smaller stands along the main ridgeline of the Santa Ynez Mountains. Stands are mapped where *A. glandulosa* dominates the shrub layer or co-dominates with *Adenostoma fasciculata.* Stands may have a component of *Ceanothus crassifolius. Pinus coulteri* may be a native (most likely not planted) emergent in portions of several of the stands.

PHOTO INTERPRETATION SIGNATURE:

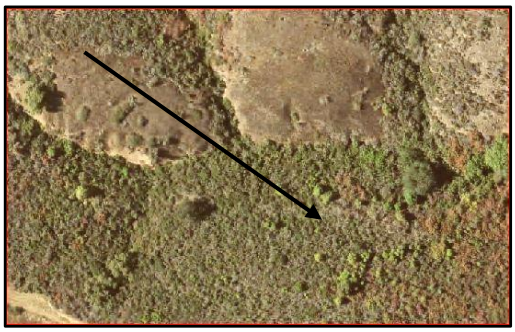
The *Arctostaphylos glandulosa* Alliance is almost impossible to distinguish from *A. glauca.* It is modeled only at the highest elevations of the mapping area. However, overall texture across the stand is smoother than that typified by the larger *A. glauca*, thus showing the more uniform recovery characteristics of this crown-sprouting species.

22110 – *Artemisia californica* Shrubland Alliance (California sagebrush scrub)



112 Acres Mapped

The stand in the aerial photo contains a dense cover of *A. californica* with some *D. aurantiacus* and *T. diversilobum* in the more mesic portions of the stand. This example is located just east of San Pedro Creek on slopes immediately above the coastal plain. The stand in the ground photo is just north of the study area at the intersection of Painted Cave Rd and East Camino Cielo.



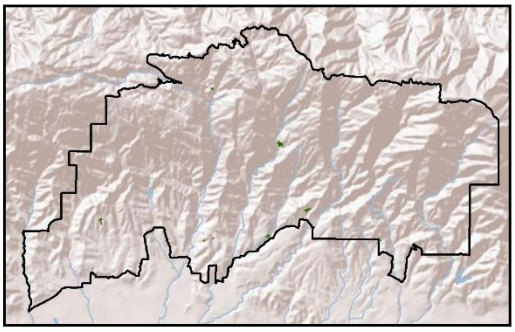
DESCRIPTION:

The *Artemisia californica* Alliance is limited to a few small stands along or near the southern boundary of the mapping area. Mapped in moderately dense to dense cover, where *Artemisia californica* dominates or co-dominates the stand with *Toxicodendron diversilobum, Diplacus aurantiacus,* or *Acmispon glaber.* Some stands contain small amounts of *Baccharis pilularis.*

PHOTO INTERPRETATION SIGNATURE:

The *Artemisia californica* Alliance has a wide range of signature characteristics due to frequently mixing with other coastal and seral scrub species. Signature is seasonally variable, especially toward mid-summer where leaf stress varies depending on slope exposure. Generally, colors trend light green to yellow-green with a stippled to finely mottled texture.

22120 – *Artemisia californica – Eriogonum fasciculatum* Shrubland Alliance (California sagebrush – California buckwheat scrub)



There is no ground photo available of *Artemisia californica – Eriogonum fasciculatum.*

16 Acres Mapped

This stand is located along State Highway 154 on both sides of the road.

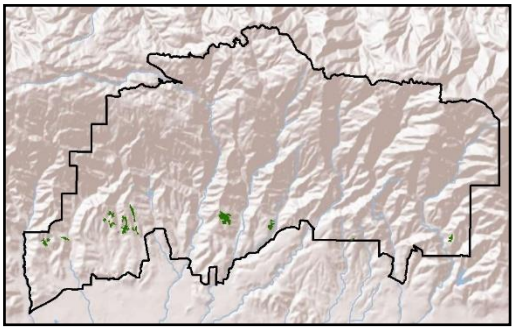
DESCRIPTION:

The *Artemisia californica – Eriogonum fasciculatum* Alliance is found along the southern third of the mapping area, primarily in the western portion on steep south trending slopes. Mapped in moderately open, grassy cover, where *Artemisia californica* and *Eriogonum fasciculatum* co-dominate the shrub layer. Stands may contain significant amounts of *Malosma laurina.*

PHOTO INTERPRETATION SIGNATURE:

The *Artemisia californica – Eriogonum fasciculatum* Alliance has signature characteristics of both species, the *E. fasciculatum* trending brown to orange and the *A. californica* yielding a silver-grayish to yellow-green hue. Stands are mottled and patterning is variable across the stand. Signature color and texture also depends on the makeup of understory herbaceous species.

22130 – *Artemisia californica - Salvia mellifera* Shrubland Alliance (California sagebrush – black sage scrub)



There is no ground photo available of *Artemisia californica - Salvia mellifera.*

70 Acres Mapped

This stand contains a dense cover of *Artemisia californica* and *Salvia mellifera* to the east and west of a *Q. agrifolia/ T. diversilobum* stand. It is located on a private property east of Fairview Ave.

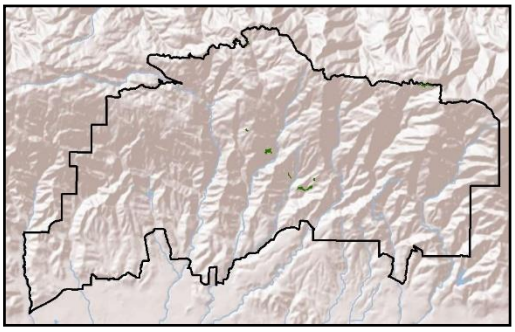
DESCRIPTION:

The *Artemisia californica – Salvia mellifera* Alliance is found along the southern third of the mapping area in small patchy stands generally under 5 acres in size near or adjacent to grasslands or urban-agricultural areas. Mapped where both species co-dominate the stand in moderate to high cover. Some stands have a co-dominant cover of *Malosma laurina.*

PHOTO INTERPRETATION SIGNATURE:

The *Artemisia californica – Salvia mellifera* Alliance has signature characteristics of both species, where *A. californica* has a silver-gray to medium gray hue with *S. mellifera* yielding a medium rather dull green to brown color. Polygons mapped to this alliance vary considerably across the stand even though most are limited in size.

22150 –*Eriogonum fasciculatum* Shrubland Alliance (California buckwheat scrub)



20 Acres Mapped

Some of the mappable stands of *Eriogonum fasciculatum* are located in road cuts along Highway 154. The stand depicted in the ground picture and aerial imagery is the best example for signature purposes and is located just outside the study area on the north side of East Camino Cielo Road.

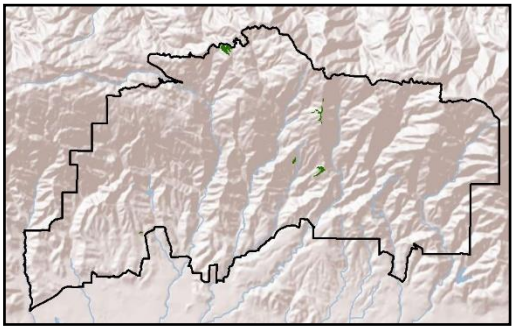
DESCRIPTION:

The *Eriogonum fasciculatum* Alliance is mapped as small stand only along road cuts and other types of recently denuded sites. Within the study area, these stands are mapped exclusively in disturbance settings where *Eriogonum fasciculatum* dominates the shrub layer in open cover.

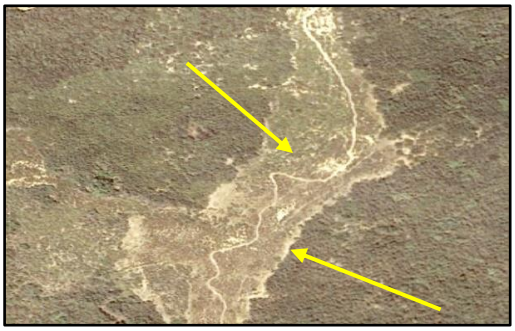
PHOTO INTERPRETATION SIGNATURE:

The *Eriogonum fasciculatum* Alliance has a brown to rusty color. The substrate is light colored with striations throughout. Signature varies depending on dry-season stress to the leaves.

22190 –*Salvia mellifera* Shrubland Alliance (Black sage scrub)



33 Acres Mapped



The stand in the ground photo is a small stand in the bend of the road just outside the mapping area on the north side of East Camino Cielo Road. The location in aerial photo is along the Windy Gap Fuel break. The *S. mellifera* stand extends along both sides of the trail in the fuel break.

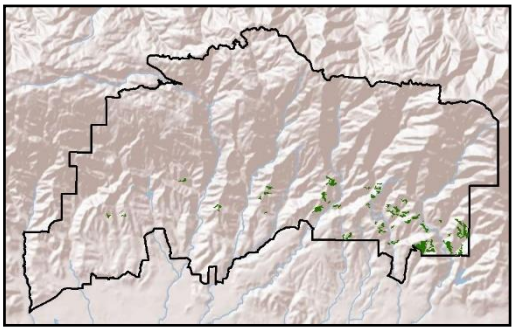
DESCRIPTION:

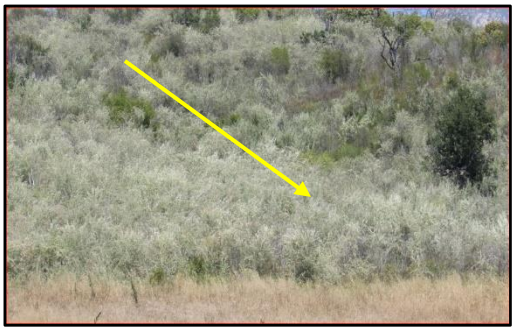
The *Salvia mellifera* Alliance is mapped along old firebreaks and other post fire settings in only a few locations of the mapping area. It is a more frequent component to post fire recovering chaparral communities. This alliance is mapped where *Salvia mellifera* dominates the shrub canopy, usually in dense cover.

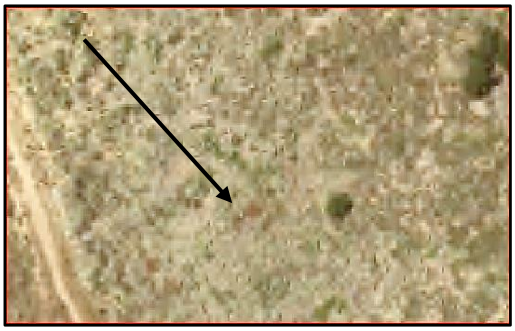
PHOTO INTERPRETATION SIGNATURE:

The *Salvia mellifera* Alliance has a medium brown to dull green color depending on the imagery date. Later season stands yield a somewhat brownish hue, earlier season stands are greener in color. Stands within the mapping area tend to have a more uniform signature height than most coastal scrub species since several of the polygons are mapped along previously cleared firebreaks.

22330 –*Malacothamnus fasciculatus* Shrubland Alliance (Bush mallow scrub)







158 Acres Mapped

This example is located on a moderately steep south facing slope above Jesusita Creek. The area burned in 2009. Based on the 2014 imagery, it was most likely a coastal expression of the *Ceanothus megacarpus* Alliance. Note *C. megacarpus* on upper right portions of the ground photo and image.

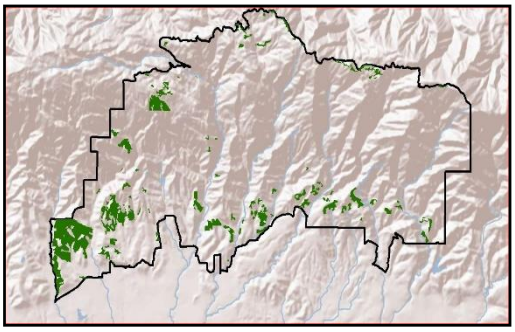
DESCRIPTION:

The *Malacothamnus fasciculatus* Alliance is mapped primarily in the southeastern quarter of the study area in areas that burned in the 2009 Jesusita fire. Most stands previously were likely to be dominated by *Ceanothus megacarpus.* Stands tend to occur on xeric trending topography but vary considerably. Mapped where *Malacothamnus fasciculata* dominates the stand in open to moderately dense cover over a dense herbaceous understory.

PHOTO INTERPRETATION SIGNATURE:

The *Malacothamnus fasciculatus* Alliance has an off-white color with a bluish to green hue. Signature characteristics vary minimally; it can be affected by the presence of small amounts of *Ceanothus megacarpus* or variability in the understory herbaceous component.

23300 - Mediterranean California naturalized annual & perennial grassland Group



814 Acres Mapped

This example is located below East Camino Cielo Road at 3,200-foot elevation. Isolated *Prunus ilicifolia* dot portions of the stand with less than 2% shrub cover.

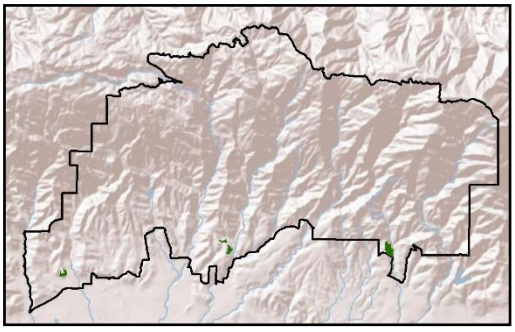
DESCRIPTION:

The Mediterranean California naturalized annual & perennial grasslands Group is mapped primarily in the southwestern third of the study area in a variety of topographical settings. Stands are dominated by non-native annual grasses and forbs that are not discernable to the species level using photo interpretation techniques. Stands are mapped where emergent shrub and tree cover is under 8-10%.

PHOTO INTERPRETATION SIGNATURE:

Signature characteristics within the weedy grasses vary considerably. Annual grasses such as *Avena spp., Bromus spp.* and others yield varying shades of tan to gray. *Brassica spp.* in some cases can be discernable and separated out into a type. Other forb-dominated types such as *Conium spp., Lepidium spp.,* and *Foeniculum spp.* are often too small to map.

23310 - *Brassica nigra* and other mustards Herbaceous Semi-Natural Alliance



34 Acres Mapped

This example is located to the west of Barger Canyon Road near some orchards. The black arrow is pointing at *Brassica nigra* and the red arrow is pointing at a small inclusion of *Conium maculatum*. The darker shades on the imagery is a characteristic signature of dense stands of *Brassica.*

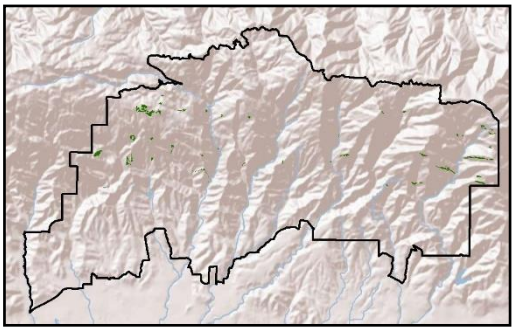
DESCRIPTION:

The *Brassica nigra* semi-natural Alliance is mapped sparingly in the study area; most stands are patchy and integrate too intricately with other forb-dominated vegetation. Mapped stands are dominated by mustard, other forbs tend to be patchy and annual grasses often are found in low cover and occur underneath. Stands are mapped where emergent shrub and tree cover is under 8-10%.

PHOTO INTERPRETATION SIGNATURE:

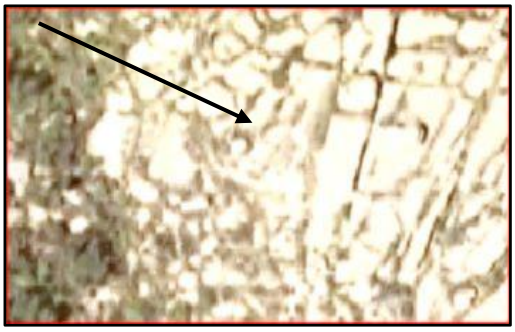
Signature characteristics of mustard species often continue fairly consistent over extensive areas, but can be influenced by the density and diversity of the stand. Dense, uniform stands yield darker gray hues while stands that share dominance with annual grasses tend to have a lighter gray color and can be difficult to separate out.

51100 – Central California Coast Ranges Cliff & Canyon Group



71 Acres Mapped

This example is located south of West Camino Cielo Road at 2,000-foot elevation. Isolated *Prunus ilicifolia* dot portions of the stand with less than 2% shrub cover. *Quercus agrifolia* is scattered toward the left side of the photo and image.



DESCRIPTION:

The Central California Coast Ranges Cliff & Canyon Group is defined by a sparse cover of vegetation generally less than 8-10%. Outcroppings in the Santa Ynez Mountains are sedimentary in origin and include a mix of sandstones and shales. They occur in steep as well as nearly level topography.

PHOTO INTERPRETATION SIGNATURE:

Rock outcrops, cliff faces, talus slopes and other sparsely vegetated bedrock formations are easily recognizable on the imagery and yield an array of extremely bright tan to light gray colors. When they occur in extremely steep settings, they can be too narrow to delineate. At times in order to ensure connectivity of cliff faces, delineations appear to include shadows. Depending on surface orientation, the extent of the delineations over small portions of the rock outcroppings may be exaggerated.

Mapped Vegetation Types With a Limited Presence in the Mapping Area (including Groups and Macrogroups)

Due to the following vegetation types having an uncommon occurrence in the study, photo signature and biogeographical characteristics have not been described; however, a brief description of each type can be found below. This list includes types mapped to more generalized group and macrogroup level categories.

11100 - Californian broadleaf forest and woodland Group
Only one polygon mapped in the study where it mixes with both exotic and native hardwood trees containing no single observable dominant species. It was therefore assigned to a group-level code.

11210 – *Pinus coulteri* Woodland Alliance
Three polygons mapped on upper ridgelines close to or along the main summit. Stands appear to be naturally occurring as low cover emergent trees over dense manzanita chaparral.

11220 – *Pinus sabiniana* Woodland Alliance (Foothill pine woodland)
One stand mapped in the study area just south of East Camino Cielo Road in an open woodland setting over mixed chaparral.

12210 – *Acer macrophyllum Forest* Alliance
Only one stand mapped in the northern portion of study area along San Jose Creek, west of State Highway 154. The stand shares dominance with *Alnus rhombifolia, Umbellularia californica* and *Platanus racemosa.*

13120 – *Schinus (molle, terebinthifolius)* - *Myoporum laetum* Woodland Semi-Natural Alliance
One stand mapped in the southern portion of the study area, in close proximity to an orchard. Isolated pepper trees were observed in areas that were once active orchards. The orchards are noted as abandoned based on recent imagery.

14100 – Vancouverian riparian deciduous forest Group
One small polygon mapped in the study area along San Antonio Creek. Although it is likely white alder, the possibility of it being a maple stand could not be ruled out, therefore mapped to the group code.

15100 – Southwestern North American riparian evergreen and deciduous woodland Group
Several small polygons mapped in seasonally flooded stream channels in the southwestern portion of the mapping area. Mapped stands contain diverse vegetation where it is difficult to evaluate dominance of a single species. Several stands appear to be dominant by a tree willow species.

15200 – Southwestern North American riparian/wash scrub Group
Polygons are mapped to the group level due to the small, isolated stands that are seen scattered in the study area. The photo signature does not yield conclusive evidence of the vegetation type and the areas are not accessible to ground truth.

21000 – California Chaparral Macrogroup
Polygons mapped as this type are difficult to classify, usually due to vegetation regenerating in post fire situations from burns that occurred within the last decade. The vegetation is generally early to late seral in nature, and these stands do not fit straightforwardly into an alliance or even a xeric or mesic group level. In these situations, the vegetation is assigned to the macro-group category.

21100 – Californian xeric chaparral Group
Most of these polygons are in post-burn recovery state, fragmented or in areas of disturbance, making the vegetation difficult to classify into an alliance. Stands occur on mid to upper neutral or south trending slopes, generally on steep terrain. These topographical settings tend to yield chaparral types within the xeric group.

21180 – *Eriodictyon crassifolium* Provisional Shrubland Alliance
Two small stands mapped as this post-fire vegetation within the study area along East Camino Cielo Road. Both stands continue north of the road beyond the project boundary.

21220– *Rhus integrifolia* Shrubland Alliance
Only four stands mapped at low elevations in the southern portion of the study area, all in close proximity to active orchards.

21300– Californian mesic chaparral Group
The majority of these polygons occur in post fire settings, in the early stages of recovery (within a decade). Classification to finer levels is difficult for the above reasons as well as the fact that they are often found on steep shady north trending slopes.

21430– *Quercus wislizeni* (shrub) Shrubland Alliance
Five polygons mapped in the study area. These stands are found on steep slopes usually mixing with *Quercus berberidifolia, Cercocarpus montanus,* shrubby *Q. agrifolia*, small *Umbellularia californica* and in more xeric settings with *Arctostaphylos spp.*

22000– California Coastal Scrub Macrogroup
Two polygons mapped in the southern portion of the study area, near the Arroyo Burro Trail. Both areas burned in 2009, and are currently in the recovery stage.

22100– Central and South Coastal Californian coastal sage scrub Group
Most of these polygons are mapped near or adjacent to orchards in the southern portion of the study area. Disturbance and drought stress related issues have made these stands difficult to assign to an alliance type using the 2015 and 2016 imagery.

22140– *Diplacus aurantiacus* Shrubland Alliance
One stand mapped along East Camino Cielo Road, based on ground truthing during the field reconnaissance effort.

22160– *Eriogonum fasciculatum - Salvia apiana* Shrubland Alliance
One stand mapped west of the Arroyo Burro trail and south of East Camino Cielo Road.

22200– *Salvia leucophylla* Shrubland Alliance
Four small stands mapped; two are located in road cuts next to State Highway 154.

22410– Broom (*Cytisus scoparius* and Others) Shrubland Semi-Natural Alliance
One stand mapped adjacent to East Camino Cielo Road. Broom is noted as a component to several other chaparral stands that were mapped to the native type.

23320- *Pennisetum setaceum* Herbaceous Semi-Natural Alliance
Three stands mapped on steep road cuts adjacent to State Highway 154.

31100– Vancouverian coastal deciduous scrub Group
One polygon is mapped north of La Goleta Road. The stand appears to have components of *Baccharis pilularis* and *Toxicodendron diversilobum.*

31110– *Toxicodendron diversilobum* Shrubland Alliance
Two polygons mapped, which are both located on mesic slopes in the southern section of the study area.

32110– *Baccharis pilularis* Shrubland Alliance
Four stands mapped in the southwestern portion of the study area. All are located near urban disturbed areas (homes or orchards). Mapped polygons have other coastal scrub species as a component to the stand.

33100– Arid West freshwater emergent marsh Group
One small stand located next to a small pond on a homestead. The stand is too small to distinguish the dominant species.

33120– *Schoenoplectus (acutus, californicus)* Mapping Unit
Three small stands mapped adjacent to small ponds located in urban settings.

34100– Californian warm temperate marsh/seep Group
One polygon is mapped in a mesic area adjacent to a small pond.

51110– *Selaginella bigelovii* Herbaceous Alliance
Six stands mapped on or immediately adjacent to sparsely vegetated rock outcrops.

Miscellaneous Classes

For all polygons, a dual coding system was used to depict both vegetation and land use. Most vegetated types do not have a land use code because there is no land use associated. However, when there is >8% native vegetation that occurs with land use (e.g. the San Marcos Trout Club), then the vegetation is coded and the land use is coded as Urban to indicate that there is urban development with native vegetation. When a polygon is urban with less than 8% native vegetation in it, then the vegetation is coded as Built Up & Urban Disturbance with a land use code of Urban.

It should be noted that percent cover was not evaluated for most of the Miscellaneous Classes.

The following descriptions pertain to the Map Unit codes that are classified as Miscellaneous Categories.

92000 – Agriculture
Corresponding Land Use is either: 2300 (Nursery) or 2700 (Equestrian Use)
For this project, areas classified as agriculture must have been active within 5 years prior to the project base imagery, so was active during or after 2010. The agriculture class was broken down into two categories: Woody Agriculture (Orchards, Vineyards) (92100), and Non-woody Row and Field Agriculture (92200). In general, agriculture polygons, such as nurseries or equestrian facilities, were coded with the generic 92000 code if they were not defined as the Woody Agriculture or Non-woody Row and Field Agriculture subclasses.

All of the polygons mapped as the general category of Agriculture are located in the southern section of the study area and are either open or covered nurseries or equestrian facilities containing riding arenas and associated boarding stables. To determine the appropriate land use, another attribute was assigned to each polygon, called Land Use, see list at the end of this section.

92100 – Woody Agriculture (orchards, vineyards)
Corresponding Land Use is 2210 (Orchards)

Orchards and vineyards are included in this category. Approximately 1,940 acres of orchards were mapped for this project. Avocado orchards were coded as this type and the following criteria were used when mapping them:

- Stressed or “abandoned” avocado orchards were evaluated on a case-by-case basis.
- Orchards containing dead or dying trees with open grassy areas adjacent to producing ones were still coded to this category.
- Recently cleared open areas, previously containing trees were included in this category
- Natural vegetation within the orchard (grasslands and shrub-dominated vegetation) was mapped based on the MMU criteria for the vegetation type.

92200 – Non-woody Row and Field Agriculture
Corresponding Land Use is 2100 (Non-woody Row & Field Crops)
33 acres (six mapped crops) are designated with this category of agriculture. All lie near the southern boundary of the study west of SR 154.

93000 – Built-up & Urban Disturbance
Corresponding Land Use is 1000 (Urban)
Isolated built-up areas are typically more rural in character, and can range from one isolated homestead to a group of houses on large lots mixed with vacant lots, equestrian facilities, and pods of natural vegetation.

There are situations where natural vegetation occurs on the same plot of land as the built-up disturbance. In these settings, it is important to represent the urban disturbance as well as show the continuity of the natural vegetation community by using the two-tiered coding system of Map Unit (vegetation) and Land Use.

- If the natural vegetation met the mapping criteria for an Alliance, the entire area was coded as a natural vegetation type in the Map Unit attribute and was assigned a Land Use attribute value of 1000.
- If the natural vegetation did not meet the mapping criteria for an Alliance, the entire area was coded as a 9300. This polygon was assigned a Land Use attribute value of 1000.

93200 – Anthropogenic Areas of Little or No Vegetation
Corresponding Land Use is either: 0 (Not Assigned/Not Assessed) or 2000 (Agriculture)
Isolated scrapes that are larger than 1 acre with no apparent built-up uses associated with them that have sparse vegetation present are mapped as Anthropogenic Areas of Little or No Vegetation and assigned a high value for the Anthropogenically Altered Disturbance attribute code.

95000 – Exotic Trees
Corresponding Land Use is 0 (Not Assigned/Not Assessed)
The non-native tree plantings that are mapped under this class are usually associated with urban uses such as orchards or homes.

95020 – Plantation Pine (Planted pines)
Corresponding Land Use is 0 (Not Assigned/Not Assessed)
This class is used to code areas where pines are known or suspected to have been planted. In several circumstances, the pines are not native to this part of the state.

98010 – Seasonal or Perennial Stream Channel
Corresponding Land Use is 9800 (Undifferentiated Water)
Mapped in areas of seasonally or permanently flooded and sparsely vegetated stream channels.

98030 – Small Earthen-dammed Ponds & Natural Lakes
Corresponding Land Use is 9800 (Undifferentiated Water)
This class includes perennial or seasonally flooded water bodies, either occurring naturally in the landscape or impounded by earthen dams, which receive their water primarily from the upstream watershed.

The following are considerations for mapping polygons that are coded as Small Earthen-dammed Ponds & Natural Lakes:

- The MMU was 1/4 acre.
- Small-dammed ponds on creeks contain ephemeral water from natural seasonal flow.
- Bermed ponds in agricultural fields are not included.

98050 – Water Impoundment Feature
Corresponding Land Use is 9810 (Water Impoundment Feature)
These are typically utility or other straight-edged water bodies impounded by berms and may or may not contain water at time of imagery exposure. The MMU is ¼-acre. Bermed agricultural ponds (with or without water) are mapped as this type.

Land Use Attribute

Land use is the human use of the land and is embodied through such features as urban centers, towns, mining, agriculture, and individual settlements. In this mapping effort land use was represented both as a possible vegetation class and as a separate attribute of a vegetated polygon. Therefore, all polygons were assigned a land use attribute; however, the majority of them were assigned a value of “Not Assigned/Not Assessed” because there was little to no land use present in the polygon.

The separate attribute field for Land use was created to account for the possibility of natural vegetation and land use occurring on the same plot of land. For instance, a developed area with houses under a canopy of natural vegetation intermingled would be assigned a code value representing its natural vegetation type, i.e. *Quercus agrifolia* Woodland Alliance and a code showing the area as urban/developed. For planning purposes, it is important to represent the housing as well as showing the continuity of a natural vegetation community. If we only assigned a vegetation code value, the mapper would have to choose between representing the polygon as *Quercus agrifolia* Woodland Alliance or urban. One or the other assignment would be lost.

The hierarchical format of the land use classification is such that classes that are more detailed 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 based on an AIS modified version of the Anderson Land Use Classification (Anderson et al., 1976) with Level I being most general and lower levels for specific categories, as shown below:

0 - Not Assigned/Not Assessed
1000 - Urban
2000 - Agriculture
    2100 - Non-woody Row & Field Crops
    2200 - Orchards and Vineyards (*this class is only listed to show the hierarchy)*
        2210 - Orchards
    2300 - Nursery
    2700 - Equestrian Use
9800 - Undifferentiated Water
    9810 - Water Impoundment Feature

0 - Not Assigned/Not Assessed
Corresponding Map Unit is variable
This value is assigned to areas that do not meet the criteria for a more detailed class or were not evaluated for land use, i.e. vacant land.

1000 - Urban
Corresponding Map Unit is variable
The Urban or Built-up Land category is characterized by intensive land use where the landscape has been altered by human activities. Although structures are usually present, this category is not restricted to traditional urban areas. Also included are associated lands, buildings, parking lots, access roads, and other appurtenances.

2000 - Agriculture
Corresponding Map Unit is variable
This category typically includes all lands used primarily for the production of food and fiber, poultry, and livestock, as well as structures associated with these activities. For the EGVCP project, Agriculture is broken down into specific categories: Non-woody Row and Field Agriculture (2100), Orchards (2210), Nursery (2300), and Equestrian Use (2700).

For the EGVCP project, the generic land use Agriculture (2000) category is used to code areas that were previously part of an active avocado orchard (visible on the 2008 imagery), but were burned after the 2008 imagery, resulting in vegetation replacing the area where avocado trees once stood. The resulting vegetation is coded as the appropriate vegetation but the land use attribute is coded as Agriculture to denote that the vegetated area was previously orchard. The post burn situation is also noted in the Notes attribute.

Another example of the Agriculture land use code is a large area of cleared land within a large avocado orchard that had farm related equipment on it.

2100 - Non-woody Row & Field crops
Corresponding Map Unit code is 92200 (Non-woody Row and Field Agriculture)
This category is used with areas of Non-woody Row and Field Agriculture. Included are active field and row cropland areas and improved pasturelands. The croplands include cultivated, in-crop, harvested, fallow or temporarily idle land. The improved pastureland may be in pasture year-around or may be in the cropland seasonal rotation. Improved pastureland does not include rangeland.

2210 - Orchards
Corresponding Map Unit code is 92100 (Woody Agriculture)
For the EGVCP project, the only types of orchards mapped were avocado orchards. The area must be in an active state to be mapped as an orchard. On the imagery the orchard areas look neat and uniform with green trees dispersed evenly throughout the area. Orchards where the trees looked stressed or abandoned were examined on a case-by-case basis as to whether to keep the area coded as Orchard. Some Orchards can look dubious, especially if the trees look

as if they are dying. In these situations, those that have a grassy understory are coded as an orchard while those that have shrubs, such as coast sage scrub or chaparral, in the understory are mapped as natural vegetation and given a land use code of zero.

2300 – Nursery
Corresponding Map Unit code is 92000 (Agriculture)
This category includes land managed for the production of plants and flowers, vegetable seedlings, seed farms, and wholesale greenhouses. Nurseries typically appear on the imagery similar to row crops. However, the area is non-uniform with a few rows of similar plants next to a few rows of a different type of plant, and so on. Trees may occur in some rows next to rows of plants in the next section. Greenhouses or hot houses may also occur in some row areas, or in separate areas altogether. Greenhouses typically appear as long narrow structures abutting each other with steeply pitched roofs or as rounded tubular looking structures. Often plants (including trees) may appear to be in boxes or other temporary containers.

2700 - Equestrian Use
Corresponding Map Unit code is 92000 (Agriculture)
This category includes commercial and non-commercial horse ranches, stables, tracks, barns, and corral areas and improved pastureland.

Stables appear as one or more long, narrow buildings within a farm complex, usually adjacent to pastures. Horse tracks are large dirt oval tracks located at the horse ranches. Corral areas and improved pastures are larger areas set aside for horse use and are usually fenced, containing water troughs, and possibly shade structures or enclosures. Smaller corrals associated with residential use are not coded in this category.

9800 - Undifferentiated Water
Corresponding Map Unit is either: 98010 (Seasonal or Perennial Stream Channel) or 98030 (Small Earthen-dammed Ponds & Natural Lakes)
Undifferentiated Water category typically includes open water bodies, either natural or artificially created, that may or may not contain water at the time of the project base imagery. Seasonal or perennial stream channels and small earthen dammed and naturally occurring lakes are included in this land use category.

9810 - Water Impoundment Feature
Corresponding Map Unit code is 98050 (Water Impoundment Feature)
The polygons coded as Water Impoundment Features are typically straight-edged water bodies impounded by berms and may or may not contain water at time of imagery exposure.