Vegetation Classification, Descriptions, and Mapping of the Clear Creek Management Area, Joaquin Ridge, Monocline Ridge, and Environs in San Benito and Western Fresno Counties, California

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ABSTRACT

This report summarizes the findings based on vegetation data collected in the inner South Coast Ranges of California in an approximately 100,000-acre area. In the spring and summer of 2004 and 2005, a field crew of vegetation ecologists collected 570 vegetation rapid assessments. In the fall-winter of 2004-2005, these data were entered into a database and analyzed using multivariate statistical programs to develop a floristic classification, keys, and descriptions of the vegetation types identified in the area.

This project serves two complementary functions. The first is to develop a detailed vegetation inventory to assist the Bureau of Land Management in the development of long-range management decisions in the area, which has a range of uses from a wilderness study area to grazing, mining, and off-road vehicles. The second is to provide a test case for the development of vegetation mapping methodologies with recommendations to the California State Vegetation Memorandum of Understanding Committee. The classification and descriptions produced herein have been used to develop detailed maps of the area's vegetation, and these maps are compared to other existing maps in the area to test their accuracy and efficiency of production.

BACKGROUND

Current, high quality vegetation data are critical for the preservation and management of California's ecosystems. Various agencies and organizations collect and maintain information resources regarding vegetation and produce maps to illustrate vegetation resources. Natural resource agencies consider vegetation as one of most important, if not the most important, data sets for their planning. For example, it is useful for:

- Developing land management plans (such as Federal Resource Management Plans or County General plans),
- Conducting watershed analysis,
- Monitoring and evaluating the status, health, and trends of wildlife and other natural resources,
- Assessing wildfire fuel loads and risks,
- Making pre-fire and post-fire assessments and plans,
- Modeling and predicting wildlife distributions and associated project impacts,
- Identifying critical habitat and conservation priorities for endangered species,
- Identifying potential habitat acquisitions,
- Assessing risks of exotic species infestations,
- Identifying restoration opportunities,
- Planning for recreation and resource extraction,
- Siting new facilities and infrastructure so as to minimize environmental impacts, and
- Resolving conflicts prior to land use decisions that affect natural resources.

Because of the importance of vegetation data, various public agencies and private organizations have funded their own individual land cover mapping efforts to meet their specific needs. These mapping efforts have used different mapping standards mostly independently of each other, making their integration across larger areas very difficult.

To correct this problem, the agencies and organizations that collect and distribute vegetation data in the state signed a Vegetation Memorandum of Understanding (MOU) in June 2000. They include the following: Bureau of Land Management (BLM), Bureau of Reclamation, California Department of Forestry (CDF), California Department of Fish and Game (CDFG), California Department of Parks and Recreation, California Native Plant Society (CNPS), California Department of Conservation, The

Resources Agency, University of California, US Forest Service (USFS), and US Fish and Wildlife Service. The purpose of the MOU is for the signatory organizations to work collaboratively in:

- Developing common standards for vegetation and land cover data content, data capture methods, field procedures, accuracy assessment and documentation.

- Completing a hierarchical vegetation classification system adaptable to varying goals of the signatories and improve vegetation and habitat classification and crosswalks between systems, and adhering to state and national standards for classification.

- Completing and maintaining a vegetation map of all public and private lands in California on a regional basis through interagency cooperative efforts as the basis for vegetation inventories and assessments of habitats, including detection of changes.

The Vegetation MOU Group has developed common mapping standards and identified the most essential information (attributes) to capture for each map unit (polygon or pixel), based on each organization's most important business needs. The standards can be found on the following web site: http://ceres.ca.gov/biodiversity/vegmou.html. The team has also created a crosswalk of rules for identifying vegetation types across existing classification systems. This crosswalk is an interim step until the more standardized National Vegetation Classification System is completed and adopted by public agencies.

INTRODUCTION

One of the purposes of this project is to test the Vegetation MOU Group's standards in a realistic mapping effort. This will help refine the standards, develop realistic ways for agencies to work together, and set the stage for improved land cover mapping throughout the state. In the long-term, the results from this project will guide future collaborative mapping efforts to cover all other parts of the state. The specific objectives of this project are to:

- Test land cover mapping standards for feasibility and cost-effectiveness;
- Develop and test a process for multiple agencies to reduce overall costs and collaborate on an integrated land cover mapping effort; and
- Combine and refine existing classification systems (i.e., USFS's CalVeg, CNPS's Manual of California Vegetation, CalFed's ERP classification) to create a hierarchical system for the inner Central Coast region consistent with the National Vegetation Classification System.

In addition to testing the Vegetation MOU Group's standards, the goal of this project from the BLM's standpoint is to provide an improved land cover GIS data set for the project area, with medium-scale data covering a larger area and fine-scale data in BLM's Clear Creek Management area and adjacent lands. The fine-scale map, in particular, will be useful in guiding management decisions in association with the Clear Creek Management Area Resource Management Plan and for adjacent areas. For example, it will produce more precise location information for specific habitats and vegetation types and the location of habitats for focal species. Also, detailed analysis may be possible on associated habitats, so that specific management issues can be addressed.

This project has benefited from the interest in its development by several cooperating agencies and organizations. Contributions from the cooperators include:

- Funding from the California Department of Fish and Game Resource Assessment Program to cover the cost of field data collection
- Funding from the Resources Legacy Group to cover cost of analyzing the field data for the vegetation classification and descriptions and for the map accuracy assessment done by the California Native Plant Society

- In kind services from the California Department of Fish and Game Vegetation Classification and Mapping Program to assist with field sampling, classification and mapping of the vegetation and to maintain state and national classification and mapping standards
- Funding from BLM to cover about half the cost of the fine-scale mapping, including air photo interpretation and delineation in the pilot study area, and a donation from BLM of recent digital color infrared aerial photography to assist with detailed photo interpretation of the study area.
- Funding from CalFed to cover the initial medium-scale mapping effort produced by US Forest Service and California Department of Forestry
- In kind services from the Remote Sensing Lab of the US Forest Service Region 5 office to provide segmented imagery for the entire study area.
- Funding from The Resources Agency for about half of the costs of air photo interpretation and delineation in the pilot study

This report covers the project completed by the California Native Plant Society with funding from Resources Legacy Group. The five main objectives of this project are as follows:

1. Define standard methods for collecting vegetation data for mapping efforts and supervise/train field staff.
2. Systematically classify the vegetation/habitats to state and national standards.
3. Describe the vegetation/habitat types.
4. Organize the final vegetation data and database that will be used in the fine-scale mapping and the accuracy assessment of the fine and medium-scale mapping.
5. Analyze/compare accuracy of the map data.

The analysis includes a crosswalk of the fine-scale classification and map products with the medium-scale products, and a comparison of accuracy and resolution between the products. This analysis will assist in building capacity between the organizations and will guide future efforts for vegetation mapping. Further, the final vegetation classification and map products will directly apply to efforts for habitat conservation planning, modeling for rare plant and animal species, designation of rare plant communities, and restoration of habitats.

METHODS

Study Area

The study area is in the inner Central Coast Ranges of the Diablo Range, straddling the boundary between San Benito and Fresno Counties, California (Figure 1). Much of the area is mountainous with sloping summits and steep side slopes along the east-northeast side of the San Andreas Fault. The study area is comprised of two subareas within three USDA subsections (Miles and Goudey 1997):

1. A portion of Monocline Ridge, within the Westside Alluvial Fans and Terraces (262Aq) and Eastern Hills (M262Ad) ecological subsections, and
2. The Clear Creek Management Area and adjacent Joaquin Ridge, primarily within the Diablo Range (M262Ac) subsection and a small extent into the Eastern Hills (M262Ad) subsection.

Both areas are under the jurisdiction of the Bureau of Land Management of Hollister, California. Each area has its own unique geology and floristic composition, as described below.

The Monocline Ridge portion of the study area is approximately 5,000 acres located west of Highway 5 northwest of the town of Firebaugh in Fresno County. The Monocline Ridge study area has had a long history of cattle grazing and is actively grazed today. The majority of the area is annual grassland dominated by non-native annual grasses; however, there are several unique habitats within the area. Monocline Ridge is actually a series of sand dune peaks known as the Monvero Dunes. A theory suggests that these dunes have eroded in place from sandstone of the Miocene period. The dunes

consist of loose sand at the highest peaks and are host to a unique dune flora that includes several forb species characteristic of the Colorado and Mojave deserts (Holland 1986). Another theory by Mel Erskine, geological consultant in California, suggests that the sands have been blown in and deposited in place by the dominant storm winds coming northwesterly off the ocean. A wind driven air mass meets the coastal mountains and the velocity of the wind increases to get the same volume of air through a smaller area. The greater velocity picks up larger particles from the surface, sand size in this case. The air mass then reaches the elevation drop into the San Joaquin Valley and the air mass has more room, so the velocity drops and the heavier sand sized particles are dropped out as soon as the velocity drops. The sand dunes are on the southeast side of the topographic highs such as at Monocline Ridge, and they generally are larger near the high passes where the velocity of the wind first decreases. The finer particles remain airborne longer and are dispersed over a much larger area, such as Bakersfield (Mel Erskine, personal communication). On the lower slopes of the dunes where the soils have become consolidated are found native shrub communities. A second unique plant community within the Monocline Ridge study area is found on open barren slopes where the soils have high kaolinite (clay) content. These barrens host a unique plant association dominated by *Eriogonum nudum* var. *indictum* and *Eriogonum vestitum,* both CNPS list 4 species (CNPS 2005).

The Clear Creek Management Area and adjacent Joaquin Ridge are located in San Benito County. They are bounded by Highway 25 to the west, King City-Coalinga Road to the south, Interstate Highway 5 to the east, and Panoche Road to the north. The study area comprises approximately 100,000 acres, of which about 70,000 are in the Clear Creek Management Area and about 35,000 are serpentine soils. Vegetation ranges from dense shrub land on relatively mesic non-serpentine north-facing slopes to open serpentine barrens and serpentine chaparral and woodlands, to semi-desert scrub of California Juniper, rabbitbrush, and saltbush on the eastern, driest portions of the study area.

The study area was divided by soil type and the areas are referred to as Eastern Non-serpentine, Serpentine, and Western Non-serpentine. The Eastern Non-serpentine area includes the area from Wright Mountain east along the length of Joaquin Ridge to near Donut Rocks. Further west the area also includes the nearly 1550 m Condon Peak in the south and Tucker Mountain in the far northwest. The Serpentine portion of the study area covers the central portion of the Management Area west of Wright Mountain to the Clear Creek drainage and north to the New Idria Mines. The Clear Creek Management Area has also had a long history of human use including mining and logging. Today it is a popular site for off-road vehicle use.

The area including and immediately surrounding the Clear Creek Management Area has elevations ranging from about 800 m adjacent to the San Benito River up to 1579 m on San Benito Mountain. Mean annual precipitation ranges from 40 to 60 cm. Snowfall is rare at the lower elevations, but it is an occasional occurrence at the higher elevations where snow may remain on the ground for a few days.

The core of the study area is known geologically as the New Idria antiform (Alexander et al. 2005). Here is exposed the largest serpentine body in the south coast ranges of California, a block of highly sheared serpentinite approximately 15 km long and 5 km wide, parallel to the San Andreas fault. This serpentinite body is in fault contact with rocks of the Franciscan complex, Great Valley sediments, and Tertiary marine and nonmarine sediments. These serpentine rocks form a dome that has been continuing to rise since the Miocene (around 11 million years ago). Numerous tectonic inclusions of Franciscan complex rocks are found within the New Idria dome and some have been recrystallized under high pressure to glaucophane schist, indicating that these rocks were forced up from depths greater than 15 to 20 km in the Franciscan subduction zone (Alexander et al 2005).

The New Idria serpentinite contains highly sheared and crushed material that consists of soft crumbly aggregates and sheets of asbestos (Coleman 1996). Chrysotile is the predominant mineral, with some lizardite, brucite, and magnetite. Within the wet weathering zone many secondary minerals, such as artinite, coalingite, hydromagnesite, and pyroaurite, are present. These minerals do not persist in well-drained soils. Cinnabar (mercury) deposits were mined from 1856 to 1970 and asbestos was mined in the New Idria locality until very recently (Eckel and Myers 1946). Government regulations concerning the introduction of toxic mercury into local streams terminated the cinnabar mining (Coleman 1996).

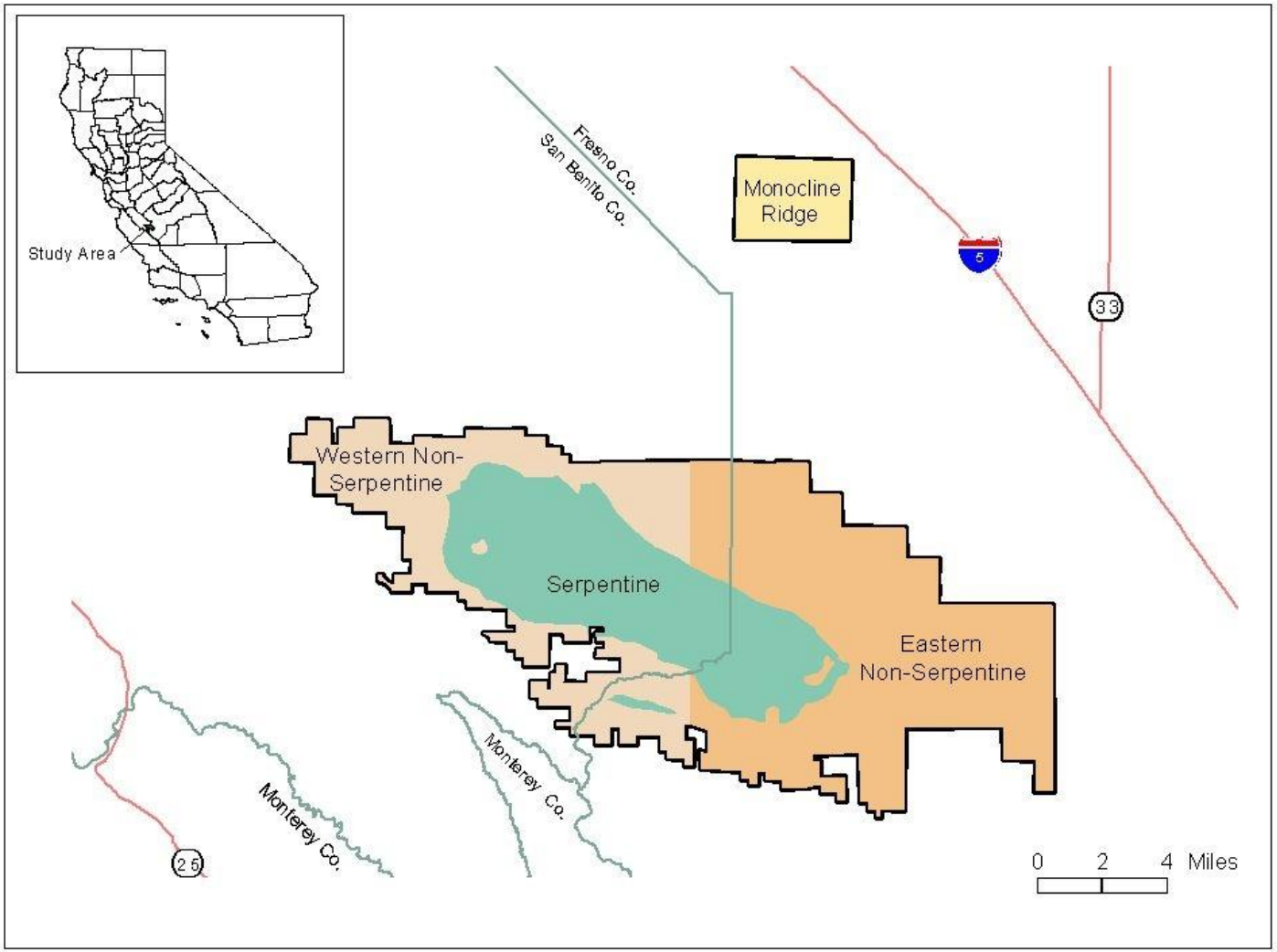

Figure 1. Map of study area for vegetation classification and fine-scale mapping in the inner Central Coast Ranges.

Soils are predominately Lithic Argixerolls of the Henneke and Hentine series, Typic Argixerolls of the Atravesada Series, and other Mollisols. These soils have a cover of chaparral prevailing on steep slopes, except where they are severely eroded (Isgrig 1969, Arroues 2004). Foothill pine (*Pinus sabiniana*) trees are common, but sparse.

A striking feature of the New Idria locality is large areas of severely eroded, barren land with very shallow Entisols lacking vegetative cover (Figure 2). These soils consist of a thin layer of loose serpentine detritus, commonly less than 10 cm thick, over bedrock that has been weathered soft enough to dig into with a spade. They have been mapped as rock outcrop in the soil survey of San Benito County and as asbestos in the soil survey of western Fresno County (Isgrig 1969, Arroues 2004). Moderately deep to deep Mollisols are common on the summit slopes, along with shallow Mollisols. A moderately deep clayey-skeletal, magnesic, mesic Ultic Argixeroll with open stands of Coulter pine (*Pinus coulteri*) and an understory of leather oak (*Quercus durata*), buckbrush (*Ceanothus cuneatus*), and Mexican manzanita (*Arctostaphylos pungens*) was described near the summit of San Benito Mountain.

Site Selection and Sampling

A preliminary vegetation classification for the study area was developed from an existing California vegetation classification (Sawyer and Keeler-Wolf 1995) and from initial reconnaissance of the study area. The preliminary reconnaissance was completed in April 2004, by Julie Evens (CNPS), Todd Keeler-Wolf (CDFG), Diana Hickson (CDFG) and Julie Anne Delgado (BLM). This preliminary classification provided field staff with a list of actual and potential alliances and associations to look for during the course of the field season.

The primary goal of the field staff was to obtain as many replicate field samples of the different vegetation types as time and resources allowed. Survey sites were selected by subjectively identifying stands of vegetation. A “stand” is defined as vegetation that has a characteristic combination of plant species and that is similar in age and size occurring across a landscape. A stand may be a small seep measuring several square meters in size or a large brush stand measuring several acres in size. The majority of field data was collected over a 10-week period between May 4 and July 10, 2004. Another week of surveys was completed the week of July 26, 2004, and additional surveys were collected during a reconnaissance visit the week of April 18, 2005. Sau San and Jeanne Taylor, Vegetation Program Assistants with CNPS, conducted the majority of the field sampling. Julie Evens and Anne Klein, vegetation ecologists with CNPS, participated in three weeks of field supervision/ training, reconnaissance, and field data collection. Todd Keeler-Wolf and Diana Hickson, vegetation ecologists with CDFG, participated in four weeks of reconnaissance and data collection.

Over the course of the field season, the CNPS Vegetation Rapid Assessment method was used to collect vegetation samples of tree, shrub and herb alliances and associations (visit www.cnps.org for the protocol descriptions and forms). The focus of the field data collection was to collect as many Rapid Assessments as could be completed in the accessible portions of land in the study area (Figure 3). In addition to sampling across the entire study area, four sub-areas (Tucker Mountain, San Benito Mountain, Condon Peak and Joaquin Rocks) were selected for more intensive data collection. Within these sub-areas, one week each was dedicated to collecting as many stand summaries as possible to obtain a statistically significant number of samples for each of the main vegetation types. This intensive sampling was done to gain adequate data to classify the vegetation into alliances and associations and to assess the accuracy of the test mapping project.

In addition, the sampling was done to provide the photo-interpreters with a maximum number of on-the-ground data points to create an accurate vegetation map. Reconnaissance surveys were collected as well as the full Rapid Assessment surveys. These shortened versions of the Rapid Assessment method were collected to provide the photo-interpreters with supplementary ground points indicating the dominant species in a stand. Note that the data collected from reconnaissance surveys were not used to develop the classification.

Figure 2. Juxtaposition of serpentine barrens, dense chaparral, and open coniferous woodland within the heart of the Clear Creek Management Area.

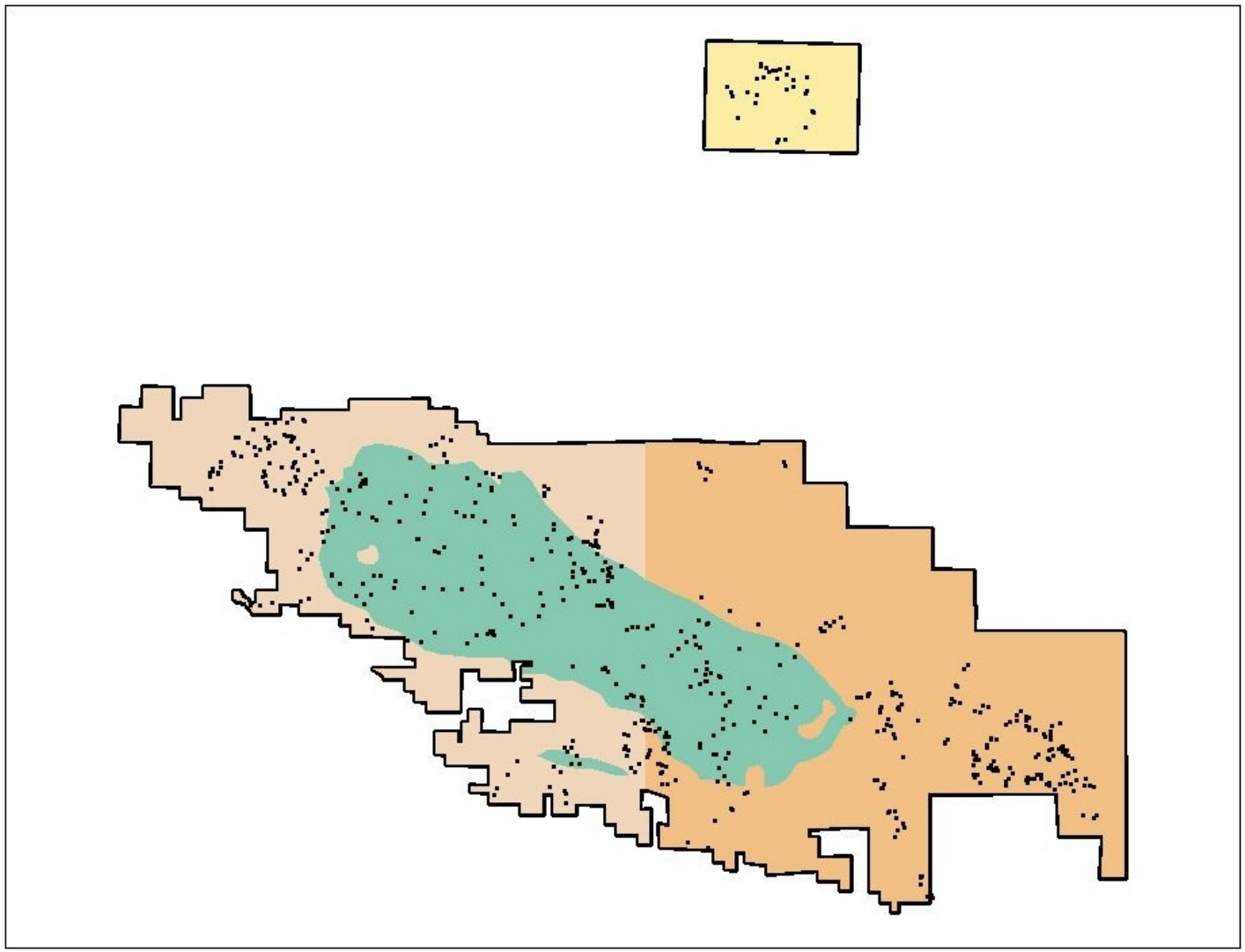

Figure 3. Map of the study area with locations of the vegetation Rapid Assessment surveys.

The Rapid Assessment protocol is a concise method for collecting environmental variables, species composition, and wildlife habitat information across an entire stand of vegetation. Each assessment takes about 30-45 minutes to complete, and they are recorded on one-page, paper field forms. Survey time depends on the size and accessibility of the stand.

With the rapid assessment protocol, data were collected on homogeneous "stands" of vegetation, which were identified by locating areas of homogeneous vegetation composition, species abundance, and site history. For each stand identified, a list of tree, shrub, and/or herb species was recorded (on average each Rapid Assessment list contained 12 native species and any additional non-native species). Each species was designated a height stratum (low=<0.5 m, medium=>0.5 to 5 m, and tall=>5 m), and the abundance or percent cover of each species was assessed by estimating the percentage of ground area covered by living parts. Sometimes, species were identified in more than one stratum (e.g., blue oak could be found in the low, medium and tall layers). In these instances, percent cover was estimated separately for each stratum in which the species occurred.

Throughout the field season, unknown plant specimens were identified using The Jepson Manual (Hickman 1993), A California Flora (Munz and Keck 1959), An Illustrated Field Key to the Flowering Plants of Monterey County (Matthews 1997) and a local plant list obtained from the BLM botanist. Additionally, staff from the University of California at Davis herbarium and the Jepson Herbarium helped identify unknown plant specimens.

All survey locations were recorded in Universal Transverse Mercator (UTM) and North American 1983 datum (NAD 83) using global positioning system (GPS) receivers. One GPS location was recorded within a representative location of each rapid assessment survey. When a stand was inaccessible due to distance or terrain, and the stand could be *clearly viewed*, survey data were collected remotely. GPS location was collected at each survey point and a distance and bearing to the stand center were taken. Distance to the stand was measured using a digital rangefinder. Compass bearings were true north using a declination of 16° east. GPS points were later plotted, and these points were shifted to the stand center by calculating a trigonometric equation with the distance and bearing.

Standard sets of additional variables were collected as part of all field samples. These include elevation, degree aspect, degree slope, total vegetative cover, total overstory cover, total understory cover, geologic substrate, and soil texture. Survey data were entered directly into an Access database created by CNPS. All surveys were entered manually into a standardized database in July and August 2004. Error checking of the database was conducted in the fall of 2004. The information is archived in the MS Access database for Rapid Assessment surveys. All associated data survey information is located in the RAPlots, RAPlants, RAPlants_Analysis, RAImpacts, RAReports, and RA_AA tables. Other tables are look-up reference tables for the functionality of the forms and data tables.

Fine-scale Classification Analysis

Once all the field data were entered and quality checked, the process of developing a standardized, quantitative and fine-scale classification of the study area was performed. In the following paragraphs a detailed description of the processes and methods involved are described. In brief, the phases can be summarized as follows:

1. Accumulate existing literature and combine into preliminary classification of vegetation types.
2. Target the various vegetation types using current field sampling and survey to capture all bio-environments in the study area and fill in the gaps in the existing classification.
3. Analyze new plots to develop quantitative classification rules.
4. Bring the classification into accordance with the standardized National Vegetation Classification System (NVCS).
5. Develop keys and descriptions to all the alliances of the mapping area.
6. Review existing literature.

Beginning in early April 2004, information from a state California vegetation classification (Sawyer and Keeler-Wolf 1995), and other existing literature were reviewed to obtain a current view of the local vegetation with respect to the National Vegetation Classification (Grossman et al. 1998). This information was compiled into a preliminary, floristic classification of vegetation at the alliance and association levels. The initial reconnaissance of the study area in April 2004 also supplemented this classification. The initial inventory included around 50 alliances and suggested about 100 associations or phases (an informal subdivision of an association) in the mapping area. This was substantially revised following analysis of the samples.

Cluster analyses for vegetation classification

Following the 2004 sampling effort by the field staff, 565 rapid assessment surveys were statistically analyzed. A team of ecologists classified the data, including Julie Evens, Diana Hickson, Todd Keeler-Wolf, and Anne Klein. The analysis of sample data was undertaken using the PC-ORD software suite of classification and ordination tools (McCune and Mefford 1997). PC-ORD performs multivariate analyses to generate order out of complex biological patterns. It can be used to objectively define groups of samples into a formalized classification of community types. Using programs such as Cluster Analysis and Ordination (McCune and Mefford 1997), groups are defined by similarities in species composition and abundance.

Since plant community datasets are inherently complex and more than one environmental axis determines the heterogeneity in plant patterns, a hierarchical agglomerative Cluster Analysis technique was employed with Sorenson distance and flexible beta linkage method at -0.25 (McCune and Grace 2002). The cluster analysis technique was based on abundance (cover) values converted to seven different classes using the following modified Braun-Blanquet (1932/1951) cover categories: 1=<1%, 2=1-5%, 3=>5-15%, 4=>15-25%, 5=>25-50%, 6=>50-75%, 7=>75%. The majority of the species values fell within the first four cover classes. Prior to these analyses, data were screened for outliers (extreme values of sample units or species) using outlier analysis in PC-ORD. Outlier samples and species were removed to reduce heterogeneity and increase normality in the dataset. For samples, Sorenson distance was used for the outlier analysis. Species in less than two samples were removed. After outliers were removed from the dataset, a dendrogram was generated in the first-order cluster analysis run. This dendrogram was interpreted at group levels 6, 55 and 150 to display the main ecological groupings, the generic alliance levels, and the finest association levels, respectively.

The six ecological groupings included the following vegetation assemblages: 1) serpentine chaparral and mixed conifer, 2) chaparral, 3) riparian, pine barren, and canyon live oak, 4) desert transition, 5) blue oak, California juniper and mountain-mahogany, and 6) upland herbaceous, coastal sage, and disturbance samples.

After the main Cluster Analysis run, Indicator Species Analysis (ISA) was employed to decide objectively what group level to "cut" the dendrogram and explicitly interpret the groups. Further, ISA was used to designate species that indicate the different groups. ISA produced indicator values for each species in each of groups within the dendrogram, and these species were tested for statistical significance using a Monte Carlo technique (Dufrene and Legendre 1997). ISA was repeated at group levels for the 6 main groups of the dendrogram at 55 and 150 groups. At the 55 and 150 group levels, the analysis was evaluated to obtain the total number of significant indicator species (p-value ≤0.5) within each group level and the mean p-value for all species. Plant community names within floristic classes were applied to the samples of the different groups.

Naming conventions followed the floristic units of "associations," as defined by the National Vegetation Classification System (Grossman et al. 1998) and the California Native Plant Society (Sawyer and Keeler-Wolf 1995). An association is defined by a group of samples that have similar dominant and characteristic species in the overstory and other important and indicator species, whereby these species are distinctive for a particular environmental setting. Further, significant indicator species were drawn from the analysis and applied to the associations. A set of similar associations is grouped hierarchically to the next level in the classification, the alliance-level. For example, different types of Birchleaf Mountain-mahogany Shrubland are classified to the association level depending on the characteristic overstory and understory species (e.g., *Cercocarpus betuloides-Ceanothus cuneatus-Quercus john-tuckeri* as compared to *Cercocarpus betuloides-Juniperus californica*/Annual-Perennial Herb), while there is a Birchleaf Mountain-mahogany Alliance based on the characteristic presence of this shrub in the overstory. Associations are usually differentiated by environmental factors as well as floristic characteristics.

Each sample was revisited within the context of the cluster to which it had been assigned to quantitatively define membership rules for each association. The membership rules were defined by species constancy, indicator species, and species cover values. Upon revisiting each sample, a few samples misclassified in earlier fusions of the cluster analysis were reclassified based on the membership rules. Additionally, the three outlier samples and the five 2005 samples were assigned membership rules based on dominant species in the overstory.

The set of data collected throughout the study area was used as the principal means for defining the association composition and membership rules; however, pre-existing classifications and floras were consulted to locate analogous/similar classifications or descriptions of vegetation.

A summary of the analysis process is provided in the following steps:

a. Screen all sample-by-species data for outliers. Samples that were outliers in Sorenson distance and species that were in fewer than two samples were removed.
b. Run cover category Cluster Analysis to display a more specific arrangement of samples based on species presence and abundance.
c. Run Indicator Species Analysis (ISA) at three different group levels in the Cluster Analysis output.
d. Settle on the final representative grouping levels to use in the preliminary labeling.
e. Preliminarily label alliance and association for each of the samples, and denote indicator species from the ISA.
f. Develop decision rules for each association and alliance based on review of species cover on a sample-by-sample basis.
g. Assign final alliance and association labels for each sample and arrange in table of database.

h. Use decision rules developed in the new data to assign alliance and association names to all analyzed data and all other samples within the dataset, including outliers.

Samples were classified first to the generic alliance-level, and then they were defined to the more specific association-level when at least three samples of similar species composition and cover were present. These designations are based on the standard floristic hierarchy of the U.S. National Vegetation Classification as supported by NatureServe (see www.naturerserve.org, NatureServe 2005). They are based on species composition, abundance, and habitat/environment. Samples were defined only at the alliance-level when less than three samples occurred in the study area. The alliance-only designations occurred in three main situations:

1. The alliance has been described elsewhere in the state as a widespread alliance (e.g., Fremont Cottonwood Alliance). Usually the one or two samples recorded in this project corresponded appropriately with an existing alliance definition, but the plots did not "fit" into any existing, specific association definition.

2. The alliance has been described elsewhere, but only at the alliance-level (e.g., Coulter Pine - Canyon Live Oak Alliance). The one to two samples corresponded suitably with an existing alliance description, but there were not enough samples of similar constitution to define a specific association.

3. The alliance has been defined as a new alliance in this study area. With few samples to define this new alliance, it is seen as a provisional alliance until additional samples are recorded from this or other regions.

These circumstances lead to the point that some vegetation types were under-represented in the sampling effort. Particularly for the third situation, they may be rare types that have been considered important and are described separately in the result section based on their rare edaphic environments. They are often the only representatives of rare alliances known from within the boundary of the study area, or they were the only representatives of rare alliances that are found scattered in California. In some cases, they represented unusual species groupings heretofore undescribed and were viewed as affording perspective into unusual vegetation types that deserve additional sampling.

Methods for Mapping Processes

Numerous techniques are available for fine-scale mapping of vegetation. Among the most promising are those relying on delineation and attribution of vegetation patches using expert interpretation of digital (computer-screen) geo-referenced aerial photography. This is generally faster than traditional methods of manual interpretation of hard-copy aerial photos through stereoscopes. Another method is based on computer-segmentation (computer decides where the lines are drawn) of satellite images, which are then attributed manually by experts or automatically by computer models. As more and more emphasis is being put on standard approaches to mapping vegetation throughout California, it is important to test the efficiency and accuracy of the most likely methods to be used. This project tests both of these methods and at the same time will result in a detailed vegetation map of an important management area in central California.

One of the principal goals of this project is to test the efficacy of using two different approaches to mapping vegetation. Another goal is to test the draft map attribute standards agreed upon by the California Interagency Vegetation MOU Committee (further known as "The Vegetation Committee"). The latter purpose will be used to make decisions within the Vegetation Committee for future cooperative vegetation mapping projects throughout the state. The former purpose is a comparison of a computer-automated approach of defining mapping units through image segmentation developed by the US Forest Service versus a standard manual approach of "head's-up" digitizing mapping units on a computer-screen.

The underlying wishes of the US Forest Service (USFS) are to use a photo-interpreter modification of segmented imagery as a standard way to match more finely-delineated maps with a computer-automated segmentation approach that have been implemented by the USFS for their mid-scale products. The argument for this approach is that using segmented images as a base is a more standard method to defining vegetation polygons because it is "impartial" and does not vary based on "human opinion." The counter-argument is that human interpretation of vegetation classification is important to enable incorporation of subtle distinctions of species composition, dominance by lifeform, and phenological and topographic variance, which otherwise might be interpreted just as spectral differences by the image segmentation process. The conclusions from this study will help us decide if image segmentation is a useful technique to reduce time and photo-interpreter error in manually delineating and labeling stands based on the National Vegetation Classification System.

Medium-scale Mapping Methodology

The medium-scale mapping classification used in this comparison is known as CalVeg. The CalVeg mapping classification is maintained and updated at the Remote Sensing Lab (RSL) of the US Forest Service in Sacramento, and it currently has 178 distinct vegetation and land use types (USFS 2002). CalVeg alliances are similar in resolution (though not always in formal definition) to those in the uppermost floristic level (Alliance) of the National Vegetation Classification hierarchy. Both are based on dominant and existing vegetation components in a given area, but mapping units stress woody economically important types and tend to aggregate or overlook vegetation that typically does not attain stands of the minimum mapping unit of 2.5 ha.

The methods for developing classified images for CalVeg mapping follow a prescribed sequence of steps including lifeform classification, data collection and descriptions, terrain model development, forest stand structure, field verification and map editing, and accuracy assessment.

1) Lifeform classification: Prior to modeling ecological relationships for vegetation type, a LANDSAT Thematic Mapper image, usually merged with a finer-scale satellite image such as IRS or SPOT is classified into several lifeforms: conifer, hardwood, mixed, shrub, wet herbaceous, dry herbaceous, barren, water, snow, agricultural and urban. Other more specific vegetation types that have unique spectral properties may be mapped at this time as well.

Image classification occurs on individual pixels, not stands. All recent work by RSL relies on a basic pixel size of 5 m. An additional step uses an image segmentation procedure, which delineates stand boundaries based on spectral similarities. When combined with the pixel classification, a "stand based" land cover map is produced. This map is generated through a decision rule process, which uses analyst-specified decision rules to label the stands or polygons, based on the membership of classified pixels. Editing is then carried out on these stands or polygons to resolve any ambiguous results for lifeform. This stand lifeform map is then used as input to the ecological terrain model.

2) Data collection and descriptions: Field and existing data collection drives the classification system to enable the development of models that predict the occurrence of existing vegetation alliances. However, the intensity of data collection and analysis is substantially lower than methods used to develop the classification, training, and accuracy assessment in this project. This process provides updated alliances for the CalVeg classification system as areas across the state are systematically mapped within regional or Ecological Unit boundaries. Field time is allocated to collect new information throughout the project's mapping boundaries, including, at the minimum, slope angle, elevation, slope aspect, and dominant species for each alliance in its varied expression throughout the mapping area. Since the mapping area of this CalVeg project included about 2.2 million acres, the actual amount of data collected in the study area (ca 100,000 acres) was limited to a few observations. In many cases, areas are "masked" in the models to exclude

alliances that are restricted in extent. Alliances are then described for the general mapping area or CalVeg Zone, often with the inclusion or updating of a general dichotomous key to the alliances.

3) Terrain model development: In addition to floristic information, terrain variables such as elevation, slope angle, slope aspect, soil and geologic or land form type, precipitation averages, fire history, etc. are addressed in the vegetation predictive models in ARC Macro Language scripts. Models are processed separately for each of four lifeform types - conifer, hardwood, mixed conifer/hardwood stands, and shrub. Herbaceous types are usually assessed from remotely sensed imagery corrected and edited by interpreting information from aerial photos. In cases where vegetation cannot be modeled, such as in serpentine or other edaphically defined vegetation types, ancillary data are used and superseded the model's output. Model results are analyzed for conformance with new field data and field observations. A final "run" of the model merges output from the four lifeform models with land cover classifications derived from edited remotely sensed data to assure the labeling of all map areas.

4) Forest stand structure: In addition to mapping the floristic composition, the structural characteristics of canopy closure and overstory tree size are also mapped for the tree land cover types. Stands that are mapped as conifer, hardwood, or conifer/hardwood mix are used as stratifications for independent canopy and size mapping approaches. Canopy closure is derived from a geometric optical canopy model that estimates canopy closure within each tree stand as a percent cover value. The resulting estimates of canopy closure in forested stands are evaluated using aerial photography to correct any errors in the GIS environment. Overstory tree size is generated from satellite imagery using a combination of supervised and unsupervised image classification techniques in conjunction with aerial photography. As with canopy closure, size estimates are reviewed against aerial photography to correct anomalous errors.

5) Field verification and final editing: Maps are provided for field reviewers and brought into the mapping area for comments and corrections that produce the final CalVeg data layers. The models are corrected and re-run, or the needed edits are made on the computer screen in ARC/INFO to produce a final CalVeg map product. The final completed map includes the results of tree crown and density models and tree size estimates. Crosswalks to the California Wildlife Habitat Relationships (WHR) and regional descriptions of the vegetation alliances are supplied with the final map products.

Fine-scale Mapping Methodology

The fine-scale mapping methods used to compare with the medium-scale approach described above is called “Heads-up digitizing.” The process has been implemented by Aerial Information Systems (AIS), from Redlands, California. It involves a traditional air photo interpreter’s technique of delineation of individual stands or “mapping units” of vegetation based on a detailed understanding of the floristic classification developed in this report. The steps used by the AIS photo interpreters are as follows:

1) Familiarization of the study area’s vegetation into floristic and mapping classifications. Photo interpreters are trained and become familiarized with the specific vegetation features of the study area through a combination of field reconnaissance and indoctrination in the details and rules of the floristic classification derived from the field data. This work is done in collaboration with the ecologists who collected and analyzed the field data. Once the photo-interpreters interpret the information provided in the field reconnaissance, field data, and floristic mapping classification, they derive a mapping classification of vegetation that can be reliably and repeatedly mapped.

2) Manual delineation of vegetation through digital means. Instead of lines being drawn in pen and ink as an overlay over an aerial photographic print, a digitally ortho-rectified copy of the aerial photograph is displayed on the computer screen, and the AIS photo interpreter uses a mouse to digitally draw boundaries of the stands in a GIS environment, followed with attributing each

polygon with a set of vegetation codes and other descriptive attributes. Additional clues to the proper labeling and delineation of the vegetation are interpreted through the use of 30 meter digital elevation models – converted to contour backdrops depicting slope characteristics (direction-steepness-position) and elevation and Digital Raster Grids – showing backdrops of a USGS 1:24,000 topographic map including approximate locations of streams, roads, and other features.

3) Use of field samples to assist photo interpretation. The basis for the certainty of photo interpretation of all attributes comes from the approximately 360 individual field vegetation samples that were collected specifically for this study and provided to the photo interpreters. These samples contained all the information necessary to interpret all attributes and contained an array of examples of all major vegetation types in the study zone.

4) Attribution of vegetation type, cover, tree height, and disturbance. Test areas are interpreted to the highest level of floristic detail possible, which for the most part equate to sub-alliance and association mapping for lifeforms of shrub and trees based on the classification of the vegetation detailed in this report. In addition to the vegetation type attribution, the photo interpreters defined vegetation cover (density), height, and disturbance:

a. Stand Density (density determined on the dominant lifeform of the alliance or association; for example, the density for a tree type would be the tree cover not the understory cover)
b. Stand Height (height determined on lifeform of alliance or association except where trees make up at least 10% of a shrub dominated association
c. Stand Disturbance Intensity (Values for both exotic component and land disturbance, called “cleared” as an attribute)

Attribution of these variables was accomplished by AIS using the training data provided from the field crews and on the gauging of categories based on texture, shadowing, and other cues taken from the aerial photographs. Photo interpreters used disturbance categories for exotic vegetation and clearing. These categories are based on minimum standard of visible human or human-mediated impacts each ranked as high, moderate, or low impact. The “cleared” category is attributed using a standardized ranking of disturbance by roads, mining, and bulldozer clearing based on the percentage of each polygon covered by these types of disturbance. The exotics category was attributed from the photo-interpreters knowledge of signatures of non-native grasses or larger non-native species such as tamarisk.

5) Final editing. Maps are reviewed the by vegetation ecologists in an accuracy assessment process, and final results of accuracy are provided to the photo interpreters. The photo interpreters use the information to correct any misinterpreted vegetation types and other attributes. Crosswalks to the California Wildlife Habitat Relationships (WHR) and regional descriptions of the vegetation alliances are supplied with the final map products.

The photo interpreters had access to two different photo imagery bases: high resolution (approximately 1 foot resolution or 1:12,000) color-infrared photography (CIR imagery) flown in the dry season in June 2004, and black and white (B&W) standard digital orthophoto quarter-quadrangle (DOQQ) imagery derived from aerial photography flown in 1994 (approximately 1 meter resolution). The high resolution imagery was available for the Clear Creek Management area (around 70,000 acres), and the other imagery was available for the entire study area (around 100,000 acres).

Polygon Attributes and Issues of Compatibility

One of the problems in this study was that different classification systems and different attributes were used in the medium-scale and the fine-scale efforts. The medium-scale segmented approach used a CalVeg classification system (USFS 2004) and indicated additional codes for size class and density

class of trees in both the CalVeg and WHR classification systems (Mayer and Laudenslayer 1988, USFS 2002). The fine-scale approach used the Alliance and Association-level vegetation classification system based on the National Vegetation classification system (Grossman et al., 1998), which typically operates at a finer resolution than the CalVeg classification. Further, the fine-scale photo interpretation approach used a compatible density (cover) scale for the dominant vegetation overstory, using similar rules to the CalVeg approach (WHR density scale was used), while the fine-scale effort used different height category attributes (which were not readily comparable to any of the CalVeg attributes).

In addition to floristic attributes, the fine-scale polygon attribution contained the following stand characteristics:

a) Vegetation cover: Based on minimum standard of five cover classes of dominant stratum, including the following.

1 = Greater than 60%, 2 = 40-60%, 3 = 25-40%, 4 = 10-25%, 5 = 2-10%

b) Tree height: Based on minimum standard on five standard height classes, including the following.

1 = <0.5 m, 2 = 0.5 – 2 m, 3 = 2 – 5 m, 4 = 5 – 15 m, 5 = 15 – 35 m, 6 = > 35 m

c) Vegetation disturbance: Based on minimum standard of visible human or human-mediated impacts each ranked as high, moderate, or low impact.

Clearing: 0 = <5%, 1 = 5-25%, 2 = 25-50%, 3 = >50%

Exotics: 0 = <5%, 1 = 5-25%, 2 = 25-50%, 3 = >50%

The CalVeg medium-scale approach did not have a vegetation height category, but it did have canopy closure categories for all tree types (defined as polygons with >10% cover of trees). The cover classes are similar to those used in the density attribute for the fine-scale approach:

Tree Cover Classes: S (Sparse Cover) = 10.0-24.9%, P (Open Cover) = 25.0-39.9%, M (Moderate Cover) = 40.0-59.9%, D (Dense Cover) $\geq$60%, X (Not Determined) = Not Applicable

CalVeg also uses a set of size class categories for all polygons dominated by trees, used in the mid scale but not in the fine-scale approach:

1 = Seedlings (<1”), 2 = Saplings (1-6”), 3 = Pole (6-11”), 4 = Small (11-25”), 5 = Medium to large (Greater than 25”), 6 = Multi-layered medium to large trees over smaller trees in densities >60%

Of course, the classification systems used by the medium-scale and the fine-scale were also not completely compatible. As described above, the CalVeg system has been developed stressing woody vegetation, particularly tree dominated types, while the National Classification system treats all forms of vegetation, woody or not, small or large size stands, equally. In order to make these systems comparable in the analysis of accuracy, the complexity of both systems was reduced and aggregated into an easily interpreted compatible system, which in this case equated to the WHR habitat classification (Mayer and Laudenslayer 1988).

Assessing Accuracy of the Mapping Methods

As previously described, vegetation sampling was conducted at a higher level of intensity within pilot test areas with the idea that a number of these samples would be used by CNPS and CDFG ecologists to test the accuracy of the mapping and labeling of vegetation attributes. Over 150 vegetation samples were collected in the pilot areas.

Two of test areas of approximately 3,500 acres (or approximately 5 ½ square miles) each overlapped with both fine-scale and medium-scale efforts (see Congdon Peaks and Joaquin Rocks test areas in Figure 4). In these two test areas, a total of 80 field samples were reserved for accuracy assessment (31 in Congdon Peaks and 49 in Joaquin Rocks). These samples were conducted with the specific intention of testing of thematic accuracy on type, density, and other structural attributes, as well as spatial accuracy. Thus, somewhat more detailed notes were made by the field crews than would normally be done on a standard Rapid Assessment form.

Further, two additional test areas of approximately 3,500 acres each were also selected (see Figure 4), so that AIS could additionally map the four test regions in two approaches: using their standard heads-up digitizing on DOQQs and using a finer-tuned segmentation process than the medium-scale effort produced by USFS. All four test areas were attributed by AIS in an exercise to determine the extra effort needed to meet proposed standards of the Vegetation Committee. The Team tracked the time necessary to map using both methods and for the extra attribution.

The four test areas had been selected to cover the range of variability of the different types of vegetation and mapping conditions within the larger 100,000-acre study area. They represent the local variety of the vegetation within the study, in the following areas:

1. Tucker Mountain: Western largely non-serpentine chaparral and oak woodland.
2. San Benito Mountain: Largely high elevation serpentine coniferous woodland and serpentine chaparral.
3. Condon Peak: Mixture of higher elevation serpentine and non-serpentine chaparral and conifer woodland.
4. Joaquin Rocks: Eastern portion of the study area with drier oak woodlands, non-serpentine chaparral, grasslands, and juniper scrub.

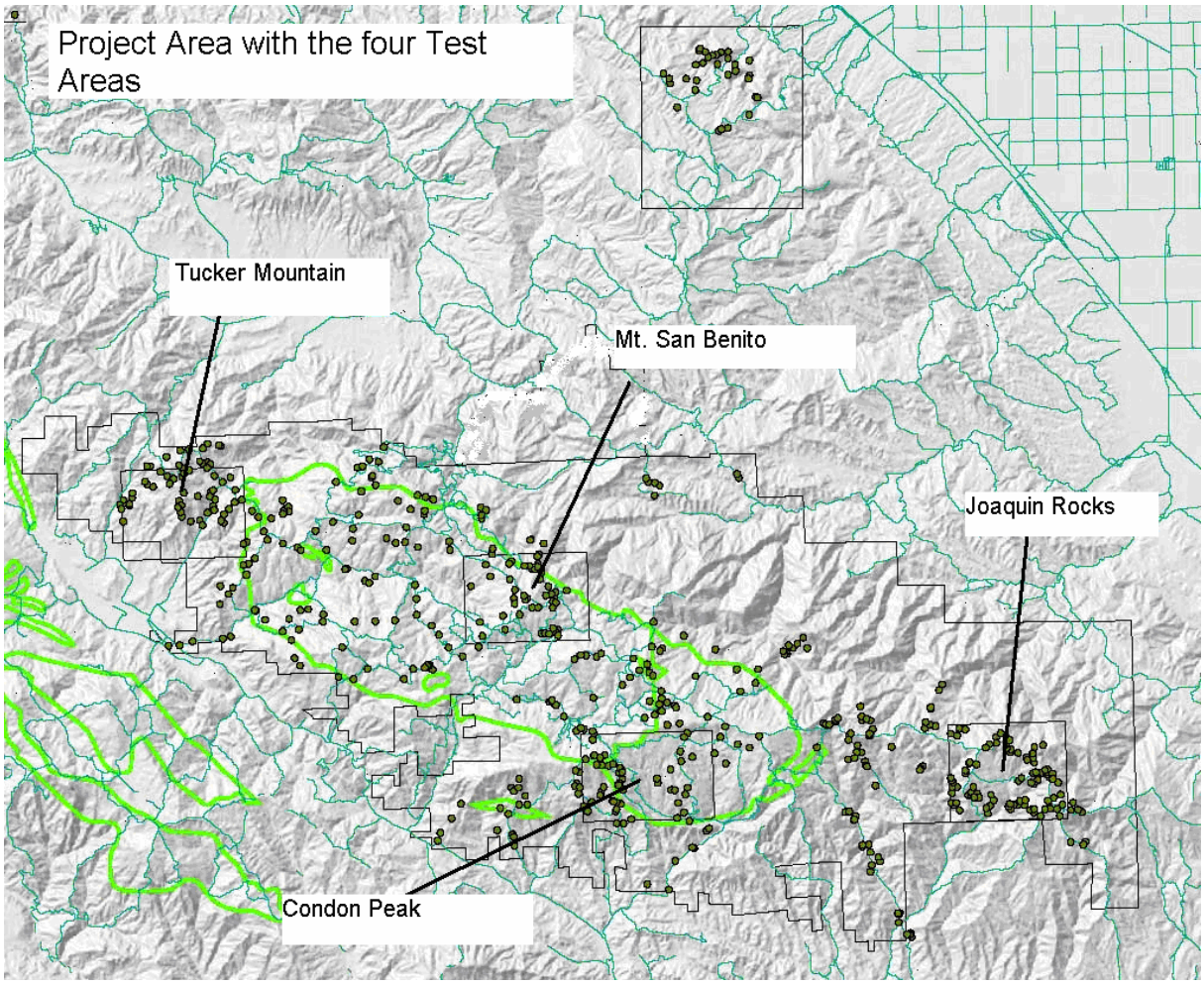

Figure 4. Project area showing study boundary (thin black line), four Test Areas (labeled), serpentine areas (green lines), and sample points from the vegetation surveys (green dots).

Fuzzy Logic Rules for Accuracy Assessment of Vegetation Mapping

Using a traditional method of accuracy assessment, only one possible answer (considered to be the best answer by an 'expert' in the field) is compared to the map label. However, vegetation map classes do not always lend themselves to unambiguous measurements. While a map label of *Arctostaphylos glauca-Quercus durata* may be considered absolutely correct for a particular site, a user might consider acceptable a map label of *Arctostaphylos glauca,* or if translating to a more general category, ultramafic chaparral might be considered accurate. An alternative method for evaluating map accuracy, and the one chosen for use in this assessment, is based on the use of fuzzy sets, first developed by Gopal and Woodcock (1994). With the fuzzy logic method of accuracy assessment, for each evaluation site, all map classes including the map label are assigned a ranking based on their degree of ecological similarity with the ground data. The ecological similarity is derived from the actual analysis of plot data defined by similarity values in the cluster analysis as well as similarities in lifeform. The numeric scoring, used in this assessment, is shown below:

0 = Completely wrong lifeform and very low ecological similarity
1 = Same life-form (e.g., shrub, tree, or herb-grass), not ecologically related in cluster analysis
2 = Same sub-lifeform (e.g., tall wetland herb, short annual grass), but not necessarily ecologically related in cluster analysis or could be different lifeform, but share diagnostic species or somewhat ecologically related (same super cluster)
3 = Same alliance or similar alliance within same meso-cluster, but diagnostic species not shared for association
4. = Same alliance or similar alliance within same meso-cluster and diagnostic species shared, but doesn't meet key definitions
5 = Perfect, meets key definitions for the vegetation type or mapping unit

Using the ground-collected data with a set of decision rules (described below), a ranking of 0 to 5 was assigned to all map classes at each evaluation site. The rankings were modified when used to compare the generic categories of WHR habitats assigned to the mid scale and the fine-scale vegetation attributes. The ecological relationships identified in the detailed data analysis were translated to the WHR categories in order to accomplish this.

Fuzzy logic rules for disturbance: In order to rank the other attributes fuzzy logic was used as well. To score the accuracy of the disturbance attributes exotics and clearing, the following process was enacted: If the field data matched perfectly (for example an exotic or clearing code was identified as high intensity on the ground and also interpreted for the polygon), a score of 5 was given. If a disturbance attribute was identified from both the polygon interpretation and the field sample, but the intensity noted did not match, the attributed received partial credit (a score of 3). If the polygon either scored a disturbance attribute that was not seen on the ground or if one was seen on the ground but not interpreted for the polygon a score of 0 was given.

Fuzzy logic rules for spatial accuracy: To score the accuracy of the spatial attributes, fuzzy logic was also used. The testers used GIS to measure the degree of divergence from the vegetation stand as it was described by the field crew conducting the assessment point from the way the polygon was delineated in the mid-scale and the fine-scale delineations. A scoring system for under-delineation (or heterogeneity) and over-delineation was developed by estimating the percentage of polygon area that matched with the correct definition of the stand, as sketched and described by the ground-based field crew. Calculations were made "on-the-fly" in a GIS editing session, in which the addition and/or deletion of portions of the polygon were digitized, and the resulting area of the digitized portions were either added or subtracted from the correctly defined polygon identified in the field.

As an example, a polygon was given a score of 3 out of a possible 4 for "under-delineation" or heterogeneity if the delineated polygon included between 25 and 50% more area than the actual stand was estimated to cover. Conversely, a polygon was given a score of 3 out of a possible 4 for "over-

delineation" if the delineated polygon was between 25 and 50% smaller than the extent of the actual stand as it was described in the field. See below for additional explanation.

Testing Spatial Accuracy of Mapping

Since the CalVeg approach is considered a medium-scale mapping method while the AIS method is fine-scale, the size and detail of the mapping polygons, and their ability to depict actual vegetation stands, are assumed to be different. A way to show the difference between the two approaches in a spatial context is to compare their capacities to capture the spatial distribution of the "on-the-ground" vegetation. A method was devised to assess/score delineation based on the adherence of the polygon to the description in the field sample of the particular stand reserved for accuracy assessment.

For each of the accuracy assessment points, field biologists recorded notes on location of GPS within stand (whether center, south, north, west, or east edges) and also recorded an estimate of the size of stand and general position of stand (on entire slope, upper or lower portion, direction stand faced, etc.), by drawing stands on a print out of the aerial photos in the field. From these notes in addition to independent GIS analysis of the backdrop aerial photo imagery, there was a determination of how well each method interpreted the area compared to the field assessment of the stand. Two elements were devised in scoring the spatial representation. These included: 1) polygon over-delineation, defined as the degree to which the polygon delineated by each method over-divided the stand on the ground; and 2) polygon heterogeneity, defined as the degree to which the polygon drawn by each method represented the actual stand of vegetation as it was described from the field sample.

Polygon Under-delineation or heterogeneity is scored using a 4-rank system:

4 = between 0 and 25% heterogeneity within polygon
3 = between 25-50% heterogeneity within polygon
2 = between 50 and 75% heterogeneity within polygon
1 = between 75 and 100% heterogeneity within polygon

Polygon Over-delineation is also scored with a 4-rank system:

4 = between 0 and 25% of polygon over-delineated
3 = between 25 and 50% of polygon over-delineated
2 = between 50 and 75% of polygon over-delineated
1 = greater than 75% of polygon over-delineated

Both scores were also based on overlying the two delineation methods on top of the remotely sensed image used by the photo interpreters in a GIS session. These were matched with the location of the sample points and their descriptions on screen. Todd Keeler-Wolf and Julie Evens coded the test results independently and then cross-checked their results. These test results were summarized for the medium-scale and the fine-scale approaches in the two pilot test areas (Congdon Peaks and Joaquin Rocks) where the fine-scale and the mid-scale products overlapped.

These two scores are essentially the inverse of one another. A polygon with a poor score for "under-delineation" or heterogeneity indicates the inability of the delineation to capture the variety of vegetation within it. A polygon with a poor score for "over-delineation" indicates that the method over-divided the polygon and relied too heavily on non-vegetative information that was misinterpreted to be meaningful breaks in vegetation.

Diagnostic Key to the Alliances and Associations

A key was produced to identify all vegetation types detected in the fieldwork for the fine-scale mapping and classification project. The key provides general choices and information on the physiognomy of the vegetation and the different environments based on wetland/upland position. This approach in the key was chosen: 1) to reduce the length and redundancy that is common in dichotomous keys, and 2) to be a guide that can be easily used by non-botanists/plant ecologists. The vegetation key can be used as a stand-alone product, allowing anyone with some basic ecology background and knowledge of the main characteristic plant species to identify the vegetation. It is written from two perspectives: (1) a field team attempting to identify vegetation and (2) an office team attempting to place field samples into the proper category. Thus, heavy reliance is placed on correct identification of characteristic plant species and of estimation of cover of these species.

The key is first broken into major units based on dominant plant lifeform: trees, shrubs and herbs. Within these groups, it is further divided by habit, leaf morphology, stature, etc. The key and descriptions hopefully will afford further refinement to the understanding of the Clear Creek Management Area and Joaquin Ridge from the standpoint of both classification and mapping.

Description Writing

Following the classification analysis of field data, development of the brief association-level descriptions were written and based on field data and available literature. If alliances or habitats were defined without any associations, these also have brief descriptions in the same format as the association descriptions. In these descriptions, scientific names of plants follow Hickman (1993) and UCB (2004). Common names follow these sources and USDA (2004). The primary writers were Julie Evens, Anne Klein, and Jeanne Taylor (California Native Plant Society). Todd Keeler–Wolf and Diana Hickson (California Department of Fish and Game) reviewed and edited the descriptions. When writing the descriptions, the following standards were set:

1. **Dominant or co-dominant species**: Must be in at least 80 percent of the samples, with at least 30 percent relative cover in all samples.
2. **Consistent/Characteristic/Diagnostic species**: Must be present in at least 80 percent of the samples, with no restriction on cover.
3. **Abundant species**: Must be present in at least 50 percent of the samples, with an average of at least 30 percent relative cover in all samples.
4. **Frequently/often/usually occurring species**: Must be present in at least 50 percent of the samples, with no restriction on cover.
5. **Infrequently occurring**: present in less than 25 percent of the samples.
6. **Minimum sample size for classification and description**: n = 3. Descriptions of associations with fewer than three samples were attempted if (a) the association was sampled and described by previous authors or (b) the vegetation was confirmed as distinctive and repeatedly encountered based on field reconnaissance or by photo-interpretation signature.
7. **Open**: Used to describe individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where the cover is generally less than 33 percent absolute cover
8. **Intermittent**: Used to describe individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where there is 33-66 percent absolute cover
9. **Continuous**: Used to describe individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where there is greater than 66 percent absolute cover
10. **Relative cover**: Refers to the amount of the surface of the stand sampled that is covered by one species (or physiognomic group) as compared to (relative to) the amount of surface of the stand covered by all species (in that group). Thus, 50 percent relative cover means that half of the total cover of all species or physiognomic groups is composed of the single species or group in question. Relative cover values are proportional numbers and, if added, total 100 percent for each stand (sample).

11. **Absolute cover:** Refers to the actual percentage of the ground (surface of the stand) that is covered by a species or group of species. For example, *Pinus sabiniana* covers between 5 percent and 10 percent of the stand. Absolute cover of all species or groups if added in a stand may total greater or less than 100 percent because it is not a proportional number.
12. **Stand:** Is the basic physical unit of vegetation in a landscape. It has no set size. Some vegetation stands are very small, such as wetland seeps, and some may be several square kilometers in size, such as desert or forest types. A stand is defined by two main unifying characteristics:
    A. It has *compositional* integrity. Throughout the site, the combination of species is similar. The stand is differentiated from adjacent stands by a discernable boundary that may be abrupt or gradual.
    B. It has *structural* integrity. It has a similar history or environmental setting, affording relatively similar horizontal and vertical spacing of plant species. For example, a hillside forest formerly dominated by the same species, but that has burned on the upper part of the slope and not the lower is divided into two stands. Likewise, a sparse woodland occupying a slope with shallow rocky soils is considered a different stand from an adjacent slope of a denser woodland/forest with deep moister soil and the same species.
13. **Woody plant:** Is any species of plant that has noticeably woody stems. It does not include herbaceous species with woody underground portions such as tubers, roots, or rhizomes.
14. **Tree:** Is a one-stemmed woody plant that normally grows to be greater than 5 meters tall.
15. **Shrub:** Is normally a multi-stemmed woody plant that is usually between 0.2 meters and 5 meters tall. Definitions are blurred at the low and the high ends of the height scales.
16. **Herbaceous plant:** Is any species of plant that has no main woody stem-development, and includes grasses, forbs, and perennial species that die-back seasonally.
17. **Forest:** In the National Vegetation Classification, a forest is defined as a tree-dominated stand of vegetation with 60 percent or greater cover of trees.
18. **Woodland:** In the National Vegetation Classification, a woodland is defined as a tree-dominated stand of vegetation with between 25 percent and 60 percent cover of trees; however, in this study we use 10% cover as the lower cut-off value.
19. **Rare and endangered plants:** Listed as per CNPS (2005) Online Inventory of Rare and Endangered Plants
20. **Conservation rank**: Listed by the state Nature Conservancy Heritage Programs. All communities were ranked, though ones without much information were ranked with a "?" after the rank to denote that this rank may change with more information, but that the best knowledge to date (sometimes personal) was used in these situations. Otherwise, hard references were used to place rank. These ranks are the "Global" and "State" ranks as seen below:
    a. **G1** and **S1**: Fewer than 6 viable occurrences worldwide and/or 2000 acres
    b. **G2** and **S2**: 6-20 viable occurrences worldwide and/or 2000-10,000 acres
    c. **G3** and **S3**: 21-100 viable occurrences worldwide and/or 10,000-50,000 acres
    d. **G4** and **S4**: Greater than 100 viable occurrences worldwide and/or greater than 50,000 acres
    e. **G5** and **S5**: Community demonstrably secure due to secure worldwide and statewide abundance
21. **Sample(s)**: Listed by their survey numbers from the vegetation databases, and indicated using the alpha-code CCBLM (an abbreviation for Clear Creek Bureau of Land Management). Successive numeric codes follow each of the alpha-prefixes.
22. **Con, Avg, Min, Max:** A species table is provided at the end of each alliance description. The Con column provides the overall constancy value for each species within all rapid assessments classified as that alliance. The constancy values are between 0 and 100. Trees, shrubs, and herbs that occurred with at least 10% constancy are listed in the table. The Avg column provides the average cover value for each species, as calculated across all samples in that alliance. The Min and Max values denote the minimum and maximum cover values of species listed in the table.

RESULTS

From the beginning of April 2004 through July 2004, 565 Rapid Assessment surveys were collected in the Central Coast study area, and 92 reconnaissance surveys were collected. In April 2005, five additional surveys were collected. In these surveys, 347 vascular plant taxa were identified. Generic names were given to vascular plant species that were not identified to the species level. Additionally, non-vascular taxa were indicated by the following general names: algae, cryptogamic crust, lichen, and moss.

Appendix 1 provides a complete list of scientific and common names for all taxa identified and analyzed in the vegetation surveys. Scientific names of the taxa were converted to alpha-numeric codes for data analyses, as recorded in the appendix. Further, each hardwood and conifer tree species was given an alpha-numeric code with three different endings based on the three different height strata where the species occurred. Tree species sampled in the tall stratum have an alpha-numeric code ending in "-t", those sampled in a medium stratum have a code ending in "-m", and those sampled in a low stratum have a code ending in "-l". For example, *Quercus douglasii* sampled in tall and low strata are coded "QUDO-t" and "QUDO-l", respectively. Records of all taxa were reviewed before the analyses, and groups of taxa that were inconsistently identified to species and genus levels were subsumed into a general name (e.g., *Erodium* sp., *Erodium botrys*, *E. brachycarpum*, and *E. moschatum* were merged into *Erodium* for the analysis).

Of the 347 plant taxa, 13 sensitive plants were observed in the vegetation surveys within the study area (Table 1). Appendix 2 describes the state and federal listing status and generalized habitat information for all 13 sensitive plants (per CNPS 2005), including two CNPS List 1B species.

Although the species below were observed in the study, they are not inclusive of all of recorded sensitive, rare species present in the study area. Six other rare plants occur in the study area: *Fritillaria agrestis, F. viridea, F. falcata, Layia discoidea, Pentachaeta exilis* subsp. *aeolica,* and *Phacelia phacelioides* (per CNPS 2005 and J.A. Delgado, personal communication). Many of these species were observed in early spring of 2004. However, they were not observed in late spring when the vegetation surveys occurred, mainly because low rainfall shortened the phenology and detectability of these species in this year of sampling.

Table 1. Rare plant species and number of occurrences found in vegetation surveys within the Clear Creek Management Area and adjacent lands, including the CNPS List ranking (per CNPS 2005).

Scientific Name	Common Name	Lifeform	CNPS List	n-samples
Acanthomintha lanceolata	Santa Clara thorn-mint	annual herb	List 4	5
Acanthomintha obovata subsp. *obovata*	San Benito thorn-mint	annual herb	List 4	7
Camissonia benitensis	San Benito evening-primrose	annual herb	List 1B	1
Calystegia collina subsp. *venusta*	South Coast Range morning-glory	perennial rhizomatous herb	List 4	18
Clarkia breweri	Brewer's clarkia	annual herb	List 4	1
Eriogonum nudum var. *indictum*	protruding buckwheat	perennial herb	List 4	13
Eriogonum umbellatum (subsp. *bahiiforme*)	sulphur-flower buckwheat	perennial herb	List 4	7
Eriogonum vestitum	Idria buckwheat	annual herb	List 4	7
Lessingia occidentalis	western lessingia	annual herb	List 4	1
Malacothamnus aboriginum	Indian Valley bush mallow	perennial deciduous shrub	List 1B	1
Monardella antonina subsp. *benitensis*	San Benito monardella	perennial rhizomatous herb	List 4	55
Solidago guiradonis	Guirado's goldenrod	perennial rhizomatous herb	List 4	16
Trichostema rubisepalum	Hernandez bluecurls	annual herb	List 4	7

The cluster analysis was produced for the 565 surveys. This included data on 22 tree-overstory types, 49 shrub-overstory types, 11 herbaceous types, and 4 cryptogam and rock/barren vegetated types. After producing a cluster analysis run on the full dataset with species abundance values, Outlier analysis was performed and three outlier samples and 82 species were removed from the dataset. Next, Indicator Species Analysis was run and six clusters were differentiated as main groups for final analysis. The main groups are summarized as follows:

- 120 samples with indicator species such as *Quercus durata, Arctostaphylos glauca, Arctostaphylos pungens, Pinus coulteri, Calocedrus decurrens*;
- 103 samples with indicators such as *Adenostoma fasciculatum, Quercus john-tuckeri, Garrya*;
- 99 samples with indicators such as *Quercus douglasii*, *Bromus hordeaceus*, *Juniperus californica*, *Ericameria linearifolia*, *Poa secunda*;
- 148 samples with indicators such as *Eriogonum fasciculatum* var. *foliolosum*, *Avena*, *Yucca whipplei*, *Artemisia californica*;
- 60 samples with indicators such as *Salix breweri*, *Muhlenbergia asperifolia*, *Quercus chrysolepis*, *Chrysothamnus nauseosus*, *Pinus jeffreyi*;
- 32 samples with indicators such as *Atriplex spinifera*, *Gutierrezia californica*, *Eriastrum pluriflorum*, *Chorizanthe membranacea*.

Final cluster analyses were produced at group levels 55 and 150, and all but three of the 565 samples were classified to alliance level. Out of the full dataset, 519 samples were further classified to association level. See Figure 5 for an example dendrogram from the 32 samples of the sixth group.

Final class	Sample ID	Diagram (splits closest to left are ecologically more closely related than splits to right)
Eriogonum nudum var. *indictum-Eriogonum vestitum*	CCBLM084	
Eriogonum nudum var. *indictum-Eriogonum vestitum*	CCBLM474	
Eriogonum nudum var. *indictum-Eriogonum vestitum*	CCBLM496	
Eriogonum nudum var. *indictum-Eriogonum vestitum*	CCBLM499	
Eriogonum nudum var. *indictum-Eriogonum vestitum*	CCBLM502	
Ephedra californica-Gutierrezia californica/Eriastrum pluriflorum	CCBLM472	
Eriogonum fasciculatum var. *polifolium/Eriastrum pluriflorum*	CCBLM483	
Eriogonum fasciculatum var. *polifolium/Eriastrum pluriflorum*	CCBLM501	
Eriogonum fasciculatum var. *polifolium/Eriastrum pluriflorum*	CCBLM487	
Eriogonum fasciculatum var. *polifolium/Eriastrum pluriflorum*	CCBLM484	
Ephedra californica-Gutierrezia californica/Eriastrum pluriflorum	CCBLM477	
Ephedra californica-Gutierrezia californica/Eriastrum pluriflorum	CCBLM485	
Ephedra californica-Gutierrezia californica/Eriastrum pluriflorum	CCBLM500	
Ephedra californica-Gutierrezia californica/Eriastrum pluriflorum	CCBLM478	
Ephedra californica-Gutierrezia californica/Eriastrum pluriflorum	CCBLM480	
Atriplex spinifera/Annual Herb	CCBLM473	
Atriplex spinifera/Annual Herb	CCBLM489	
Atriplex spinifera/Annual Herb	CCBLM492	
Upland Annual-Perennial Herb	CCBLM491	
Gutierrezia californica/Annual-Perennial Herb	CCBLM493	
Gutierrezia californica/Annual-Perennial Herb	CCBLM488	
Gutierrezia californica/Annual-Perennial Herb	CCBLM495	
Upland Annual-Perennial Herb	CCBLM490	
Upland Annual-Perennial Herb	CCBLM494	
Upland Annual-Perennial Herb	CCBLM498	
Atriplex spinifera/Annual Herb	CCBLM497	
Achnatherum hymenoides (Alliance only)	CCBLM475	
Rumex hymenosepalus (Alliance only)	CCBLM476	
Gutierrezia californica/Annual-Perennial Herb	CCBLM479	
Gutierrezia californica/Annual-Perennial Herb	CCBLM481	
Ephedra californica/Annual-Perennial Herb	CCBLM482	
Ephedra californica/Annual-Perennial Herb	CCBLM486	

Figure 5. Example of the cluster analysis output showing (from right to left) the arrangement and relationship of surveys in the clustering diagram and their final association names. In the diagram, splits closest to left are ecologically more closely related than splits to right, and the different colors in the diagram indicate the alliance.

CLASSIFICATION

The final analysis substantiated 85 vegetation types to the alliance level or below. Specifically, 50 different alliances and 4 habitat types were classified, including 10 tree-dominated alliances, 30 shrub-dominated alliances, and 10 herbaceous-dominated alliances. Of these alliances, 63 associations were additionally defined, including 17 tree-dominated associations, 37 shrub-dominated associations, 4 herbaceous-dominated associations, and 4 cryptogam-dominated or sparsely vegetated associations. See complete list of alliances and associations in Table 2. While some alliances/associations may have little data available for the classification and description, they have been provisionally defined for three different reasons:

1. To be established as types *in situ* and compared to other areas where the plant community is more common,
2. To be represented as rare communities to be compared to other similar locations, especially the wetland associations, and
3. So future projects can benefit from the definitions of alliances and associations in this project.

By providing as much information as possible in the classification and descriptions, it is hoped that future research and management efforts could build upon this framework of vegetation classification in the Central Coast and in other areas with serpentine outcrops.

This project has attempted to describe all the vegetation types in the study area, though it is possible that additional alliance and association characteristics could come out through further research after this project. Additional sampling and classification could be allocated to vegetation with an abundant herbaceous component, especially during a spring that follows early and continuous winter rains along with cool temperatures. At this time, some associations included the terms “Annual-Perennial Herb” or “Annual Herb” to denote the significantly herbaceous nature to the understory of certain associations. These common names have been similarly defined in other existing classifications (e.g., Allen et al. 1989), using a general term for grasses and herbs in the understory.

In reviewing the classification, a number of rare vegetation types exist in the region with respect to the state and national classification. Rarity in vegetation is primarily based on the number of occurrences worldwide and statewide and/or the amount of area covered worldwide and statewide. Table 3 provides a list of 39 vegetation types that are of highest rarity in the study area, including 9 tree associations, 24 shrub alliances/associations, and 3 herbaceous alliances/associations, and 3 sparsely vegetated associations. This accounts for around 45% of the vegetation types described in this project.

Regardless of rarity, almost 90% of the plant communities in the study area have impact by off-road vehicles and/or non-native plant species (Table 4). The most common impact is competition from non-native plant species, though off-road vehicles have observably impacted at least 35% of the vegetation types. Figure 6 provides a descriptive view of the impact of off-road vehicles, including disturbance of native plant species and erosion, which occurs particularly within the rare serpentine habitats.

Table 2. Vegetation classification and geology in the study area of Clear Creek Management Area, Joaquin Ridge, and Monocline Ridge in San Benito and W Fresno Counties, California. Geology codes where vegetation types occur are translated as follows: ALLU = alluvium, SAND = sandstone, SETU = sedimentary (type unknown), SERP = serpentine, SHAL = shale, SLAT = slate

Alliance	Association	n-samples	Geology
Tree-Overstory			
Conifer Alliances			
Pinus coulteri			
	Pinus coulteri-Calocedrus decurrens/Quercus durata-Arctostaphylos glauca	14	SERP
	Pinus coulteri-Calocedrus decurrens/Rhamnus tomentella/Aquilegia eximia	5	SERP, SETU
	Pinus coulteri-Calocedrus decurrens-Pinus jeffreyi/Quercus durata	6	SERP
	Pinus coulteri-Pinus sabiniana/Quercus durata-Arctostaphylos pungens	20	SERP
	Pinus coulteri/Arctostaphylos glauca	4	SERP, SETU
	Pinus coulteri/Quercus durata	7	SERP
Pinus coulteri-Quercus chrysolepis			
	No association defined	2	SERP, SETU
Pinus jeffreyi			
	No association defined	2	SERP
Pinus sabiniana			
	Pinus sabiniana/Juniperus californica/Annual-Perennial Herb	7	SETU
Hardwood Evergreen Alliances			
Quercus chrysolepis			
	Quercus chrysolepis	7	SERP, SETU
Quercus wislizeni			
	No association defined	1	SETU
Quercus wislizeni-Quercus chrysolepis			
	Quercus wislizeni-Quercus chrysolepis	5	SERP, SETU, SHAL
Hardwood Deciduous Alliances			
Populus fremontii			
	No association defined	1	ALLU
Quercus douglasii			
	Quercus douglasii-Pinus sabiniana/Cercocarpus betuloides	6	SETU
	Quercus douglasii-Quercus wislizeni-Pinus sabiniana	1	SERP
	Quercus douglasii/Annual-Perennial Herb	3	SERP, SETU
	Quercus douglasii/Ceanothus cuneatus	4	SETU
	Quercus douglasii/Ericameria linearifolia-Juniperus californica	37	SERP, SETU
	Quercus douglasii/Eriogonum fasciculatum/Annual-Perennial Herb	4	SETU
	Quercus douglasii/Juniperus californica-Cercocarpus betuloides	14	SETU
	Quercus douglasii/Juniperus californica-Quercus john-tuckeri	11	SERP, SETU
Quercus lobata			
	No association defined	1	SERP
Shrub-Overstory			
Chaparral Alliances			
Adenostoma fasciculatum			
	Adenostoma fasciculatum (pure)	17	SETU

Alliance	Association	n-samples	Geology
	Adenostoma fasciculatum Serpentine	12	SERP
Adenostoma fasciculatum-Arctostaphylos glauca			
	Adenostoma fasciculatum-Arctostaphylos glauca Serpentine	10	SERP
	Adenostoma fasciculatum-Arctostaphylos glauca-Salvia mellifera	3	SETU
Adenostoma fasciculatum-Salvia mellifera			
	Alliance only	1	SETU
Arctostaphylos glauca			
	Arctostaphylos glauca-Quercus durata/Pinus sabiniana	17	SERP
Ceanothus cuneatus			
	No association defined	2	SETU
Ceanothus leucodermis			
	No association defined	2	SETU
Cercocarpus betuloides			
	Cercocarpus betuloides-Ceanothus cuneatus-Quercus john-tuckeri	10	SERP, SETU
	Cercocarpus betuloides-Juniperus californica/Annual-Perennial Herb	11	SERP, SETU
Cercocarpus betuloides-Eriogonum fasciculatum			
	No association defined	1	SERP
Prunus ilicifolia			
	No association defined	2	SETU
Prunus virginiana			
	No association defined (placeholder)	0	SETU
Quercus berberidifolia			
	No association defined	1	SETU
Quercus john-tuckeri			
	No association defined	2	SLAT
	Quercus john-tuckeri-Adenostoma fasciculatum	5	SERP, SETU
	Quercus john-tuckeri-Juniperus californica-Ericameria linearifolia	22	SETU
	Quercus john-tuckeri-Juniperus californica-Fraxinus dipetala	5	SERP, SETU
	Quercus john-tuckeri-Quercus wislizeni-Garrya flavescens	6	SETU, SHAL
Quercus durata			
	Quercus durata/Pinus sabiniana	8	SERP
	Quercus durata-Adenostoma fasciculatum-Quercus wislizeni	4	SETU
	Quercus durata-Arctostaphylos glauca/Pinus sabiniana	29	SERP
	Quercus durata-Arctostaphylos glauca/Pinus sabiniana	29	SETU
	Quercus durata-Arctostaphylos glauca-Garrya congdonii/Melica torreyana	1	SERP
	Quercus durata-Arctostaphylos pungens/Pinus sabiniana	11	SERP
	Quercus durata-Cercocarpus betuloides	4	SERP
Coastal Sage Scrub Alliances			
Artemisia californica			
	Artemisia californica-Lepidospartum squamatum/Annual Herb	2	ALLU, SETU
	Artemisia californica-Malacothamnus aboriginum	1	SETU
	Artemisia californica/Annual Herb	4	SETU
Artemisia californica-Eriogonum fasciculatum			
	Artemisia californica-Eriogonum fasciculatum-Ephedra californica	8	SETU
Artemisia californica-Salvia mellifera			
	No association defined	1	SETU

Alliance	Association	n-samples	Geology
Eriogonum fasciculatum			
	Eriogonum fasciculatum var. *foliolosum* /Annual Grass-Herb	13	SETU, SERP
	Eriogonum fasciculatum var. *foliolosum-Juniperus californica*/Annual-Perennial Herb	17	SETU, SERP
	Eriogonum fasciculatum-Yucca whipplei/Annual-Perennial Grass-Herb	28	SETU, SERP
	Eriogonum fasciculatum var. *polifolium/Eriastrum pluriflorum*	4	SETU
Lotus scoparius			
	No association defined	1	SETU
Lupinus albifrons			
	No association defined	1	SETU
Salvia mellifera			
	Salvia mellifera-Eriogonum fasciculatum var*. foliolosum - Eriodictyon tomentosum*	5	SETU
Desert Scrub And Desert Transition Alliances			
Atriplex spinifera			
	Atriplex spinifera/Annual Herb	4	SAND, SETU
Chrysothamnus nauseosus			
	Alliance only	1	SERP
	Chrysothamnus nauseosus-Juniperus californica/Annual-Perennial Herb	11	SETU
Ephedra californica			
	Ephedra californica/Annual-Perennial Herb	2	SETU
	Ephedra californica-Gutierrezia californica/Eriastrum pluriflorum	6	SAND, SETU
Eriogonum heermannii			
	No association defined	1	ALLU
Eriogonum wrightii			
	Eriogonum wrightii-Eriophyllum confertiflorum/Monardella antonina subsp. *benitensis*	3	SERP, SETU
	Eriogonum wrightii-Juniperus californica/Annual-Perennial Herb	5	SERP, SETU
Gutierrezia californica			
	Gutierrezia californica/Annual-Perennial Herb	5	SETU, SLAT
Juniperus californica			
	Juniperus californica-Ericameria linearifolia/Annual-Perennial Herb	13	SETU
	Juniperus californica-Fraxinus dipetala-Ericameria linearifolia/Annual-Perennial Herb	5	SETU
Riparian Scrub Alliances			
Baccharis salicifolia			
	Baccharis salicifolia-Lepidospartum squamatum-Hazardia squarrosa	2	SETU, ALLU
Salix breweri			
	Salix breweri/Muhlenbergia asperifolia	12	SERP, SETU
***Tamarix* spp.**			
	No association defined	1	ALLU
Herbaceous			
Upland Coastal and Coast Range Grasslands			
Elymus multisetus			
	No association defined	1	SERP
Eriogonum nudum			
	Eriogonum nudum var. *indictum-Eriogonum vestitum*	5	SETU, SLAT

Upland Annual-Perennial Herbaceous			
	No associations defined	18	SERP, SETU, SLAT
Vulpia microstachys			
	Vulpia microstachys-Plantago erecta	1	SETU
Upland Desert Grasslands			
Achnatherum hymenoides			
	No association defined	1	DUNE
Rumex hymenosepalus			
	No association defined	1	SETU
Wet Meadow Alliances			
***Carex* spp.**			
	Carex spp.-*Juncus mexicanus-Leymus triticoides*	3	SERP, SETU
Eleocharis macrostachya			
	No association defined	2	SERP
Juncus mexicanus			
	Juncus mexicanus	2	SERP, SETU
Phragmites australis			
	No association defined	1	SERP
Typha latifolia			
	No association defined	2	SERP, SETU
Serpentine Vernal Pool			
	Habitat (placeholder)	0	SERP
Rock/Barren			
Lichen-Moss			
	No association defined	2	SERP, SETU
Sparsely Vegetated			
	Pinus coulteri Barren	2	SERP
	Pinus jeffreyi-Pinus sabiniana Barren	7	SERP
	Pinus sabiniana-Pinus coulteri Barren	4	SERP

Table 3. List of high priority vegetation types in the study area based on their global and state rankings. See section on description writing for an explanation of the rankings.

Lifeform	Rank	Alliance or Association Name
Tree-Overstory		
	G2S2	*Pinus coulteri-Calocedrus decurrens/Rhamnus tomentella/Aquilegia eximia* Association
	G2S2	*Pinus coulteri-Calocedrus decurrens-Pinus jeffreyi/Quercus durata* Association
	G3S3	*Pinus coulteri/Arctostaphylos glauca* Association
	G3S3	*Pinus coulteri/Quercus durata* Association
	G3S3	*Pinus coulteri-Calocedrus decurrens/Quercus durata-Arctostaphylos glauca* Association
	G3S3	*Pinus coulteri-Pinus sabiniana/Quercus durata-Arctostaphylos pungens* Association
	G3S3	*Pinus sabiniana/Juniperus californica*/Annual-Perennial Herb Association
	G3S3	*Quercus douglasii/Juniperus californica-Cercocarpus betuloides* Association
	G3S3	*Quercus douglasii/Juniperus californica-Quercus john-tuckeri* Association
Shrub-Overstory		
	G2S2	*Artemisia californica-Malacothamnus aboriginum* Association
	G2S2	*Ephedra californica-Gutierrezia californica/Eriastrum pluriflorum* Association
	G2S2	*Eriogonum fasciculatum* var. *polifolium/Eriastrum pluriflorum* Association
	G2S2	*Eriogonum heermannii* Alliance
	G2S2	*Eriogonum wrightii-Eriophyllum confertiflorum/Monardella antonina* subsp. *benitensis* Association
	G2S2	*Quercus durata-Arctostaphylos pungens/Pinus sabiniana* Association
	G2S2	*Salix breweri/Muhlenbergia asperifolia* Association
	G3S3	*Adenostoma fasciculatum-Arctostaphylos glauca Serpentine* Association
	G3S3	*Arctostaphylos glauca-Quercus durata/Pinus sabiniana* Association
	G3S3	*Artemisia californica-Lepidospartum squamatum*/Annual grass-herb Association
	G3S3	*Artemisia californica-Eriogonum fasciculatum-Ephedra californica* Association
	G3S3	*Atriplex spinifera*/Annual Herb Association
	G3S3	*Baccharis salicifolia-Lepidospartum squamatum-Hazardia squarrosa* Association
	G3S3	*Cercocarpus betuloides-Ceanothus cuneatus-Quercus john-tuckeri* Association
	G3S3	*Ephedra californica*/Annual-Perennial Herb Association
	G3S3	*Eriogonum fasciculatum* var. *foliolosum-Juniperus californica*/Annual-Perennial Herb Association
	G3S3	*Eriogonum wrightii-Juniperus californica*/Annual-Perennial Herb Association
	G3S3	*Juniperus californica-Fraxinus dipetala-Ericameria linearifolia*/Annual-Perennial Herb Association
	G3S3	*Quercus durata-Arctostaphylos glauca-Garrya congdonii/Melica torreyana* Association
	G3S3	*Quercus john-tuckeri-Adenostoma fasciculatum* Association
	G3S3	*Quercus john-tuckeri-Juniperus californica-Ericameria linearifolia* Association
	G3S3	*Quercus john-tuckeri-Juniperus californica-Fraxinus dipetala* Association
	G3S3	*Quercus john-tuckeri-Quercus wislizeni-Garrya flavescens* Association
	G3S3	*Salvia mellifera-Eriogonum fasciculatum* var. *foliolosum-Eriodictyon tomentosum* Association
Herbaceous		
	G2S2	*Eriogonum nudum* var. *indictum-Eriogonum vestitum* Association
	G2S2	*Rumex hymenosepalus* Alliance
	G2S2-G4S4	Upland Annual-Perennial Herbaceous Habitat
	G3S3	*Carex* spp.-*Juncus mexicanus-Leymus triticoides* Association
Rock/Barren		
	G2S2	*Pinus coulteri* Barren Association
	G2S2	*Pinus jeffreyi-Pinus sabiniana* Barren Association
	G2S2	*Pinus sabiniana-Pinus coulteri* Barren Association

Table 4. Vegetation types impacted by off-road vehicle (ORV) and non-native species impacts in the study area including Clear Creek Management Area, Joaquin Ridge, and Monocline Ridge.

Alliance	Association	ORV	Non-Native
Tree-Overstory			
Pinus coulteri	*Pinus coulteri-Calocedrus decurrens/Quercus durata-Arctostaphylos glauca*	X	
Pinus coulteri	*Pinus coulteri-Calocedrus decurrens/Rhamnus tomentella/Aquilegia eximia*	X	X
Pinus coulteri	*Pinus coulteri-Calocedrus decurrens-Pinus jeffreyi/Quercus durata*	X	
Pinus coulteri	*Pinus coulteri-Pinus sabiniana/Quercus durata-Arctostaphylos pungens*	X	
Pinus coulteri	*Pinus coulteri/Arctostaphylos glauca*	X	
Pinus coulteri	*Pinus coulteri/Quercus durata*	X	
Pinus jeffreyi	No association defined	X	
Pinus sabiniana	*Pinus sabiniana/Juniperus californica*/Annual-Perennial Herb		X
Populus fremontii	No association defined		X
Quercus chrysolepis	*Quercus chrysolepis*	X	X
Quercus douglasii	*Quercus douglasii-Pinus sabiniana/Cercocarpus betuloides*		X
Quercus douglasii	*Quercus douglasii-Quercus wislizeni-Pinus sabiniana*		X
Quercus douglasii	Quercus douglasii/Annual-Perennial Herb		X
Quercus douglasii	*Quercus douglasii/Ceanothus cuneatus*		X
Quercus douglasii	*Quercus douglasii/Ericameria linearifolia-Juniperus californica*	X	X
Quercus douglasii	*Quercus douglasii/Eriogonum fasciculatum*/Annual-Perennial Herb		X
Quercus douglasii	*Quercus douglasii/Juniperus californica-Cercocarpus betuloides*		X
Quercus douglasii	*Quercus douglasii/Juniperus californica-Quercus john-tuckeri*	X	X
Quercus lobata	No association defined		X
Quercus wislizeni-Quercus chrysolepis	*Quercus wislizeni-Quercus chrysolepis*	X	X
Shrub-Overstory			
Adenostoma fasciculatum	*Adenostoma fasciculatum*		X
Adenostoma fasciculatum	*Adenostoma fasciculatum Serpentine*	X	X
Adenostoma fasciculatum-Arctostaphylos glauca	*Adenostoma fasciculatum-Arctostaphylos glauca Serpentine*	X	X
Adenostoma fasciculatum-Arctostaphylos glauca	*Adenostoma fasciculatum-Arctostaphylos glauca-Salvia mellifera*		X
Arctostaphylos glauca	*Arctostaphylos glauca-Quercus durata/Pinus sabiniana*	X	
Artemisia californica	*Artemisia californica-Lepidospartum squamatum*/Annual Herb		X
Artemisia californica	*Artemisia californica-Malacothamnus aboriginum*		X
Artemisia californica	*Artemisia californica*/Annual Herb		X

Alliance	Association	ORV	Non-Native
Artemisia californica-Eriogonum fasciculatum	*Artemisia californica-Eriogonum fasciculatum-Ephedra californica*		X
Artemisia californica-Salvia mellifera	No association defined		X
Atriplex spinifera	*Atriplex spinifera*/Annual Herb	X	X
Baccharis salicifolia	*Baccharis salicifolia-Lepidospartum squamatum-Hazardia squarrosa*		X
Ceanothus cuneatus	No association defined		X
Ceanothus leucodermis	No association defined	X	X
Cercocarpus betuloides	*Cercocarpus betuloides-Ceanothus cuneatus-Quercus john-tuckeri*		X
Cercocarpus betuloides	*Cercocarpus betuloides-Juniperus californica*/Annual-Perennial Herb		X
Cercocarpus betuloides-Eriogonum fasciculatum	No association defined		X
Chrysothamnus nauseosus	*Chrysothamnus nauseosus-Juniperus californica*/Annual-Perennial Herb	X	X
Ephedra californica	*Ephedra californica*/Annual-Perennial Herb		X
Ephedra californica	*Ephedra californica-Gutierrezia californica/Eriastrum pluriflorum*	X	X
Eriogonum fasciculatum	*Eriogonum fasciculatum* var. *foliolosum*/Annual Herb	X	X
Eriogonum fasciculatum	*Eriogonum fasciculatum* var. *foliolosum-Juniperus californica*/Annual-Perennial Herb		X
Eriogonum fasciculatum	*Eriogonum fasciculatum* var. *foliolosum-Yucca whipplei*/Annual-Perennial Herb		X
Eriogonum fasciculatum	*Eriogonum fasciculatum* var. *polifolium/Eriastrum pluriflorum*	X	X
Eriogonum heermannii	No association defined		X
Eriogonum wrightii	*Eriogonum wrightii-Eriophyllum confertiflorum/Monardella antonina* subsp. *benitensis*		X
Eriogonum wrightii	*Eriogonum wrightii-Juniperus californica*/Annual-Perennial Herb		X
Gutierrezia californica	*Gutierrezia californica*/Annual-Perennial Herb		X
Juniperus californica	*Juniperus californica-Ericameria linearifolia*/Annual-Perennial Herb		X
Juniperus californica	*Juniperus californica-Fraxinus dipetala-Ericameria linearifolia*/Annual-Perennial Herb		X
Lotus scoparius	No association defined		X
Lupinus albifrons	No association defined		X
Prunus ilicifolia	No association defined		X
Quercus durata	*Quercus durata/Pinus sabiniana*	X	
Quercus durata	*Quercus durata-Adenostoma fasciculatum-Quercus wislizeni*	X	
Quercus durata	*Quercus durata-Arctostaphylos glauca/Pinus sabiniana*	X	X
Quercus durata	*Quercus durata-Arctostaphylos pungens/Pinus sabiniana*	X	
Quercus durata	*Quercus durata-Cercocarpus betuloides*		X
Quercus john-tuckeri	*Quercus john-tuckeri-Adenostoma fasciculatum*	X	X
Quercus john-tuckeri	*Quercus john-tuckeri-Juniperus californica-Ericameria linearifolia*		X
Quercus john-tuckeri	*Quercus john-tuckeri-Juniperus californica-Fraxinus dipetala*	X	X
Quercus john-tuckeri	*Quercus john-tuckeri-Quercus wislizeni-Garrya flavescens*	X	X
Salix breweri	*Salix breweri/Muhlenbergia asperifolia*	X	
Salvia mellifera	*Salvia mellifera-Eriogonum fasciculatum* var. *foliolosum -Eriodictyon tomentosum*		X
Tamarix	No association defined		X

Alliance	Association	ORV	Non-Native
Herbaceous			
Achnatherum hymenoides	No association defined		X
Carex spp.	*Carex spp.-Juncus mexicanus-Leymus triticoides*		X
Elymus multisetus	No association defined		X
Eriogonum nudum	*Eriogonum nudum* var. *indictum-Eriogonum vestitum*		X
Juncus mexicanus	*Juncus mexicanus*		X
Rumex hymenosepalus	No association defined		X
Upland Annual-Perennial Herbaceous	No association defined		X
Serpentine Vernal Pool Habitat	No association defined		X
Vulpia microstachys	*Vulpia microstachys-Plantago erecta*		X
Rock/Barren			
Lichen-Moss	No association defined		X
Sparsely vegetated	*Pinus coulteri* Barren	X	
Sparsely vegetated	*Pinus jeffreyi-Pinus sabiniana* Barren	X	
Sparsely vegetated	*Pinus sabiniana-Pinus coulteri* Barren	X	

Figure 6. Off-road vehicle impacts in study area are particularly noticeable in the sparsely vegetated areas of the Foothill Pine - Coulter Pine Barrens.

CROSSWALKS TO OTHER CLASSIFICATIONS

The term “crosswalk” is commonly used in vegetation classification and mapping, referring to the development of relationships between different classification systems. The need for crosswalks arises when there is more than one classification system in use for a given area. The crosswalk produced for this project (Appendix 3) relates the principle state and national classification (c.f. Sawyer and Keeler-Wolf 1995) to the US Forest Service classification of CalVeg (USFS 2002) and to the California Wildlife Habitat Relationships or CWHR (Mayer and Laudenslayer 1988). The CalVeg classification was used in the medium-scale mapping effort, and the CWHR is a common habitat typing system that is used in the state.

It is important to note that crosswalks are never exactly precise. Assuming that classifications arise independently, the meaning of one classification unit may not always completely encompass or be nested within the other classification unit(s) to which it is being related. Choices need to be made about those classification units that are partially included within two or more types of another classification system. For example, CalVeg’s classification type of “ultramafic mixed shrub” includes many associations and alliances of serpentine chaparral of the National Vegetation Classification. Likewise, the Wildlife Habitat Relationships (WHR) classification unit of “coastal sage scrub” actually includes many vegetation alliances.

The complexity and uncertainty of such relationships arise not only from independent evolution of classifications, but also from their imprecise definitions, without quantitative rules for proper interpretation. The best crosswalks are those that have been developed with a good understanding of the meaning and definitions of each classification system.

ASSESSMENT OF THE ASSOCIATED MAPPING EFFORTS

Table 5 provides a general summary of the types of vegetation attributed in each mapping effort within the two test areas. In comparing the vegetation or habitat types attributed, the medium-scale effort had fewer polygon delineations and fewer vegetation types as compared to the fine-scale effort. Specifically, the medium-scale effort had 10 alliance or habitat types that were mapped in 525 polygons of the two test areas, while the fine-scale effort had 35 alliances or habitats within which 42 associations (divisions of alliances) were mapped in 1231 polygons. Since the two test areas have a combined area of 6,501 acres, the size of the polygons representing vegetation is around 12.4 acres per polygon for the medium-scale in these two test areas, versus 5.3 acres per polygon of vegetation for the fine-scale (less than half the size of polygons in the medium-scale).

Table 5. The type and number of vegetation attributes (habitats, alliances, and/or associations) used in the two mapping efforts within the test areas of Congdon Peaks and Joaquin Rocks.

USFS CalVeg	Count
Barren	17
Chamise	42
Lower Montane Mixed Chaparral	41
Annual Grasses/Forbs	56
Coulter Pine	15
Gray Pine	19
Blue Oak	275
California Sagebrush	50
Water	1
Unknown	9
Total polygon number	**525**

AIS Alliance	*Association*	Count
Barren	Barren with Lichen and Moss	42
Barren	Barren with *Pinus sabiniana-Pinus coulteri*	54
Bigberry Manzanita	*Arctostaphylos glauca-Quercus durata/Pinus sabiniana*	104
Birchleaf Mountain Mahogany	*Cercocarpus betuloides* Alliance	4
Birchleaf Mountain Mahogany	*Cercocarpus betuloides-Ceanothus cuneatus-Quercus john-tuckeri*	32
Black Sage	*Salvia mellifera-Eriogonum fasciculatum* var. *foliolosum-Eriodictyon tomentosum*	3
Blue Oak	*Quercus douglasii* Alliance	6
Blue Oak	*Quercus douglasii*/Annual-Perennial Herb	27
Blue Oak	*Quercus douglasii/Ceanothus cuneatus*	21
Blue Oak	*Quercus douglasii/Ericameria linearifolia-Juniperus californica*	108
Blue Oak	*Quercus douglasii/Eriogonum fasciculatum*/Annual-Perennial Herb	39
Blue Oak	*Quercus douglasii/Juniperus californica-Cercocarpus betuloides*	2
Blue Oak	*Quercus douglasii/Juniperus californica-Quercus john-tuckeri*	52
Blue Oak	*Quercus douglasii-Pinus sabiniana/Cercocarpus betuloides*	3
Blue Oak	*Quercus douglasii-Quercus wislizeni-Pinus sabiniana*	2
Brewer Willow	*Salix breweri/Muhlenbergia asperifolia*	1
California Buckwheat	*Eriogonum fasciculatum* var. *foliolosum*/Annual Herb	36
California Buckwheat	*Eriogonum fasciculatum* var. *foliolosum-Juniperus californica*/Annual-Perennial Herb	78
California Buckwheat	*Eriogonum fasciculatum* var. *foliolosum-Yucca whipplei*/Annual-Perennial Herb	43
California Juniper	*Juniperus californica-Ericameria linearifolia*/Annual-Perennial Herb	38
California Juniper	*Juniperus californica-Fraxinus dipetala-Ericameria linearifolia*/Annual-Perennial Herb	10
California Sagebrush	*Artemisia californica*/Annual Herb	2
California Sagebrush - Buckwheat	*Artemisia californica-Eriogonum fasciculatum-Ephedra californica*	5
Canyon Live Oak	*Quercus chrysolepis*	2
Chamise	*Adenostoma fasciculatum* Alliance	2
Chamise	*Adenostoma fasciculatum*	9
Chamise	*Adenostoma fasciculatum* Serpentine	19
Chamise - Bigberry Manzanita	*Adenostoma fasciculatum-Arctostaphylos glauca* Serpentine	93

USFS CalVeg	Count	AIS Alliance	*Association*	Count
		Chamise - Bigberry Manzanita	*Adenostoma fasciculatum-Arctostaphylos glauca-Salvia mellifera*	64
		Coulter Pine	*Pinus coulteri/Arctostaphylos glauca*	13
		Coulter Pine	*Pinus coulteri/Quercus durata*	9
		Coulter Pine	*Pinus coulteri-Calocedrus decurrens/Quercus durata-Arctostaphylos glauca*	2
		Gray Pine	*Pinus sabiniana/Juniperus californica*/Annual-Perennial Herb	9
		Hollyleaf Cherry	*Prunus ilicifolia* Alliance only	4
		Interior Live Oak	*Quercus wislizeni* Alliance	4
		Interior Live Oak - Canyon Live Oak	*Quercus wislizeni-Quercus chrysolepis*	20
		Leather Oak	*Quercus durata* Alliance	1
		Leather Oak	*Quercus durata/Pinus sabiniana*	5
		Leather Oak	*Quercus durata-Adenostoma fasciculatum-Quercus wislizeni*	13
		Leather Oak	*Quercus durata-Arctostaphylos glauca/Pinus sabiniana*	49
		Leather Oak	*Quercus durata-Arctostaphylos pungens/Pinus sabiniana*	8
		Lichen-Moss	Lichen Moss Habitat only	1
		Mexican Rush	*Juncus mexicanus*	1
		Mulefat	*Baccharis salicifolia-Lepidium squamatum-Hazardia squarrosa*	1
		River- Lake Flats	Riverine - Lacustrine Habitat only	2
		Rubber Rabbitbrush	*Chrysothamnus nauseosus-Juniperus californica*/Annual-Perennial Herb	17
		Serpentine Barrens	*Serpentine Barrens* Habitat only	10
		Silver Bush Lupine	*Lupinus albifrons* Alliance only	1
		Small Fescue	*Vulpia microstachys-Plantago erecta*	1
		Tucker Oak	*Quercus john-tuckeri* Alliance	3
		Tucker Oak	*Quercus john-tuckeri-Adenostoma fasciculatum*	10
		Tucker Oak	*Quercus john-tuckeri-Juniperus californica-Ericameria linearifolia*	38
		Tucker Oak	*Quercus john-tuckeri-Juniperus californica-Fraxinus dipetala*	13
		Tucker Oak	*Quercus john-tuckeri-Quercus wislizeni-Garrya flavescens*	6
		Annual-Perennial Herbaceous	Upland Annual-Perennial Herbaceous Habitat only	67
		Urban - Developed	Urban - Developed	3
		Vacant	Disturbed bare ground	2
		Vernal Pool	Vernal Pool Habitat only	1
		Water	Water	1
		Buckbrush	*Ceanothus cuneatus* Alliance only	11
		Chaparral Whitethorn	*Ceanothus leucodermis* Alliance only	2
		Wright's Buckwheat	*Eriogonum wrightii-Juniperus californica*/Annual-Perennial Herb	2
		Total polygon number		**1231**

Since the medium-scale effort used coarser vegetation and habitat types to attribute the map (alliance or habitat level), the accuracy comparisons for vegetation attributes were done at the alliance and habitat level for the fine-scale map (and not the more detailed association level). In interpreting the field data collected for accuracy assessment, lower scores of accuracy resulted for vegetation attributes used in the medium-scale mapping as compared to the vegetation attributes used in the fine-scale mapping.

Table 6 provides the average accuracy scores (on a scale from 1 to 5) for vegetation attribution per method. With regard to basic vegetation attribution, the fine-scale effort showed a higher accuracy within simple lifeform categories (tree, shrub, and herb) with values around 4.3 (or 86% accuracy), while the medium-scale effort showed values around 3.1 (or 72% accuracy). The fine-scale effort also shows significantly greater accuracy for many of the habitat categories presented in the table (e.g., Blue Oak - Foothill Pine, Ultramafic Chaparral, Coastal Scrub, and Juniper).

In further comparison of vegetation attribution, Table 7 provides a summary of the vegetation types confirmed in the ground-surveys (at the alliance level) as compared to the vegetation types that were represented within the two mapping methods. For example, the Blue Oak (*Quercus douglasii*) Alliance was identified in seven surveys. For polygons overlapping with these surveys, the medium-scale map attributed 2 of 7 survey areas as Blue Oak Alliance and the rest were attributed as Lower Montane Mixed Chaparral Habitat. In contrast, the fine-scale effort attributed 6 of 7 surveys as Blue Oak Alliance and the remaining one as Tucker Oak Alliance.

In a more complex example, the California Buckwheat *(Eriogonum fasciculatum)* Alliance was identified in 19 accuracy assessment surveys. None of the medium-scale map's polygons that overlapped with these surveys represented the California Buckwheat Alliance. Instead, this map displayed attributes of five other vegetation alliances or habitats: California Sagebrush, Annual Grasses/Forbs, Lower Montane Mixed Chaparral, Chamise, and Blue Oak. In contrast, the fine-scale map represented 15 of the 19 polygons as California Buckwheat Alliance, and this map rarely used other vegetation attributes, including Rubber Rabbitbrush, California Juniper, and Blue Oak.

Figure 7 provides a visual comparison of the two mapping efforts, in which the medium-scale effort coarsely represented Blue Oak Alliance in four polygons. An accuracy assessment survey overlaps with the left-most polygon (see red dot found in open vegetation at edge of the polygon), and the survey was identified as California Buckwheat Alliance. In contrast, the fine-scale effort delineated 28 polygons of vegetation in the same area, of which 11 were represented as Blue Oak Alliance. The additional 17 polygons were represented as nine other vegetation types, such as California Buckwheat Alliance (including the polygon overlapping with the red dot).

Table 6. Accuracy assessment comparisons for Habitat type scores between the medium-scale (USFS-CalVeg) and fine-scale (AIS-Heads-up) methods. The "*" means that a two-tailed t-test showed a significant difference (<0.05) between the two means of samples.

Average Accuracy for Vegetation Coding

Lifeform	# Surveys	USFS-CalVeg	AIS-Heads-up
Tree (T)	**13**	**3.0***	**4.3***
Closed-cone Pine - Cypress	3	2.7	3.0
Blue Oak - Foothill Pine	7	2.9*	4.7*
Montane Hardwood	3	3.7	4.7
Shrub (S)	**63**	**3.1***	**4.2***
Chamise – Mixed Chaparral	12	3.1	3.7
Ultramafic Mixed Chaparral	14	3.0*	4.4*
Coastal Scrub	23	3.1*	4.6*
Desert Scrub	6	3.0	3.7
Juniper	8	3.0*	4.3*
Herb (H)	**4**	**3.8**	**4.8**
Annual - Perennial Grassland	4	3.8	4.8
All types (H, S, T)	**80**	**3.1***	**4.3***

Table 7. Comparison of the vegetation types attributed in the two mapping efforts, organized by the Alliance names identified in the accuracy assessment (AA) surveys. Within the alliances identified by the AA surveys, the USFS medium-scale (CalVeg) vegetation types and the AIS fine-scale (Alliance) types are listed with the count of times that they were used.

AA Alliance	USFS CalVeg Attributes	Count	AIS Alliance Attributes	Count
Tree-Overstory Alliances				
Blue Oak (Quercus douglasii)				
	Blue Oak	2	Blue Oak	6
	Lower Montane Mixed Chaparral	5	Tucker Oak	1
Gray Pine (Pinus sabiniana)				
	Blue Oak	2	Blue Oak	3
	Annual Grasses/Forbs	1		
Interior Live Oak - Canyon Live Oak (Quercus wislizeni-Quercus chrysolepis)				
	Blue Oak	1	Interior Live Oak - Canyon Live Oak	2
	Lower Montane Mixed Chaparral	2	Leather Oak	1
Shrub-Overstory Alliances				
Bigberry Manzanita (Arctostaphylos glauca)				
	Lower Montane Mixed Chaparral	6	Bigberry Manzanita	2
	Chamise	1	Chamise - Bigberry Manzanita	3
			Leather Oak	2
Birchleaf Mountain Mahogany (Cercocarpus betuloides)				
	Chamise	2	Bigberry Manzanita	1
	Gray Pine	1	Chamise - Bigberry Manzanita	1

AA Alliance	USFS CalVeg Attributes	Count	AIS Alliance Attributes	Count
	Blue Oak	1	Blue Oak	1
			Interior Live Oak - Canyon Live Oak	1
California Buckwheat (Eriogonum fasciculatum)				
	California Sagebrush	3	California Buckwheat	15
	Annual Grasses/Forbs	5	California Juniper	1
	Lower Montane Mixed Chaparral	5	Rubber Rabbitbrush	1
	Chamise	2	Blue Oak	2
	Blue Oak	4		
California Juniper (Juniperus californica)				
			California Juniper	2
	Blue Oak	12	Blue Oak	4
			Gray Pine	1
			Tucker Oak	1
California Sagebrush - California Buckwheat (Artemisia californica-Eriogonum fasciculatum)				
	Annual Grasses/Forbs	2	California Buckwheat	1
			California Sagebrush	1
California Sagebrush (Artemisia californica)				
	California Sagebrush	2	California Buckwheat	2
Chamise - Bigberry Manzanita (Adenostoma fasciculatum-Arctostaphylos glauca)				
	Lower Montane Mixed Chaparral	1	Chamise - Bigberry Manzanita	1
Chamise (Adenostoma fasciculatum)				
	Chamise	1	Chamise	1
	Lower Montane Mixed Chaparral	3	Chamise - Bigberry Manzanita	3
Leather Oak (Quercus durata)				
	Lower Montane Mixed Chaparral	2	Bigberry Manzanita	1
	Chamise	1	Chamise - Bigberry Manzanita	3
	Coulter Pine	1		
Rubber Rabbitbrush *(Chrysothamnus nauseosus)*				
	Annual Grasses/Forbs	3	Upland Annual-Perennial Herbaceous	3
	Chamise	1	California Buckwheat	1
Tucker Oak *(Quercus john-tuckeri)*				
			Tucker Oak	2
	Blue Oak	5	Blue Oak	2
	Annual Grasses/Forbs	1	California Juniper	1
			Interior Live Oak - Canyon Live Oak	1
Wright's Buckwheat *(Eriogonum wrightii)*				
	Blue Oak	2	Upland Annual-Perennial Herbaceous	2
Herbaceous Alliance				
Upland Annual-Perennial Herbaceous				
	Lower Montane Mixed Chaparral	1	Annual-Perennial Herbaceous	3
	Annual Grasses/Forbs	2	Blue Oak	1
	California Sagebrush	1		

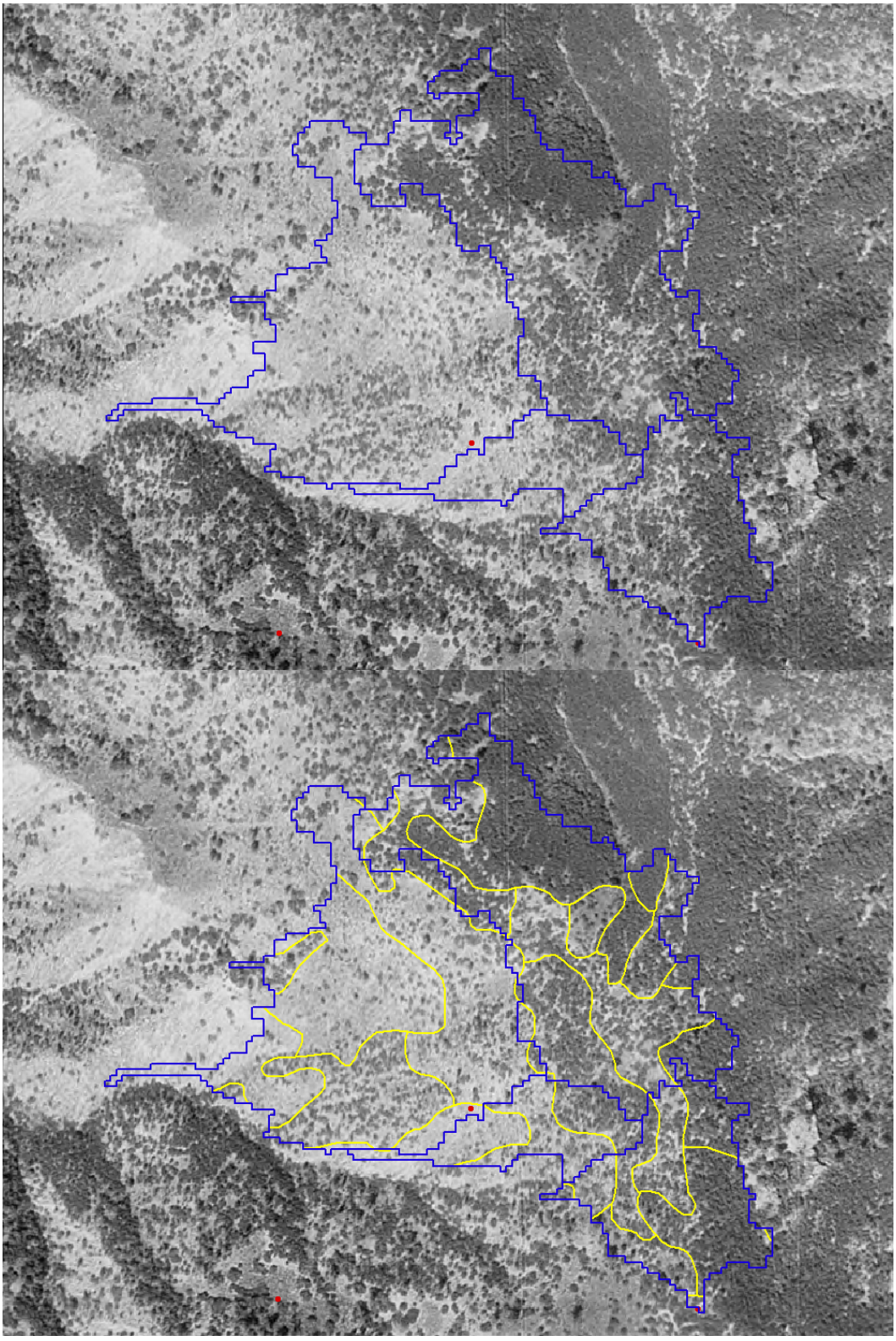

Figure 7. Example of medium-scale map with 4 polygons mapped as Blue Oak (blue polygons in top picture) within which the fine-scale map had 28 polygons with 11 mapped as Blue Oak (yellow polygons in bottom picture). Scale was 1:3,000 for the image

The examples discussed above illustrate the issue of “under-delineation” for the medium-scale effort in representing the actual vegetation patterning, or the inherent “heterogeneity” of vegetation types within polygons depicted in the medium-scale effort. In comparing the two mapping efforts, the medium-scale effort clearly misrepresented the vegetation patterns and depicted the area too coarsely.

Polygons overlapping with the 80 AA surveys were scored on a scale of 0-4 for their “under-delineation” (or coarse misrepresentation) of obvious, observed vegetation patterns. The AA scores for the medium-scale effort were significantly lower for almost all lifeforms and habitat categories (see Table 8). This effort had average accuracy values of 1.9, while the fine-scale effort had average values of 3.6.

Figure 8 provides a pictorial comparison of the two mapping efforts for “under-delineation,” whereby the medium-scale coarsely represented one large polygon mapped as Lower Elevation Mixed Chaparral. Nine accuracy assessment survey locations occur within this one polygon representing different stands of vegetation (see the red dots in Figure 8). In great contrast, the fine-scale effort represented 323 polygons with 21 different alliances and habitats within the same area. These included serpentine chaparral associations of Chamise, Chamise with Bigberry Manzanita, and Leather Oak with Bigberry Manzanita. They also included large areas of Blue Oak woodlands and Upland Annual - Perennial Grasslands as well as areas of Serpentine Barrens.

The circumstance of “over-delineation” was also assessed for the two mapping efforts, which in contrast to under-delineation, indicates an unnecessary over-representation of the landscape with one or more adjacent polygons that contain the same vegetation features as the neighboring polygon. In general, the mapping efforts had little difference in the scoring for over-delineation (see Table 9). The medium-scale effort had average accuracy values of 4.0, and the fine-scale effort had average values of 3.8. Further, scores for the medium-scale effort were significantly greater for only one habitat type (i.e., Blue Oak and Pine woodlands).

Figure 9 provides a pictorial comparison of the two mapping efforts for “over-delineation.” The medium-scale divided the landscape too finely into 62 polygons, in which many neighboring polygons represented the same vegetation features but they were attributed with different vegetation types such as Coastal Scrub, Blue Oak woodland, Chamise, and Grassland. In contrast, the fine-scale effort more generally depicted the landscape into 7 polygons of Grassland and Coastal Scrub vegetation.

Table 8. Accuracy assessment comparisons for under-delineation (or heterogeneity) scores between the medium-scale (USFS-CalVeg) and fine-scale (AIS-Heads-up) methods. The "*" means that a two-tailed t-test showed a significant difference (<0.05) between the two means of samples.

Lifeform	# Surveys	USFS-CalVeg	AIS-Heads-up
Tree (T)	**13**	**1.8***	**3.4***
Closed-cone Pine - Cypress	3	3.0	4.0
Blue Oak - Foothill Pine	7	1.4*	3.4*
Montane Hardwood	3	1.3*	2.7*
Shrub (S)	**63**	**2.0***	**3.6***
Chamise - Mixed Chaparral	12	2.0*	3.7*
Ultramafic Mixed Chaparral	14	1.4*	3.7*
Coastal Scrub	23	1.7*	3.5*
Desert Scrub	6	2.7	2.8
Juniper	8	3.1*	4.0*
Herb (H)	**4**	**2.0**	**3.8**
Annual - Perennial Grassland	4	2.0	3.8
All types (H, S, T)	**80**	**1.9***	**3.6***

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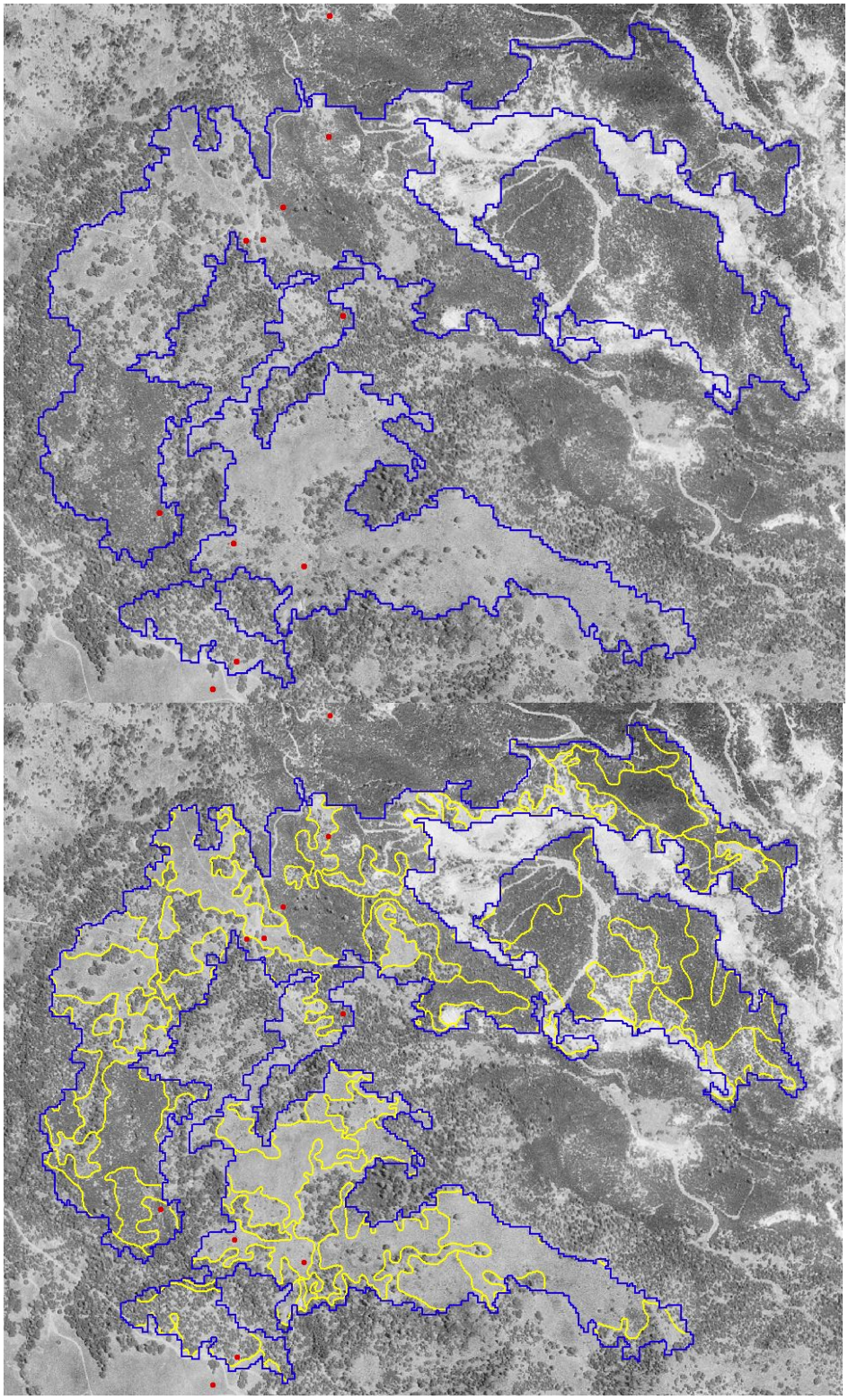

Figure 8. Example of medium-scale map with one large polygon mapped as Lower Elevation Mixed Chaparral habitat (blue polygon in top picture) within which the fine-scale map had 323 polygons with 21 different alliances and habitats mapped (yellow polygons in bottom picture). Scale is 1:6,600.

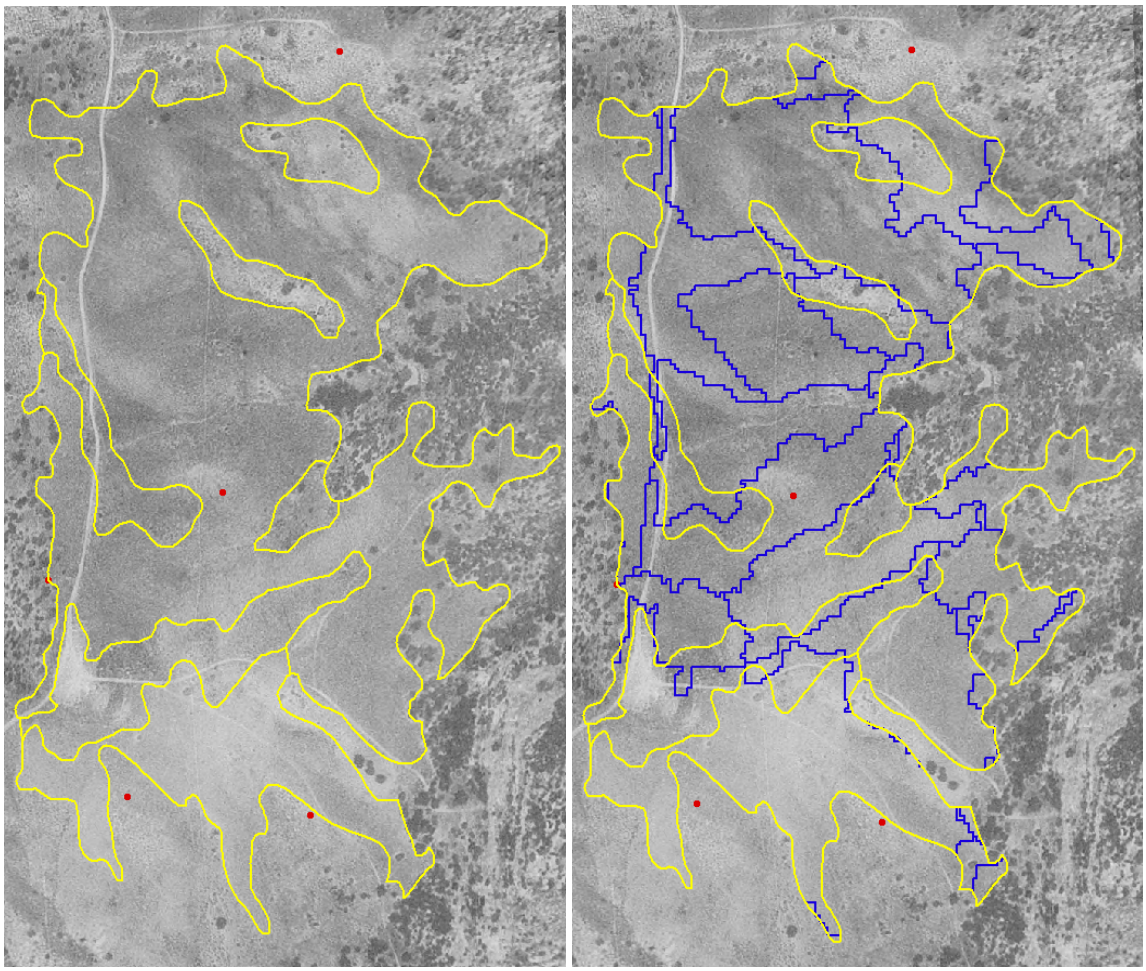

Figure 9. Medium-scale map depicting 62 polygons with attributes of 5 vegetation types including Coastal Scrub, Blue Oak, and Chamise (picture on right with blue polygons) compared to the fine-scale map of 7 polygons including Herbaceous and Coastal Scrub (picture on left with yellow polygons). Scale is 1:5,000 for the images.

Conclusions of Accuracy Assessment

Based on the comparisons made between the two mapping efforts, the fine-scale effort had more accurate and reliable representations of the natural vegetation patterns found in the landscape. First, the fine-scale effort has better resolution and accuracy in representing the vegetation types (as seen through the vegetation classification and the vegetation accuracy scores). Second, the fine-scale effort better defines the boundaries between different stands of vegetation (as seen through the under- and over-delineation accuracy scores).

The validity of a vegetation map is accomplished when its accuracy is at least 80% or greater (USGS-NPS 2005). The fine-scale map showed legitimate accuracy for its vegetation attribution, with accuracy values averaging around 86%. On the other hand, the medium-scale effort provided a coarse view of vegetation, with accuracy values for vegetation attributes lower than 80%. The lack of accuracy in the medium-scale effort is further verified in its "under-delineation" scores.

In order to acceptably represent the vegetation, the USFS mapping needs to implement a refined image-segmentation process. Their accuracy could be improved with a finer tuned process for delineating and attributing the natural patterns of vegetation. While a more detailed process would increase the USFS's overall cost, their overall product would become more valuable for multiple users of the map.

Assessment of Feasibility and Recommendations for the Interagency MOU Mapping Standards

Time spent for each method: The CalVeg method is far less labor intensive than the fine-scale approach. The total estimated cost for the equivalent area of overlap is difficult to calculate accurately. This is because the project area for CalVeg was more than 20 times more extensive than the overlapping study area and the amount of processing time involves economies of scale. For example, the modeling of lifeform, terrain and other variables necessary to develop the delineation and labeling process would be relatively more costly per acre on a small area than over a large area. However, the only way to calculate costs and time spent on the project is to assess the total cost of the area mapped (2.2 million acres), its cost per acre (8.5 cents) and then calculate the percentage of the area actually assessed, approximately 100,000 acres (R. Warbington RSL, personal communication 2006). Using these numbers, the estimated cost for the 100,000-acre study area would be around $8,500. This compares with the cost of $50,000 for field work, data analysis, and mapping at the fine-scale. Thus, the cost is almost six times greater for the fine-scale product. It is likely that the cost is actually closer to 3-4 times greater if the "economies of scale" are taken into account. Nevertheless, it is clear there is substantial savings in using the medium-scale approach.

Time taken is clearly much greater for the fine-scale than the medium-scale. The estimate from start to finish for mapping of the entire south coast range area of 2.2 million acres was less than 6 months, while time from beginning of sampling to completion of mapping of the 100,000-acre fine-scale effort (subtracting out duplicate method testing by the photo interpreters) is approximately 18 months.

Recommendation on Standards: In general, the value of the fine-scale methodology includes two basic components - its level of detail in the classification and how it matches the actual vegetation classification defined from field work, and the more spatially accurate match of actual stand boundaries as delineated by lifeforms. Although relatively costly, this is the only methodology that has been able to address the need for detailed vegetation classification mapping and detailed attributes such as disturbance categories and other site quality categories. These qualities are those most needed in sub-regional and project level assessments.

On the other hand, the CalVeg medium-scale approach has been successful in covering large areas of the state in a systematic way using a relatively low cost production method that serves basic needs of regional or statewide assessments. The CalVeg classification is tree-centric and its resolution is substantially reduced compared to the fine levels of the National Classification, thus it is not nearly as useful for assessing the detailed information of a relatively small site. Far fewer categories are used, and upon inspection, the mapping polygons are highly generalized both spatially and thematically compared to the detail that can be pulled out from interpretation of standard aerial photographs. For example, in this test only 10 main CalVeg categories were used while over 40National Classification categories were used. Those 10 categories completely missed major types present in the area such as Juniper and California Buckwheat. Part of this problem would be alleviated if more money was allocated to field checking for these projects and there was less reliance on the generic CalVeg classification, which assumes broad-scale distribution patterns of vegetation without adaptive modification from field checking.

Improving Image Segmentation resolution: One of the main values for collaboration between an AIS fine-scale and the USFS medium-scale approach to vegetation mapping is to investigate cost-savings through melding methodologies.

An independent test of an image segmentation approach to fine-scale mapping was also conducted in the study area (this will be discussed in more detail in a subsequent paper). At the beginning of the fine-scale mapping process, the USFS provided AIS, CDFG and CNPS with an example of a more detailed image-segmentation process. This additional USFS approach relied upon a more refined version of image segmentation, which was then attributed by photo interpreters.

With the refined USFS output, AIS tried attributing the image-segmentation polygons with vegetation codes in the four Test Areas that were established. The polygon sizes of the more refined segmentation approach were comparable to the heads-up delineations, and AIS spent a similar amount of time attributing these polygons and correcting minor mis-delineations as they did upon manually drawing and attributing their own fine-scale polygons. More importantly, the accuracy of labeling vegetation type and all other attributes were comparable. Spatial heterogeneity and over-delineation were also tested between the two fine-scale methods. Although the segmentation approach commonly “over-delineated” sites, especially including vegetation that was not dominated by woody species, both methods had equivalent results for “under-delineation” or heterogeneity. This suggests that the segmentation approach could be used for both medium-scale and fine-scale mapping and the accuracy of the fine-scale segmentation could be improved by more time editing and aggregating polygons to match the actual vegetation on the ground.

Figure 10 provides a pictorial comparison of USFS’s refined image-segmentation process and AIS’s manual-delineation process. The resulting accuracy for vegetation attribution was around 80% or greater when using the refined image-segmentation process, thus showing that refined processes of image-segmentation have their validity as long as more time is spent creating and working with better segmentation outputs.

Overall accuracy in the fine-scale, manual delineation and the refined image-segmentation was enabled by the availability of reference data. With over 350 vegetation field surveys and a resolved floristic classification, AIS was able to determine repeated signatures for the main vegetation types that they were attributing. Without these surveys, AIS would have had reduced consistency and precision. Regardless of the mapping project, ground data and resolved classifications will provide validity to and increase the accuracy of the final map product.

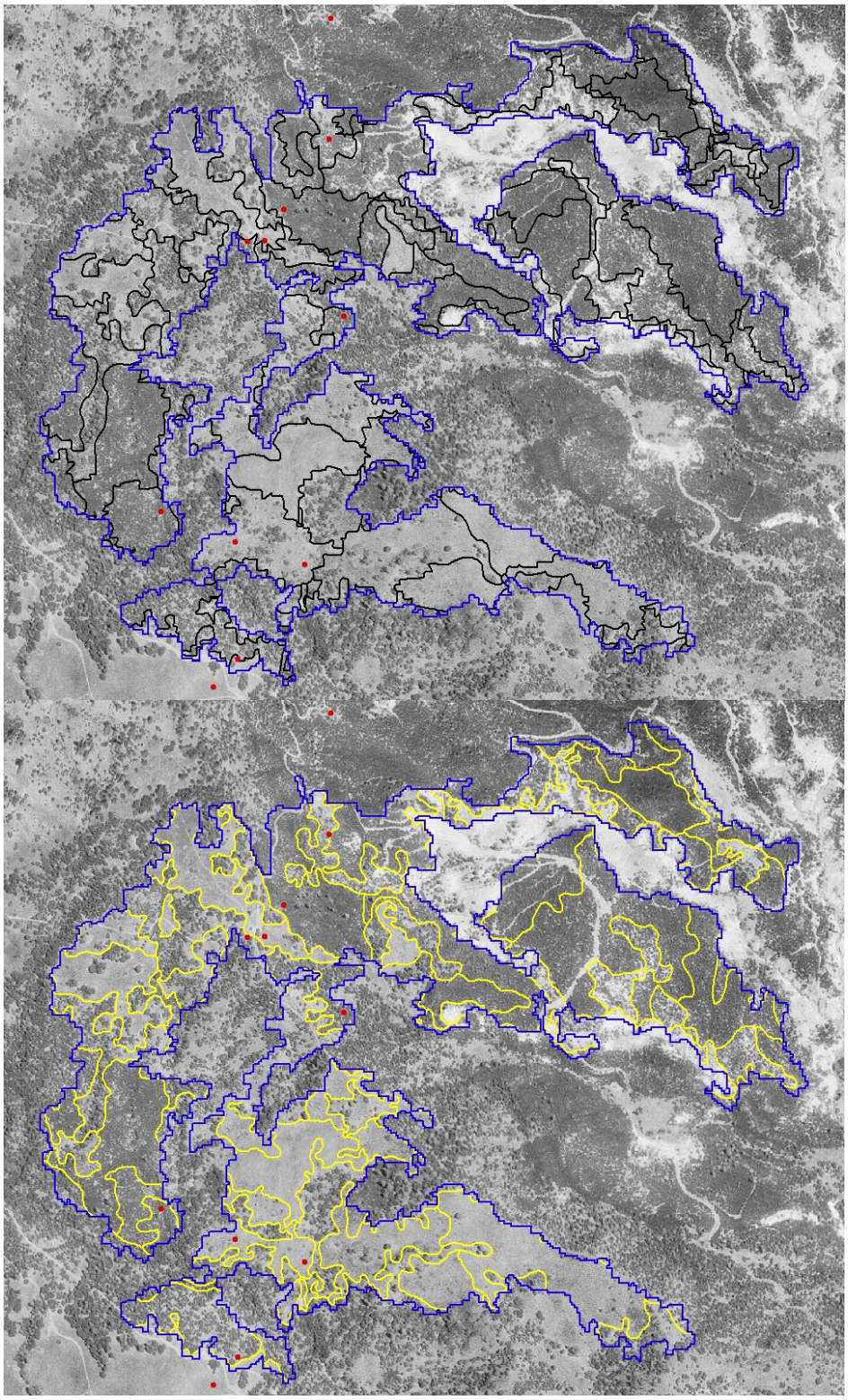

Figure 10. Finer image segmentation by USFS as compared to the medium-scale polygon by USFS (black lines and blue polygon in top image) and as compared to the fine-scale delineation by AIS (yellow lines in bottom image).

Values of integrating fine-scale and medium-scale image segmentation for mapping would include a more standardized way of delineation throughout the entire state, cost-savings on labor for hand delineation, and better matching of projects when they abut at jurisdictional boundaries. For example, the boundary of a national park using a fine-scale approach surrounded by a national forest using a mid scale approach would be more comparable if the mapping methodology used by both agencies would rely on the same basic rules of image segmentation.

Improving compatibility in fine and mid scale vegetation classification: There also needs to be more comparability in the actual mapping classification used for both methods. CalVeg, as purveyed by the US Forest Service, traditionally has focused on mapping tree-dominated vegetation with more details on tree stand characteristics. This is clear from the attributes such as size and density being applied only to tree types and not to all types of vegetation. However, the US Forest Service has huge areas of non-tree dominated vegetation under its jurisdiction, including shrublands, grasslands, and deserts. Understanding the vegetation resources of these areas has become greater over the years for managing fire and fuels, habitat for economically important and endangered species, and for predicting resource values other than trees. Matching a classification hierarchically for medium-scale and fine-scale assessment is important. Currently this effort is being undertaken by a working group developing a more ecologically representative classification hierarchy that could be applied to mid-scale mapping as well as fine-scale mapping (International Vegetation Hierarchy Working Group 2006).

Thus, maps from different producers could be improved if standard and calibrated attributes were instituted. The USFS along with CDFG and other agencies should agree upon a similar set of attributes to be used for all maps, which could include vegetation code, size, height and overstory cover attributes. Moreover, these attributes should be applied to all polygons that are delineated (i.e., size and height should be produced for shrub and herb polygons as well as for tree polygons). A completely attributed map will serve many important purposes including the assessment of available timber, fire risk, conservation values, and restoration potentials across all vegetation types.

Collaboration at the beginning of future mapping projects would provide a beneficial outcome for the main map producers and the state vegetation ecologists, whereby knowledge could be shared and attributes could be standardized in creating vegetation maps. Since collaboration is dependent upon funding cycles and current priorities, the Vegetation MOU group plans to identify future projects and locations where this may be possible.

DIAGNOSTIC VEGETATION KEY AND DESCRIPTIONS

Table 10 contains the key for distinguishing the classified vegetation types. Due to the diversity of vegetation in the fine-scale mapping area, and to avoid an excessively long document, a series of paired statements (or couplets) was not developed for each option. Instead, sets of characteristics with choices beneath them are provided. The key will first lead the user to the general options, and the individual selections for the vegetation associations will be listed beneath these options. The user will need to work through the numbered list of types from the more general to the most specific options until the best fit is reached.

Choices in the key are identified by a combination of alphanumeric codes, using capital letters, numerals, upper- and lowercase letters, and decimal points to distinguish the different key levels. The most basic, general levels in the key are on the left side of the alphanumeric code, and the most specific are on the right side. This coding system in the key relates to a series of left indentations. Thus, down the left-hand side of the pages are the major groupings; nested within them are the sub-groupings.

The preliminary key will direct you to the major groups, such as forest/woodland, shrubland, and herbaceous, with the more specific choices beneath them. The more specific lists within these are generally based on presence/absence or dominance/sub-dominance of species until arriving at the optimum choice. Please note: SINCE THERE MAY BE MORE THAN TWO ALTERNATIVES IN A GROUP, BE SURE TO WORK THROUGH ALL OF THE OPTIONS IN A LIST BEFORE YOU DECIDE ON THE BEST CHOICE.

Vegetation descriptions follow the key, in which the alliances and associations are nested within the following groupings: tee-overstory (forest/woodland), shrub-overstory, herbaceous, and rock outcrop/barren. The key and descriptions hopefully will afford further refinement to the understanding of the project area's vegetation, both from the standpoint of classification and mapping.

Table 10. Field key to the defined vegetation associations of the Clear Creek Management Area, Joaquin Ridge, and Monocline Ridge in the interior Central Coast, California

Class A. Vegetation with an overstory of trees (at least 5 m tall). Tree canopy may be as low as 10% over a denser understory of shrub and/or herbaceous species = **Tree-Overstory Vegetation**

Class B. Vegetation characterized by woody shrubs in the canopy. Tree species, if present, generally total less than 10% absolute cover. Herbaceous species may total higher cover than shrubs. Shrubs are always at least 10% cover = **Shrub-Overstory Vegetation**

Class C. Vegetation characterized by non-woody, herbaceous species in the canopy including grass, graminoid, and broad-leaved herbaceous species. Shrubs, if present, compose <10% of the vegetation, and trees, if present, generally compose <10% cover. Herbs are always at least 10% cover = **Herbaceous Vegetation**

Class D. Vascular plant species are less than 8% cover in any layer = **Rock Outcrops and Barrens**

Class A. Tree-Overstory Vegetation

Group I: Woodlands and forests characterized by needle or scale-leaved conifer trees, including pine (*Pinus* spp.) and incense cedar *(Calocedrus decurrens)*. The conifers may only occur intermittently in the overstory associated with tree oaks or shrubs.

I.A. Stands are mainly upland with pines alone in the overstory or with incense cedar or live oak in the overstory. The shrub understory may be higher in cover than the tree overstory.

IA.1. Foothill pine (*Pinus sabiniana*) occurs as the sole dominant conifer in the overstory, or it is the emergent dominant in the overstory…

IA1.a. Foothill pine occurs on non-serpentine substrates with California juniper and a well-developed herbaceous understory…

***Pinus sabiniana/Juniperus californica*/Annual-Perennial Herb Association**

IA1.b. Foothill pine occurs on serpentine substrates with bigberry manzanita (*Arctostaphylos glauca)* and/or leather oak (*Quercus durata)*…

IA1b.i. Bigberry manzanita is the dominant shrub, and leather oak and gray pine are usually present and sub-dominant...

***Arctostaphylos glauca-Quercus durata/Pinus sabiniana* Association**

IA1b.ii. Pointleaf manzanita (*Arctostaphylos pungens*) is the dominant shrub, or it co-dominates with leather oak. If bigberry manzanita is present, it has cover is similar to or less than pointleaf manzanita...

***Quercus durata-Arctostaphylos pungens/Pinus sabiniana* Association**

IA1b.iii. Leather oak co-dominates with bigberry manzanita, and other common chaparral shrubs may also co-dominate such as chamise (*Adenostoma fasciculatum)* or wedgeleaf ceanothus or buckbrush (*Ceanothus cuneatus)*…

***Quercus durata-Arctostaphylos glauca/Pinus sabiniana* Association**

IA1b.iv. Leather oak is dominant while other, common chaparral shrubs may occur at low cover such as wedgeleaf ceanothus...

***Quercus durata/Pinus sabiniana* Association**

IA.2. Blue oak (*Quercus douglasii)* occurs with foothill pine and interior live oak in the overstory, where blue oak is usually highest in cover…

***Quercus douglasii* Alliance (see Group II below)**

IA.3. Canyon live oak (*Quercus chrysolepis)* occurs with Coulter pine in the overstory, where they both usually co-dominate…

***Pinus coulteri-Quercus chrysolepis* Alliance**

IA.4. Coulter pine occurs as sole dominant conifer or it co-occurs with foothill pine, incense cedar or Jeffrey pine in the overstory and conifer cover is at least 10%…

***Pinus coulteri* Alliance**

IA4.a. Jeffrey pine and/or incense cedar provide at least 5% of combined cover. Foothill pine is often present at less cover than these two conifers combined…

IA4a.i. Jeffrey pine and incense cedar are both present and together provide 5% or greater cover in the overstory and understory, and Jeffrey pine contributes at least 2% cover or greater. The shrub understory contains leather oak and other shrubs…

***Pinus coulteri-Calocedrus decurrens-Pinus jeffreyi/Quercus durata* Association**

IA4a.ii. Jeffrey pine is relatively absent (1% or less) in the overstory. Incense cedar provides 5% or greater combined cover in overstory and understory. The shrub understory contains leather oak and other shrubs…

***Pinus coulteri-Calocedrus decurrens/Quercus durata* Association**

IA4.b. Jeffrey pine and/or incense cedar, if present, are <5% cover in combined cover. Foothill pine is usually present as a sub-dominant to co-dominant with Coulter pine…

IA4b.i. Bigberry manzanita is the dominant shrub, and leather oak (if present) is sub-dominant….

***Pinus coulteri/Arctostaphylos glauca* Association**

IA4b.ii. Leather oak is the dominant shrub or it co-dominates with bigberry manzanita and other chaparral shrubs including chamise and wedgeleaf ceanothus (*Ceanothus cuneatus)*, and pointleaf manzanita is <1% cover…

***Pinus coulteri/Quercus durata* Association**

IA4b.iii. Leather oak shares dominance with wedgeleaf ceanothus and pointleaf manzanita, which is an indicator species (cover >1%)…

***Pinus coulteri-Pinus sabiniana/Quercus durata-Arctostaphylos pungens* Association**

I.B. Stands are mainly riparian with incense cedar and pines in the overstory, including Coulter, Jeffrey and/or foothill pine. Shrub understory may be sporadic or higher in cover than the tree overstory…

***Pinus coulteri-Calocedrus decurrens/Rhamnus tomentella/Aquilegia eximia* Association**

I.C. Stands are mainly montane uplands with Jeffrey pine as the dominant conifer, or with Jeffrey pine co-dominating with foothill pine. The understory shrub layer may be well-developed, and greater in cover than the tree layer…

***Pinus jeffreyi* Alliance**

<u>Group II.</u> Woodlands and forests characterized mainly by broad-leaved evergreen and/or deciduous tree species such as oaks (*Quercus*), cottonwood (*Populus*), etc.

II.A. Stands are mainly upland with oaks, foothill pine, etc, in the overstory…

IIA.1. Stands are dominated by an evergreen oak, which can occur as overstory trees and sometimes regenerating in the understory…

IIA1.a. Stands are dominated by canyon live oak (*Quercus chrysolepis*). Other trees, including conifers and hardwoods, may be present but at relatively love cover …
***Quercus chrysolepis* Alliance and Association**

IIA1.b. Stands are dominated by interior live oak (*Quercus wislizeni*)…
***Quercus wislizeni* Alliance**

IIA1.c. Stands are co-dominated by interior live oak and canyon live oak …
***Quercus wislizeni-Quercus chrysolepis* Alliance and Association**

IIA.2. Stands are dominated by a deciduous oak, which occurs in the overstory and may also be regenerating in the understory, or the stands have a mixture of deciduous and evergreen oaks...

IIA2.a. The overstory is co-dominated by blue oak, interior live oak, and foothill pine. The understory may contain shrubs, including interior live oak, wedgeleaf ceanothus, and other chaparral species…
***Quercus douglasii-Quercus wislizeni-Pinus sabiniana* Association**

IIA2.b. Stands are dominated by valley oak (*Quercus lobata*) in the overstory…
***Quercus lobata* Alliance**

IIA2.c. Stands are dominated by blue oak (*Quercus douglasii*) in the overstory. Foothill pine is often present in the overstory at relatively low cover. The herbaceous layer is usually well-developed with annual and perennial species, and the shrub layer may be well defined (i.e., >10% aerial cover)…
***Quercus douglasii* Alliance**

IIA2c.i. The understory has a defined shrub layer that is dominated mainly by wedgeleaf ceanothus, while other shrubs also may be present…
***Quercus douglasii/Ceanothus cuneatus* Association**

IIA2c.ii The understory has a defined shrub layer that is dominated mainly by mountain-mahogany, while other shrubs may be present...
***Quercus douglasii-Pinus sabiniana/Cercocarpus betuloides* Association**

IIA2c.iii. The understory has a defined shrub layer that is co-dominated by mountain-mahogany and California juniper (*Juniperus californica*). Narrow leaf goldenbush is also usually present at low cover...
***Quercus douglasii/Juniperus californica-Cercocarpus betuloides* Association**

IIA2c.iv. The understory has a defined shrub layer that is co-dominated by Tucker oak (*Quercus john-tuckeri*) and California juniper (*Juniperus californica*), or it is dominated mainly by Tucker oak. Narrow leaf goldenbush (*Ericameria linearifolia*) is also usually present at low cover...
***Quercus douglasii/Juniperus californica-Quercus john-tuckeri* Association**

IIA2c.v. The understory has a defined shrub layer that is co-dominated by California juniper (*Juniperus californica*) and narrow leaf goldenbush, though sometimes one of the two species may be dominant. Other shrubs may be present in lower cover...
***Quercus douglasii/Ericameria linearifolia-Juniperus californica* Association**

IIA2c.vi. The understory has a defined shrub layer that is dominated mainly by California buckwheat (*Eriogonum fasciculatum*)...
***Quercus douglasii/Eriogonum fasciculatum*/Annual-Perennial Herb Association**

IIA2c.vii. The understory does not have a defined shrub layer but does have a defined herb layer that includes both grasses and herbs that are annual and perennial...
***Quercus douglasii*/Annual-Perennial Herb**

II.B. Stands are mainly riparian with Fremont cottonwood as the dominant overstory tree…
***Populus fremontii* Alliance**

<u>Class B.</u> Shrub-Overstory Vegetation

<u>Group I:</u> Shrublands of sclerophyllous temperate broad-leaved shrubs that are usually typical chaparral shrub genera, including chamise (*Adenostoma fasciculatum*), manzanita (*Arctostaphylos*), *Ceanothus,* scrub oaks (*Quercus*), mountain-mahogany *(Cercocarpus),* coffeeberry (*Rhamnus*), etc.

I.A. Chaparral in uplands where chamise is the dominant shrub as the canopy …
***Adenostoma fasciculatum* Alliance**

IA1. Chamise is the sole dominant shrub (at least 60% relative cover), while other shrub or herb species such as wedgeleaf ceanothus exhibit relatively little cover. Non-native and native herb species occur at low cover in the understory. Found off serpentine …
***Adenostoma fasciculatum* (pure) Association**

IA2. Chamise is the sole dominant shrub, yet other species are frequently present at low cover including wedgeleaf ceanothus and bigberry manzanita. Mainly native herb species occur in the understory. Found on serpentine …
***Adenostoma fasciculatum* Serpentine Association**

I.B. Chaparral in uplands where chamise shares dominance with other shrub species as the canopy…

IB.1. Black sage (*Salvia mellifera*) shares dominance with chamise, where both shrubs exhibit at least 30% relative cover in the shrub layer, usually off serpentine …
***Adenostoma fasciculatum-Salvia mellifera* Alliance**

IB.2. Bigberry manzanita *(Arctostaphylos glauca)* shares dominance with chamise., while both shrubs exhibit at least 30% relative cover in the shrub layer...
***Adenostoma fasciculatum-Arctostaphylos glauca* Alliance**

IB2.a. Shrublands occur on serpentine where a variety of other chaparral species intermix at low cover with chamise and bigberry manzanita. They include leather oak, wedgeleaf ceanothus and hollyleaf redberry *(Rhamnus ilicifolia)*…
***Adenostoma fasciculatum-Arctostaphylos glauca* Serpentine Shrubland**

IB2.b. Shrublands occur off serpentine where black sage *(Salvia mellifera)* usually occurs at lower cover with chamise and bigberry manzanita. Other chaparral species may occur at low cover such as wedgeleaf ceanothus and scrub oak (*Quercus* spp.)...

***Adenostoma fasciculatum-Arctostaphylos glauca-Salvia mellifera* Shrubland**

IC. Chaparral in uplands where leather oak (*Quercus durata*) is dominant or shares dominance with other sclerophyll shrubs (such as bigberry manzanita) in the shrub canopy. Usually found on serpentine substrates but sometimes off serpentine…

***Quercus durata* Alliance**

IC.1. Leather oak is the sole dominant (>60% relative cover), while other shrubs such as wedgeleaf ceanothus, bigberry manzanita, hoaryleaf coffeeberry, and California yerba santa *(Eriodictyon californicum)* are usually present at low cover. Foothill pine is present at varying cover (0.2-15%)...

***Quercus durata/Pinus sabiniana* Association**

IC.2. Leather oak is co-dominant with bigberry manzanita in the shrub layer, while other shrubs such as silktassel and toyon are also present at low cover. Native grasses are usually abundant in cover, especially Torrey's melic grass *(Melica torreyana)*. Foothill pine, if present, has trace cover. Substrate usually serpentine …

***Quercus durata-Arctostaphylos glauca-Garrya congdoniilMelica torreyana* Shrubland**

IC.3. Bigberry manzanita is co-dominant with leather oak in the shrub layer. Native grasses and forbs are usually low in cover (if present). Foothill pine is usually present at varying cover (0.2-15%). Substrate usually serpentine…

***Quercus durata-Arctostaphylos glauca/Pinus sabiniana* Association**

IC.4. Pointleaf manzanita *(Arctostaphylos pungens*) is dominant or co-dominant with leather oak in the shrub layer. If bigberry manzanita is present, its cover is similar to or less than pointleaf manzanita. Native grasses and forbs are usually present at low cover. *Pinus sabiniana* is consistently present in the tree layer with cover at less than 20%...

***Quercus durata-Arctostaphylos pungens/Pinus sabiniana* Association**

IC.5. Leather oak shares dominance with chamise, interior live oak, and wedgeleaf ceanothus in the shrub layer, and interior live oak is sub-dominant. Trees and native herbs are frequently present at sparse cover. Usually found off serpentine …

***Quercus durata-Adenostoma fasciculatum-Quercus wislizeni* Association**

IC.6. Leather oak shares dominance with birchleaf mountain-mahogany in the shrub layer, and wedgeleaf ceanothus, silk tassel, and flannelbush (*Fremontodendron californicum*) are frequently present at low cover. Trees and native herbs may be present at trace cover. Usually found off serpentine …

***Quercus durata-Cercocarpus betuloides* Association**

I.D. Chaparral in serpentine and non-serpentine uplands where bigberry manzanita (*Arctostaphylos glauca*) is the dominant sclerophyll species, while other soft-leaved shrub species may be present and sub-dominant …

***Arctostaphylos glauca* Alliance**

ID.1. Bigberry manzanita is usually the dominant shrub (at least 60% relative cover) in serpentine uplands, while leather oak and chamise are usually present and sub-dominant. *Pinus sabiniana* is consistently present at less than 15% cover, and native grasses and forbs occur at trace cover…

***Arctostaphylos glauca-Quercus durata/Pinus sabiniana* Association**

I.F. Chaparral in mostly exposed, south-facing non-serpentine uplands where chaparral whitethorn (*Ceanothus leucodermis*) is the sole dominant sclerophyll species, while other chaparral species such as wedgeleaf ceanothus or coastal sage species such as California buckwheat may be present...

***Ceanothus leucodermis* Alliance**

I.G. Chaparral on varied non-serpentine uplands where wedgeleaf ceanothus is the sole dominant sclerophyll species...

***Ceanothus cuneatus* Alliance**

I.H. Chaparral on rocky, serpentine or non-serpentine uplands where hollyleaf cherry (*Prunus ilicifolia*) is dominant or co-dominant as a shrub in the canopy, and sometimes rock gooseberry *(Ribes quercetorum)* may co-dominate…

***Prunus ilicifolia* Alliance**

I.I. Chaparral on cool, north-facing uplands where western chokecherry is dominant, while other shrubs may be present at lower cover...

***Prunus virginiana* Alliance**

I.J. Chaparral on cool, north-faces or neutral slopes where birchleaf mountain-mahogany is dominant or it is co-dominant with other shrubs such as scrub oak, California buckwheat, or California juniper...

IJ.1. California buckwheat is co-dominant with birchleaf mountain-mahogany, and other chaparral and coastal sage species are lower in cover...

***Cercocarpus betuloides-Eriogonum fasciculatum* Alliance**

IJ.2. Birchleaf mountain mahogany is dominant, or it is co-dominant with more than one other shrub in the overstory…

***Cercocarpus betuloides* Alliance**

IJ2.a. California juniper is sub-dominant with birchleaf mountain-mahogany, and other chaparral or soft-leaved species are usually present with lower cover, including narrowleaf goldenbush...

***Cercocarpus betuloides-Juniperus californical*Annual-Perennial Herb Association**

IJ2.b. Wedgeleaf ceanothus and Tucker oak are co-dominant with birchleaf mountain-mahogany...

***Cercocarpus betuloides-Ceanothus cuneatus-Quercus john-tuckeri* Association**

I.K. Chaparral on north-facing uplands where scrub oak *(Quercus berberidifolia*) is dominant...

***Quercus berberidifolia* Alliance**

I.L. Chaparral on north-facing or variable slopes and flats where Tucker oak is dominant, though a variety of other shrubs occur as sub-dominants...

***Quercus john-tuckeri* Alliance**

IL.1. California juniper, Narrowleaf goldenbush, and golden yarrow (*Eriophyllum confertiflorum*) are characteristically present and usually sub-dominant to Tucker oak. Other shrubs may be present at low cover, including mountain-mahogany, bigberry manzanita, or California buckwheat...

***Quercus john-tuckeri-Juniperus californica-Ericameria linearifolia* Association**

IL.2. California juniper and Foothill ash are characteristically present and usually subdominant to Tucker oak. Mountain-mahogany and pipestem clematis (*Clematis lasiantha)* are also usually present at low cover...

***Quercus john-tuckeri-Juniperus californica-Fraxinus dipetala* Association**

IL.3. Chamise and wedgeleaf ceanothus are characteristically present and subdominant to Tucker oak. A variety of other shrubs may be present at low cover, including California juniper, bigberry manzanita, and California buckwheat...

***Quercus john-tuckeri-Adenostoma fasciculatum* Association**

IL.4. Interior live oak and ashy silk tassel are characteristically present and subdominant to Tucker oak. A variety of other shrubs may be present at low cover, including wedgeleaf ceanothus and ashy silk tassel...

***Quercus john-tuckeri-Quercus wislizeni-Garrya flavescens* Association**

I.M. Riparian shrubland in mainly serpentine habitats where hoary coffeeberry (*Rhamnus tomentella*) is co-dominant with Brewer's willow (*Salix breweri)*. A variety of wetland herbs occur in the understory including alkali muhly (*Muhlenbergia asperifolia*) and Guirado's goldenrod *(Solidago guiradonis)*...

***Salix breweri/Muhlenbergia asperifolia* Association**

Group II. Scrub dominated mainly by scale-like or microphyllous leaved shrubs generally considered in desert-transition habitats. including California juniper, California ephedra *(Ephedra californica),* or rubber rabbitbrush *(Chrysothamnus nauseosus)*. Chaparral or coastal sage scrub species may be present as sub-dominants.

II.A. Rubber rabbitbrush occurs at the dominant in the shrub understory. In the active growing season, a variety of herbs can be abundant in the understory...

***Chrysothamnus nauseosus* Alliance**

IIA.1. California juniper occurs at low cover while rubber rabbitbrush is usually dominant...

***Chrysothamnus nauseosus-Juniperus californica*/Annual-Perennial Herb Association**

II.B. California juniper is the dominant in the shrub overstory, though a variety of soft-leaved, drought-deciduous shrubs also occur in the shrub layer. In the active growing season, a variety of herbs can be abundant in the understory...

***Juniperus californica* Alliance**

IIB.1. Foothill ash and narrowleaf goldenbush co-occur with California juniper as sub-dominants or co-dominants. Found primarily on north-facing slopes...

***Juniperus californica-Fraxinus dipetala-Ericameria linearifolia*/Annual-Perennial Herb Association**

IIB.2. Narrowleaf goldenbush co-occurs with California juniper at low cover without foothill ash. Found on all aspects...

***Juniperus californica-Ericameria linearifolia*/Annual-Perennial Herb Association**

II.C. California ephedra is the dominant in the shrub overstory, though it may co-dominate with California matchweed (*Gutierrezia californica*). In the active growing season, an abundant herb understory can occur...

***Ephedra californica* Alliance**

IIC.1. California ephedra is the sole dominant species in the shrub overstory...

***Ephedra californica*/Annual-Perennial Herb Association**

IIC.2. California ephedra is co-dominant with California matchweed...

***Ephedra californica-Gutierrezia californica/Eriastrum pluriflorum* Association**

II.D. California juniper or California ephedra are co-dominant with other shrubs than matchweed in the overstory...

IID.1. California juniper is co-dominant with birchleaf mountain-mahogany...
***Cercocarpus betuloides-Juniperus californica*/Annual-Perennial Herb Association**

IID.2. California juniper is co-dominant with California buckwheat...
***Eriogonum fasciculatum* var. *foliolosum-Juniperus californica*/Annual-Perennial Herb Association**

IID.3. California ephedra is co-dominant with California sagebrush and buckwheat...
***Artemisia californica-Eriogonum fasciculatum-Ephedra californica* Association**

II.E. California matchweed is the sole dominant overstory species. In the active growing season, an abundant herb understory occurs…
***Gutierrezia californica*/Annual-Perennial Herb Association**

II.F. Spinescale is the sole dominant overstory species. A variety of herbs occur in the understory…
***Atriplex spinifera*/Annual grass-herb**

<u>Group III</u>. Shrublands dominated mainly by soft-leaved or succulent shrubs that are microphyllous or broad-leaved, including cactus, drought-deciduous, and cold-deciduous species. These are generally considered to be part of coastal sage scrub, montane deciduous scrub, or other more soft-leaved shrub habitats. Chaparral species may be present but not dominant. Includes California sagebrush *(Artemisia californica)*, buckwheat *(Eriogonum)*, sage (*Salvia*), chokecherry (*Prunus)* species, baccharis (*Baccharis),* shrub willow *(Salix),* etc.

III.A. Riparian stands dominated mainly by one or more wetland species, including mulefat *(Baccharis salicifolia),* scalebroom *(Lepidospartum squamatum),* tamarisk, and/or willow…

IIIA.1. Mulefat dominates in the overstory, while other shrubs are usually present at low cover including saw-toothed goldenbush *(Hazardia squarrosa)* and scalebroom. The understory may have an abundance of grasses and herbs…
***Baccharis salicifolia-Lepidospartum squamatum-Hazardia squarrosa* Association**

IIIA.2 Tamarisk (*Tamarix* spp.) dominates in the overstory, while other shrubs may be present and sub-dominant such as *(Baccharis pilularis),* California yerba santa (*Eriodictyon californicum*), saw-toothed goldenbush, etc…
***Tamarix* Alliance**

IIIA.3 Brewer's willow *(Salix breweri)* is dominant in the shrub layer, or it is co-dominant with other shrubs such as hoary coffeeberry (*Rhamnus tomentella)* and rubber rabbitbrush *(Chrysothamnus nauseosus).* A variety of wetland herbs occur in the understory including alkali muhly (*Muhlenbergia asperifolia*) and Guirado's goldenrod *(Solidago guiradonis)*...
***Salix breweri/Muhlenbergia asperifolia* Association**

III.B. Coastal sage scrub stands dominated by California sagebrush, or California sagebrush is co-dominant with disturbance-following species such as bushmallow *(Malacothamnus*) or scalebroom…
***Artemisia californica* Alliance**

IIIB.1. California sagebrush is the sole dominant, while other shrubs may occur at low cover. A variety of herbs occur in the understory…
***Artemisia californica*/Annual Herb**

IIIB.2. Indian Valley Bush Mallow is co-dominant with California sagebrush…
***Artemisia californica-Malacothamnus aboriginum* Unique Stand**

IIIB.3. Scalebroom is sub-dominant to co-dominant with California sagebrush. Other shrubs may also occur at low cover, while annual herbs including non-native grasses and native forbs may be higher in cover than the shrub overstory…

***Artemisia californica-Lepidospartum squamatum*/Annual grass-herb**

III.C. Coastal sage scrub stands co-dominated by California sagebrush and black sage…

***Artemisia californica-Salvia mellifera* Alliance**

III.D. Coastal sage scrub stands dominated by black sage, while other shrubs may occur at lower cover…

***Salvia mellifera* Alliance**

IIID.1. A variety of shrubs occur as sub-dominants to black sage, including California sagebrush, California buckwheat, and wooly yerba santa *(Eriodictyon tomentosum)…*

***Salvia mellifera-Eriogonum fasciculatum* var. *foliolosum-Eriodictyon tomentosum* Association**

III.E. Coastal sage or montane scrub stands dominated buckwheat species or co-dominated by buckwheat and other shrub species…

IIIE.1. California buckwheat is co-dominant with other coastal sage or chaparral shrub species such as California sagebrush, birch-leaf mountain mahogany, etc...

IIIE1.a. California sagebrush is co-dominant with California buckwheat, and California ephedra is sub-dominant to co-dominant with these two coastal sage scrub species...

***Artemisia californica-Eriogonum fasciculatum-Ephedra californica* Association**

IIIE1.b. Birchleaf mountain-mahogany is present and co-dominant with California buckwheat, and other chaparral and coastal sage species may be present at low cover...

***Cercocarpus betuloides-Eriogonum fasciculatum* Alliance**

IIIE.2. California buckwheat is the dominant shrub species while other species may be present, including California juniper, California ephedra, chaparral yucca *(Yucca whipplei)*...

***Eriogonum fasciculatum* Alliance**

IIIE2.a. Chaparral yucca is present with at least 5% cover, and it is sometimes co-dominant with California buckwheat. If California juniper is present, it has lower absolute cover than chaparral yucca...

***Eriogonum fasciculatum-Yucca whippleil*/Annual-Perennial Herb Association**

IIIE2.b. California juniper is present with at least 1% cover, and it is sub-dominant to California buckwheat. If chaparral yucca is present, it has trace cover...

***Eriogonum fasciculatum* var. *foliolosum-Juniperus californica*/Annual-Perennial Herb Association**

IIIE2.c. Microphyllous leaved shrubs may be present at low cover, including California ephedra, spinescale, and yellow mock aster (*Eastwoodia elegans*). Herbaceous understory usually includes native herbs such as *Chorizanthe* spp., many-flowered eriastrum (*Eriastrum pluriflorum)*, and chia (*Salvia columbariae)* at low cover with non-native grass Spanish brome (*Bromus madritensis)*...

***Eriogonum fasciculatum* var. *polifolium/Eriastrum pluriflorum* Association**

IIIE2.d. Stands are solely dominated by California buckwheat. If California juniper or chaparral yucca is present, their cover is not like above. Herbaceous understory is usually well-developed with native and non-native species such as California melic grass (*Melica*

californica), one-sided bluegrass (*Poa secunda),* soft chess (*Bromus hordeaceus),* chia, *Avena* spp., etc...

***Eriogonum fasciculatum* var. *foliolosum*/Annual Herb Association**

III.F. Heermann's buckwheat is dominant in the overstory as an open shrubland (cover may be <10%). On rocky, non-serpentine surfaces…

***Eriogonum heermannii* Alliance**

III.G. Wright's buckwheat dominates in the overstory as a sub-shrub, or it may be co-dominated by Wright's buckwheat and other sub-shrubs. In serpentine or non-serpentine, montane locations….

***Eriogonum wrightii* Alliance**

IIIG.1. Other sub-shrubs co-occur with Wright's buckwheat and may be sub-dominant to co-dominant, including golden yarrow (*Eriophyllum confertiflorum*) and chaparral yucca. A variety of herbaceous species also occur, including San Benito monardella (*Monardella antonina* subsp. *benitensis),* one-sided bluegrass, and *Avena* spp…

***Eriogonum wrightii-Eriophyllum confertiflorum/Monardella antonina* subsp. *benitensis* Association**

IIIG.2. California juniper is sub-dominant with Wright's buckwheat dominant. Other shrubs may occur at low cover, including California buckwheat and golden yarrow. The understory is usually well developed with non-native and native species of grasses and forbs...

***Eriogonum wrightii-Juniperus californica*/Annual-Perennial Herb Association**

III.H. Rocky and sandy, non-serpentine surfaces dominated or co-dominated by California matchweed. In the active growing season, an abundant herb understory occurs…

IIIH.1. California matchweed is sole dominant shrub in the overstory…

***Gutierrezia californica*/Annual-Perennial Herb Association**

IIIH.2. California matchweed is co-dominant with California ephedra in the overstory…

***Ephedra californica-Gutierrezia californica/Eriastrum pluriflorum* Association**

III.I. Stands with recent disturbance dominated by deerweed *(Lotus scoparius*) in the overstory, and other disturbance-following shrubs may be sub-dominant such as California yerba santa. The herbaceous layer may be higher in cover than the overstory, especially with non-native grasses and native forbs…

***Lotus scoparius* Alliance**

III.J. Usually steep or alluvial, rocky surfaces dominated by *(Lupinus albifrons)* in the overstory. The herbaceous layer may be diverse and high in cover with native and non-native species…

***Lupinus albifrons* Alliance**

Class C. Herbaceous Vegetation

Group I. Vegetation is dominated by mainly wetland forb species, including cattail (*Typha*), rush (*Juncus*), sedge (*Carex)*, spikerush (*Eleocharis*), and common reedgrass (*Phragmites australis*). Woody species cover <10% of the ground surface.

I.A. Stands are dominated by wetland grasses and graminoids that are tall (generally > 1 m), including cattails *(Typha)*, bulrushes and tules (*Scirpus*), and common reed (*Phragmites australis*), though there may sometimes be greater cover of shorter herbs and graminoids.

IA.1. Vegetation dominated by cattail species...

***Typha* spp. Alliance**

IA1.a. Broad-leafed cattail (*Typha latifolia)* is strongly dominant, while other wetland grasses, graminoids, or forbs may be present at low cover…

***Typha latifolia* Association**

IA.2. Vegetation is mainly dominated by common reedgrass, while other graminoids such as rushes and spikerushes may be present and sub-dominant...

***Phragmites australis* Alliance**

I.B. Stands are strongly dominated (>60% relative cover) by grasses and graminoids that are generally between 0.1-1 m tall, including rushes (*Juncus)* and sedges *(Carex)*...

IB.1. Vegetation dominated by the stoloniferous (clonal) rush *Juncus mexicanus* (and including individuals more closely resembling *Juncus balticus*), often associated with other taller or shorter herbaceous species. Of usually temporarily saturated wetlands not inundated for extensive periods…

***Juncus balticus-Juncus mexicanus* Alliance**

IB1.a. Stands strongly dominated by Mexican rush (*Juncus mexicanus*) with low cover of other herbaceous species…

***Juncus mexicanus* Association**

IB.2. Vegetation dominated by pale spikerush, though other spikerush or rush species may be present at low cover with variable forb component. Of usually periodically inundated and saturated wetlands with aboveground water present through the growing season...

***Eleocharis macrostachya* Alliance**

IB.3. Vegetation is usually dominated by sedges (e.g., *Carex serratodens, Carex praegracilis)*, though Mexican rush and creeping ryegrass (*Leymus triticoides)* are also present and sub-dominant. Of usually temporarily saturated soils...

***Carex* spp.-*Juncus mexicanus-Leymus triticoides* Association**

I.C. Stands dominated by annual and perennial wetland forbs and graminoids...

IC.1. Vegetation comprised of forb and herb species in periodically inundated pools, including *Eryngium castrense, Eleocharis* spp., and *Psilocarphus* sp. No samples were taken to describe this habitat further, though it occurs in at least four different areas of the Spanish Lakes..

Serpentine Vernal Pool Habitat

<u>Group II.</u> Vegetation dominated mainly by upland and mesic herbaceous species, including native and exotic grasses, forbs, and cryptogamic species. If woody species are present, they cover <10% of the ground surface.

II.A. Vegetation is predominantly forbs that are annual or perennial, including buckwheat *(Eriogonum)...*

IIA.1. Wild rhubarb (*Rumex hymenosepalus)* is dominant, or other forbs and grasses may sometimes be co-dominant. Occurring on sand dunes...

***Rumex hymenosepalus* Alliance**

IIA.2. Nude Buckwheat *(Eriogonum nudum)* is dominant or is co-dominant with other herbaceous species. Shrubs such as California buckwheat or golden yarrow may be present at <10% cover...

Eriogonum nudum

IIA2.a. Nude buckwheat is dominant or co-dominant with red brome (*Bromus madritensis* subsp. *rubens),* while Idria Buckwheat is characteristically present. Occurring on rock-derived sedimentary substrates and slate...

***Eriogonum nudum* var. *indictum-Eriogonum vestitum* Association**

II.B. Vegetation is predominantly grasses that are annual or perennial, though forbs may also be present...

IIB.1. Indian ricegrass (*Achnatherum hymenoides)* is dominant or co-dominant with bromes *(Bromus* spp.) on sand dunes...

***Achnatherum hymenoides* Alliance**

IIB.2. Big squirreltail *(Elymus multisetus)* is dominant or co-dominant with bromes *(Bromus* spp.). Torrey's melic grass *(Melica torreyana*) may also be present and sub-dominant...

***Elymus multisetus* Alliance**

IIB.3. Small Fescue (*Vulpia microstachys*) is dominant or co-dominant with other annual grasses (including *Bromus* spp.) and California Plantain (*Plantago erecta)*...

***Vulpia microstachys-Plantago erecta* Association**

IIB.4. An abundance of annual non-native grasses such as bromes *(*e.g., *Bromus hordeaceus, B. madritensis, B. diandrus, B. arenarius*), annual fescue *(Vulpia myuros)*, or wild oats *(Avena barbata* or *A. fatua*) occurs with a variety of annual forbs (e.g., *Erodium* spp., *Achillea millefolium, Amsinckia menziesii, Micropus californica*) as well as perennial native grasses *(*e.g., *Poa secunda, Nassella pulchra*)...

Upland Annual-Perennial Herbaceous Habitat

<u>Class D.</u> Rock Outcrops and Barrens

Group I. Stands are open barrens of serpentine with sparse cover of mainly vascular species...

I.A. Jeffrey pine and foothill pine co-occur at relatively low cover in the overstory and understory (<10%), and shrubs may also be present at relatively low cover (<10%). Overall vegetation cover is less than 15%...

***Pinus jeffreyi-Pinus sabiniana* Barren Association**

I.B. Coulter pine occurs alone or with foothill pine at relatively low cover in the overstory and understory (<10%). Shrubs and herbs may also be present at relatively low cover (<5% in each layer)...

IB.1. Coulter pine occurs without foothill pine at elevations usually above 4500 feet...

***Pinus coulteri* Barren Association**

IB.2. Coulter pine occurs with foothill pine at elevations usually below 4500 feet...

***Pinus sabiniana-Pinus coulteri* Barren Association**

I.C. Heermann's buckwheat is dominant in the overstory as an open shrubland (cover may be <10%)…

***Eriogonum heermannii* Alliance**

Group II. Stands are open rock outcrops with predominant cover by non-vascular vegetation and sparse cover by vascular vegetation...

II.A. Various species of lichen co-occur as well as moss on rock outcrops of serpentine or sedimentary substrate...

Lichen-Moss Type

Pinus coulteri-Calocedrus decurrens/Quercus durata Association

Coulter Pine - Incense-cedar / Leather Oak Association

LOCAL VEGETATION DESCRIPTION

Stands of *Pinus coulteri-Calocedrus decurrens/Quercus durata* Woodland form an open to intermittent tree layer (8-45%, mean 30.2%), with conifers at 5-20m tall and hardwoods at 5-10m tall. *Calocedrus decurrens* is sub-dominant to or co-dominant with *Pinus coulteri* in the tree overstory. *Calocedrus decurrens* is most frequently regenerating in the understory. The shrub layer is open to continuous (15-70%, mean 48.9%) at 0-5 m tall, and the herbaceous layer is open (0.2-3%, mean 0.5%) at 0-0.5m tall. Total vegetation cover is 38-85%, mean 65.6%.

In this association*, Pinus sabiniana* often occurs in the mixed tree overstory and may be regenerating in the understory. In the shrub layer, *Quercus durata* and *Arctostaphylos glauca* are consistently present as co-dominants, while *Rhamnus tomentella* often intermixes as a sub-dominant. The herb layer is sparse and comprised of native forb and grass species, including *Galium andrewsii*, *Viola purpurea* subsp. *quercetorum*, and *Galium porrigens.*

Monardella antonina subsp. *benitensis*, a CNPS List 4 species, was found in 2 of the 14 stands sampled. *Eriogonum umbellatum* was found in 3 of 14 stands, though there are no vouchers to confirm its variety designation. *Eriogonum umbellatum* var. *bahiiforme,* a CNPS List 4 species, occurs frequently on serpentinite soils and may occur within this association.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3986-4827ft, mean 4497ft
Aspect: NE, NW
Slope: moderate to steep, range 10-28 degrees, mean 20.4 degrees
Topography: most often undulating, less often convex or concave; lower to top slopes
Small Rock Cover: range 2-26%, mean 15.6%
Large Rock Cover: range 0.2-3%, mean 1.1%
Litter Cover: range 21.4-82%, mean 51.9%
Bare Ground: range 10-59%, mean 27.5%
Parent Material: serpentine
Soil Texture: medium to very fine loamy sand, moderately coarse sandy loam, medium loam, moderately fine sandy clay loam

This association was sampled in the Arroyo Leona, Clear Creek, East Fork San Carlos Creek, Larious Canyon and Sawmill Creek watersheds within the Serpentine portion of the study area.

Samples used to describe association: (n=14)
CCBLM053, CCBLM077, CCBLM126, CCBLM127, CCBLM149, CCBLM156, CCBLM163, CCBLM196, CCBLM200, CCBLM291, CCBLM296, CCBLM307, CCBLM308, CCBLM309

Rank: G3S3

GLOBAL DISTRIBUTION

montane Central Coast Ranges

REFERENCES CITED

Sawyer and Keeler-Wolf 1995

***Pinus coulteri-Calocedrus decurrens/Quercus durata-Arctostaphylos glauca* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PICO3-t	*Pinus coulteri*	100	19.1	8	30
	CADE27-t	*Calocedrus decurrens*	100	8.9	2	22
	PISA2-t	*Pinus sabiniana*	64	2.1	0.2	15
	PIJE-t	*Pinus jeffreyi*	14	0.1	1	1
Tree Understory	CADE27-m	*Calocedrus decurrens*	64	0.8	0.2	4
	PISA2-m	*Pinus sabiniana*	29	0.2	0.2	1
	PICO3-l	*Pinus coulteri*	14	0.1	0.2	1
	PICO3-m	*Pinus coulteri*	14	0.0	0.2	0.2
	PISA2-l	*Pinus sabiniana*	14	0.0	0.2	0.2
Shrub	QUDU4	*Quercus durata*	100	28.0	7	46
	ARGL4	*Arctostaphylos glauca*	93	16.3	1	40
	RHTO6	*Rhamnus tomentella*	64	0.7	0.2	3
	CECU	*Ceanothus cuneatus*	50	2.6	1	11
	ARPU5	*Arctostaphylos pungens*	43	2.0	1	10
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	29	0.6	0.2	8
	GARRY	*Garrya*	29	0.2	0.2	1
	TODI	*Toxicodendron diversilobum*	29	0.1	0.2	0.2
	ERCA6	*Eriodictyon californicum*	21	0.0	0.2	0.2
	RHIL	*Rhamnus ilicifolia*	14	0.0	0.2	0.2
Herb	GAAN	*Galium andrewsii*	57	0.2	0.2	1
	GAPO	*Galium porrigens*	36	0.1	0.2	0.2
	VIPUQ	*Viola purpurea* subsp. *quercetorum*	36	0.1	0.2	0.2
	ELMU3	*Elymus multisetus*	29	0.1	0.2	1
	LIBI	*Linanthus bicolor*	14	0.0	0.2	0.2
	LUCO	*Lupinus concinnus*	14	0.0	0.2	0.2
	MOANB	*Monardella antonina* subsp. *benitensis*	14	0.0	0.2	0.2
	ERUM	*Eriogonum umbellatum*	21	0.0	0.2	0.2

***Pinus coulteri-Calocedrus decurrens/Rhamnus tomentella/Aquilegia eximia* Association**

Coulter Pine - Incense Cedar / Hoary Coffeeberry / Van Houtte's Columbine Association

LOCAL VEGETATION DESCRIPTION

Stands of *Pinus coulteri-Calocedrus decurrens/Rhamnus tomentella/Aquilegia eximia* Woodland form an open to intermittent tree layer (8-42%, mean 20.4%) at 5-20m tall. *Pinus coulteri* or *Calocedrus decurrens* usually dominates in the tree overstory, and they are frequently regenerating in the understory. The shrub layer is open to intermittent (20-55%, mean 33.0%) at 0.5-2m tall, and the herbaceous layer is open (8-25%, mean 14.8%) at 0-0.5m tall. Total vegetation cover is 45-70%, mean 54.6%.

In this association, *Pinus coulteri* or *Calocedrus decurrens* are usually the dominant trees. Other conifer species such as *Pinus sabiniana* or *Pinus jeffreyi* may intermix in the tree overstory and understory, and they could be co-dominant to dominant. *Chrysothamnus nauseosus* subsp. *mohavensis* and *Rhamnus tomentella* are characteristically present, and they may be co-dominant or one may be dominant. Native grass and forb species that are characteristic in the understory include *Muhlenbergia asperifolia*, *Aquilegia eximia*, *Sisyrinchium bellum*, *Achillea millefolium*, *Solidago guiradonis,* and *Castilleja miniata* subsp. *miniata.*

Solidago guiradonis, a CNPS List 4 species, was found in 4 of 5 stands sampled. *Trichostema rubisepalum* and *Calystegia collina* subsp. *venusta,* which are also CNPS List 4 species, were found in 2 of 5 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3708-4651ft, mean 4244ft
Aspect: most often NW, sometimes variable
Slope: gentle, range 1-2 degrees, mean 1.7 degrees
Topography: concave or undulating; bottom
Small Rock Cover: range 35-55%, mean 46.2%
Large Rock Cover: range 0.2-21%, mean 7.9%
Litter Cover: range 1-25%, mean 11.4%
Bare Ground: range 22-35%, mean 29.3%
Parent Material: most often serpentine, less often sedimentary
Soil Texture: medium sand, moderately coarse sandy loam, or medium loam

This association was sampled in the Clear Creek, East Fork San Carlos Creek and Sawmill Creek watersheds within the Serpentine portion of the study area.

Samples used to describe association: (n=5)
CCBLM155, CCBLM192, CCBLM274, CCBLM299, CCBLM566

Rank: G2S2

GLOBAL DISTRIBUTION

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REFERENCES CITED

Sawyer and Keeler-Wolf 1995

***Pinus coulteri-Calocedrus decurrens/Rhamnus tomentella/Aquilegia eximia* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	CADE27-t	*Calocedrus decurrens*	100	5.6	0.2	20
	PICO3-t	*Pinus coulteri*	80	10.0	1	35
	PISA2-t	*Pinus sabiniana*	80	3.2	0.2	10
	PIJE-t	*Pinus jeffreyi*	80	2.2	0.2	5
Tree Understory	PICO3-m	*Pinus coulteri*	40	0.1	0.2	0.2
	CADE27-m	*Calocedrus decurrens*	20	0.0	0.2	0.2
	PICO3-l	*Pinus coulteri*	20	0.0	0.2	0.2
	PISA2-m	*Pinus sabiniana*	20	0.0	0.2	0.2
Shrub	RHTO6	*Rhamnus tomentella*	120	17.5	0.2	33
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	80	10.0	6	20
	ARGL4	*Arctostaphylos glauca*	80	3.2	0.2	10
	SABR2	*Salix breweri*	80	1.6	0.2	5
	ERCA6	*Eriodictyon californicum*	40	0.1	0.2	0.2
	ARPU5	*Arctostaphylos pungens*	20	0.8	4	4
	QUDU4	*Quercus durata*	20	0.4	2	2
Herb	MUAS	*Muhlenbergia asperifolia*	100	6.0	1	15
	AQEX	*Aquilegia eximia*	100	0.7	0.2	2
	SIBE	*Sisyrinchium bellum*	100	0.4	0.2	1
	ACMI2	*Achillea millefolium*	80	2.0	0.2	6
	SOGU	*Solidago guiradonis*	80	2.0	1	3
	CAMIM5	*Castilleja miniata* subsp. *miniata*	80	0.3	0.2	1
	LETR5	*Leymus triticoides*	40	0.8	2	2
	CACOV	*Calystegia collina* subsp. *venusta*	40	0.1	0.2	0.2
	ELMU3	*Elymus multisetus*	40	0.1	0.2	0.2
	TRRU	*Trichostema rubisepalum*	40	0.1	0.2	0.2
	ELGL	*Elymus glaucus*	20	0.6	3	3
	STPY	*Stachys pycnantha*	20	0.2	1	1
	AICA	*Aira caryophyllea*	20	0.0	0.2	0.2
	CLPE	*Claytonia perfoliata*	20	0.0	0.2	0.2
	ELTRT2	*Elymus trachycaulus* subsp. *teslinensis*	20	0.0	0.2	0.2
	EPMI	*Epilobium minutum*	20	0.0	0.2	0.2
	ERCO17	*Eriogonum covilleanum*	20	0.0	0.2	0.2
	ESCA2	*Eschscholzia californica*	20	0.0	0.2	0.2
	MIGU	*Mimulus guttatus*	20	0.0	0.2	0.2
	POMO5	*Polypogon monspeliensis*	20	0.0	0.2	0.2
	ZIVEV	*Zigadenus venenosus* var. *venenosus*	20	0.0	0.2	0.2

***Pinus coulteri-Calocedrus decurrens-Pinus jeffreyi/Quercus durata* Association**

Coulter Pine - Incense-cedar - Jeffrey Pine / Leather Oak Association

LOCAL VEGETATION DESCRIPTION

Stands of *Pinus coulteri-Calocedrus decurrens-Pinus jeffreyi/Quercus durata* Woodland form an open tree layer (10-25%, mean 19.3%), with conifers at 5-15m tall. *Pinus coulteri*, *Calocedrus decurrens* and *Pinus jeffreyi* are generally co-dominating in the tree overstory and are frequently regenerating in the understory. The shrub layer is open to continuous (0-68%, mean 21.7%) with low shrubs at 0-2m tall and medium to tall shrubs at 1-5m tall. The herbaceous layer is open (0-0.2%, mean 0.2%) at 0-0.5m tall. Total vegetation cover is 18-75%, mean 39.6%.

In this association*, Pinus sabiniana* characteristically intermixes in the mixed conifer overstory as a sub-dominant tree and is occasionally regenerating in the understory. In the shrub layer, *Quercus durata* and *Arctostaphylos glauca* are consistently present as co-dominants, and *Arctostaphylos pungens* is characteristic at sparse cover. *Rhamnus tomentella* often intermixes as a sub-dominant. The herb layer is sparse and comprised of native forb and grass species, including *Galium andrewsii*, *Cordylanthus rigidus,* and *Lupinus concinnus.*

Eriogonum umbellatum was found in 1 of 6 stands, though there are no vouchers to confirm its variety designation. *Eriogonum umbellatum* var. *bahiiforme,* a CNPS List 4 species, occurs frequently on serpentinite soils and may occur within this association.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 4057-4868ft, mean 4366ft
Aspect: most often NW or NE, less often SE
Slope: moderate to somewhat steep, range 8-22 degrees, mean 17.4 degrees
Topography: most often undulating, less often convex or concave; lower to upper slopes
Small Rock Cover: range 5-40%, mean 25.8%
Large Rock Cover: range 0.2-10%, mean 3.2%
Litter Cover: range 15-70%, mean 32.8%
Bare Ground: range 15-73%, mean 35%
Parent Material: serpentine
Soil Texture: coarse sand to moderately coarse to very fine sandy loam

This association was sampled in the East Fork San Carlos Creek and Sawmill Creek watersheds within the Serpentine portion of the study area.

Samples used to describe association: (n=6)
CCBLM018, CCBLM060, CCBLM279, CCBLM280, CCBLM281, CCBLM301

Rank: G2S2

GLOBAL DISTRIBUTION

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REFERENCES CITED

Sawyer and Keeler-Wolf 1995

***Pinus coulteri-Calocedrus decurrens-Pinus jeffreyi/Quercus durata* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PIJE-t	*Pinus jeffreyi*	100	8.7	3	18
	PICO3-t	*Pinus coulteri*	100	5.7	2	10
	CADE27-t	*Calocedrus decurrens*	100	4.3	1	10
	PISA2-t	*Pinus sabiniana*	83	2.4	0.2	11
Tree Understory	CADE27-m	*Calocedrus decurrens*	83	1.0	0.2	5
	PIJE-m	*Pinus jeffreyi*	83	0.6	0.2	1
	PISA2-m	*Pinus sabiniana*	67	1.4	0.2	8
	PICO3-m	*Pinus coulteri*	50	1.3	1	5
	PIJE-l	*Pinus jeffreyi*	50	0.1	0.2	0.2
	PISA2-l	*Pinus sabiniana*	50	0.1	0.2	0.2
	CADE27-l	*Calocedrus decurrens*	17	0.0	0.2	0.2
	PICO3-l	*Pinus coulteri*	17	0.0	0.2	0.2
Shrub	ARGL4	*Arctostaphylos glauca*	100	14.3	1	33
	QUDU4	*Quercus durata*	100	8.9	0.2	23
	ARPU5	*Arctostaphylos pungens*	83	1.4	0.2	4
	RHTO6	*Rhamnus tomentella*	67	1.5	0.2	6
	CECU	*Ceanothus cuneatus*	33	0.5	0.2	3
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	17	0.0	0.2	0.2
	RHIL	*Rhamnus ilicifolia*	17	0.0	0.2	0.2
Herb	GAAN	*Galium andrewsii*	33	0.1	0.2	0.2
	CORI2	*Cordylanthus rigidus*	17	0.0	0.2	0.2
	ERUM	*Eriogonum umbellatum*	17	0.3	2	2
	LUCO	*Lupinus concinnus*	17	0.0	0.2	0.2
	VIPUQ	*Viola purpurea* subsp. *quercetorum*	17	0.0	0.2	0.2
Cryptogam	MOSS	Moss	17	0.2	1	1

***Pinus coulteri-Pinus sabiniana/Quercus durata-Arctostaphylos pungens* Association**

Coulter Pine - Foothill Pine / Leather Oak - Pointleaf Manzanita Association

LOCAL VEGETATION DESCRIPTION

Stands of *Pinus coulteri-Pinus sabiniana/Quercus durata-Arctostaphylos pungens* Woodland form an open to intermittent tree layer (6-55%, mean 24%), with conifers at 5-20m tall. *Pinus coulteri* dominates or co-dominates with *Pinus sabiniana* in the tree overstory, and both species are sometimes regenerating in the understory. The shrub layer is open to continuous (25-82%, mean 59.2%) at 0-5m tall, and the herbaceous layer is open (0-1%, mean 0.2%) at 0-0.5m tall. Total vegetation cover is 32-90%, mean 72.0 %.

In this association, *Pinus coulteri* is dominant and *P. sabiniana* is sub-dominant to co-dominant, while other conifers such as *Calocedrus decurrens* and *Pinus jeffreyi* may occur in the tree overstory at sparse cover and may be regenerating in the understory. In the shrub layer, *Quercus durata* dominates or co-dominates with other shrubs. *Arctostaphylos pungens* is characteristically present and may be low in cover to co-dominant with *Quercus durata*. *Ceanothus cuneatus* is also characteristically present as a sub-dominant. The sparse understory herb layer is comprised of mostly native grasses and forbs, including *Galium andrewsii* and *Elymus multisetus.*

Monardella antonina subsp. *benitensis,* a CNPS List 4 species, was found in 2 of 20 stands sampled. *Calystegia collina* subsp. *venusta,* also a CNPS List 4 species, was found in 1 of 20 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 4192-5235ft, mean 4736ft
Aspect: all aspects (except flat)
Slope: most often somewhat steep, less often gentle to moderately steep, range 5-25 degrees, mean 16.7 degrees
Topography: most often undulating, less often convex or concave; bottom to top slopes, most often middle to top slopes
Small Rock Cover: range 1-55%, mean 17.2%
Large Rock Cover: range 0-6%, mean 1.3%
Litter Cover: range 19-89%, mean 60.2%
Bare Ground: range 3-48%, mean 17.2%
Parent Material: serpentine
Soil Texture: varies from coarse loamy sand to moderately fine, sandy clay loam to silty clay loam

This association was sampled in the Canada Azul, Clear Creek, East Fork San Carlos Creek and Sawmill Creek watersheds within the Serpentine portion of the study area.

Samples used to describe association: (n=20)
CCBLM013, CCBLM057, CCBLM058, CCBLM071, CCBLM075, CCBLM107, CCBLM154, CCBLM161, CCBLM194, CCBLM201, CCBLM202, CCBLM283, CCBLM284, CCBLM285, CCBLM286, CCBLM310, CCBLM311, CCBLM313, CCBLM314, CCBLM315

Rank: G3S3

GLOBAL DISTRIBUTION

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REFERENCES CITED

Sawyer and Keeler-Wolf 1995

***Pinus coulteri-Pinus sabiniana/Quercus durata-Arctostaphylos pungens* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PICO3-t	*Pinus coulteri*	100	17.1	1	50
	PISA2-t	*Pinus sabiniana*	90	6.9	0.2	30
	CADE27-t	*Calocedrus decurrens*	65	0.4	0.2	3
Tree Understory	PISA2-m	*Pinus sabiniana*	50	0.8	0.2	5
	PICO3-m	*Pinus coulteri*	40	1.5	0.2	12
	CADE27-m	*Calocedrus decurrens*	15	0.0	0.2	0.2
Shrub	QUDU4	*Quercus durata*	100	36.6	5	80
	ARPU5	*Arctostaphylos pungens*	100	12.8	1	35
	CECU	*Ceanothus cuneatus*	90	3.1	0.2	10
	RHTO6	*Rhamnus tomentella*	80	0.8	0.2	3
	ARGL4	*Arctostaphylos glauca*	70	6.7	0.2	25
	GARRY	*Garrya*	50	0.6	0.2	3
	ERCA6	*Eriodictyon californicum*	40	0.1	0.2	1
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	35	0.2	0.2	2
	RHIL	*Rhamnus ilicifolia*	20	0.0	0.2	0.2
	ERCO25	*Eriophyllum confertiflorum*	15	0.0	0.2	0.2
	ADFA	*Adenostoma fasciculatum*	10	0.2	0.2	4
Herb	GAAN	*Galium andrewsii*	45	0.1	0.2	0.2
	ELMU3	*Elymus multisetus*	25	0.1	0.2	0.2
	MOANB	*Monardella antonina* subsp. *benitensis*	10	0.1	0.2	1
	GAPO	*Galium porrigens*	10	0.0	0.2	0.2
	LUCO	*Lupinus concinnus*	10	0.0	0.2	0.2

***Pinus coulteri/Arctostaphylos glauca* Association**

Coulter Pine / Bigberry Manzanita Association

LOCAL VEGETATION DESCRIPTION

Stands of *Pinus coulteri/Arctostaphylos glauca* Woodland form an open tree layer (12-25%, mean 17%), at 5-35m tall. *Pinus coulteri* dominates in the tree overstory and is frequently regenerating in the understory. The shrub layer is open to intermittent (12-55%, mean 32.5%) with low shrubs at 0-2m tall and with tall shrubs at 1-5m tall. The herbaceous layer is open (0.2-8%, mean 3.3%) at 0-0.5m tall. Total vegetation cover is 30-55%, mean 44.5%.

In the *Pinus coulteri/Arctostaphylos glauca* Association, *Pinus coulteri* is dominant though other conifer species such as *Pinus sabiniana*, *Calocedrus decurrens,* and *Pinus jeffreyi* frequently intermix at low cover in the tree overstory and understory. *Arctostaphylos glauca* is consistently present as the dominant shrub, while shrubs *Rhamnus tomentella*, *Chrysothamnus nauseosus* subsp. *mohavensis*, and *Eriodictyon californicum* are characteristically present at sparse cover. Native grass *Elymus multisetus* is characteristic in the herb understory, while a variety of other herbs may also occur (see species table).

Eriogonum umbellatum was found in 2 of 4 stands, though there are no vouchers to confirm its variety designation. *Eriogonum umbellatum* var. *bahiiforme,* a CNPS List 4 species, occurs frequently on serpentinite soils and may occur within this association.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 4229-4481ft, mean 4379ft
Aspect: NE and SW
Slope: somewhat steep to steep, range 20-35 degrees, mean 26.5 degrees
Topography: undulating or flat; low to upper slopes
Small Rock Cover: range 7-30%, mean 17%
Large Rock Cover: range 0.2-12%, mean 3%
Litter Cover: range 47-69%, mean 57%
Bare Ground: range 5.8-30%, mean 19%
Parent Material: frequently serpentine, occasionally sedimentary
Soil Texture: medium sand, medium to very fine sandy loam, moderately fine sandy clay loam

This association was sampled in the East Fork San Carlos Creek and the Sawmill Creek watersheds within the Western Non-Serpentine and the Serpentine portions of the study area.

Samples used to describe association: (n=4)
CCBLM070, CCBLM297, CCBLM300, CCBLM306

Rank: G3S3

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REFERENCES CITED

Sawyer and Keeler-Wolf 1995

***Pinus coulteri/Arctostaphylos glauca* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PICO3-t	*Pinus coulteri*	100	11.3	2	18
	PISA2-t	*Pinus sabiniana*	100	4.5	1	13
	CADE27-t	*Calocedrus decurrens*	75	0.6	0.2	2
	PIJE-t	*Pinus jeffreyi*	50	1.3	1	4
Tree Understory	PICO3-m	*Pinus coulteri*	75	0.8	0.2	2
	PISA2-m	*Pinus sabiniana*	50	0.3	0.2	1
	CADE27-m	*Calocedrus decurrens*	25	0.1	0.2	0.2
	PIJE-m	*Pinus jeffreyi*	25	0.1	0.2	0.2
Shrub	ARGL4	*Arctostaphylos glauca*	100	26.8	6	50
	RHTO6	*Rhamnus tomentella*	100	1.0	0.2	2
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	100	1.0	1	1
	ERCA6	*Eriodictyon californicum*	100	0.9	0.2	2
	QUDU4	*Quercus durata*	75	0.8	0.2	2
	ARPU5	*Arctostaphylos pungens*	50	2.0	0.2	8
	CECU	*Ceanothus cuneatus*	25	0.5	2	2
	BEAQD	*Berberis aquifolium* var. *dictyota*	25	0.1	0.2	0.2
	RHIL	*Rhamnus ilicifolia*	25	0.1	0.2	0.2
Herb	ELMU3	*Elymus multisetus*	100	2.8	0.2	8
	ERCA14	*Erysimum capitatum*	50	0.1	0.2	0.2
	GAAN	*Galium andrewsii*	50	0.1	0.2	0.2
	CORI2	*Cordylanthus rigidus*	25	0.5	2	2
	ASAC	*Astragalus accidens*	25	0.1	0.2	0.2
	ERIOG	*Eriogonum*	25	0.1	0.2	0.2
	SIBE	*Sisyrinchium bellum*	25	0.1	0.2	0.2
	ERUM	*Eriogonum umbellatum*	50	0.1	0.2	0.2

***Pinus coulteri/Quercus durata* Association**

Coulter Pine / Leather Oak Association

LOCAL VEGETATION DESCRIPTION

Stands of *Pinus coulteri/Quercus durata* Woodland form an open tree layer (10-25%, mean 16.7%) at 5-20m tall. *Pinus coulteri* dominates in the tree overstory and is infrequently regenerating in the understory. The shrub layer is intermittent to continuous (35-75%, mean 57.4%) at low: 0-2, tall: 2-5m tall, and the herbaceous layer is open (0.2-7%, mean 1.2%) at 0-0.5m tall. Total vegetation cover is 48-75%, mean 65.4%.

In the *Pinus coulteri/Quercus durata* Association, *Pinus coulteri* is dominant though other conifer species such as *Pinus sabiniana*, *Pinus jeffreyi*, and *Calocedrus decurrens* may also occur at low cover in the tree overstory and understory. *Quercus durata* is consistently present as the dominant shrub species, while *Arctostaphylos glauca, Ceanothus cuneatus,* and *Rhamnus tomentella* are characteristically present as sub-dominant shrubs. The herb layer is sparse and may include species such as *Galium andrewsii, Achillea millefolium,* and *Monardella antonina* subsp. *benitensis*.

Monardella antonina subsp. *benitensis*, a CNPS List 4 species, was found on 2 of the 7 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3369-4880ft, mean 4435ft
Aspect: most often NE, less often NW, rarely SW
Slope: somewhat steep, range 15-26 degrees, mean 20.5 degrees
Topography: frequently undulating, rarely convex; lower to top slopes
Small Rock Cover: range 5-60%, mean 25.4%
Large Rock Cover: range 0.2-2.4%, mean 1%
Litter Cover: range 12-74%, mean 47.7%
Bare Ground: range 5-60%, mean 22.3%
Parent Material: serpentine
Soil Texture: coarse to very fine loamy sand, moderately coarse sandy loam, medium loam

This association was sampled in the Arroyo Leona, Canada Azul, Clear Creek, Larious Canyon and Sawmill Creek watersheds within the Serpentine portion of the study area.

Samples used to describe association: (n=7)
CCBLM056, CCBLM068, CCBLM101, CCBLM105, CCBLM110, CCBLM151, CCBLM159

Rank: G3S3

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REFERENCES CITED

Sawyer and Keeler-Wolf 1995

***Pinus coulteri/Quercus durata* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PICO3-t	*Pinus coulteri*	100	15.4	10	25
	PISA2-t	*Pinus sabiniana*	86	0.9	0.2	3
	CADE27-t	*Calocedrus decurrens*	43	0.5	0.2	2
	PIJE-t	*Pinus jeffreyi*	43	0.3	0.2	1
Tree Understory	PICO3-m	*Pinus coulteri*	14	0.7	5	5
	CADE27-m	*Calocedrus decurrens*	14	0.1	1	1
	PISA2-l	*Pinus sabiniana*	14	0.0	0.2	0.2
Shrub	QUDU4	*Quercus durata*	100	31.4	20	40
	ARGL4	*Arctostaphylos glauca*	100	13.7	2	30
	CECU	*Ceanothus cuneatus*	100	9.7	0.2	30
	RHTO6	*Rhamnus tomentella*	100	1.9	0.2	4
	ERCA6	*Eriodictyon californicum*	86	0.4	0.2	2
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	57	0.1	0.2	0.2
	GARRY	*Garrya*	57	0.1	0.2	0.2
	RHIL	*Rhamnus ilicifolia*	43	0.2	0.2	1
	ADFA	*Adenostoma fasciculatum*	14	0.0	0.2	0.2
	ARPU5	*Arctostaphylos pungens*	14	0.0	0.2	0.2
	BEAQD	*Berberis aquifolium* var. *dictyota*	14	0.0	0.2	0.2
	TODI	*Toxicodendron diversilobum*	14	0.0	0.2	0.2
Herb	GAAN	*Galium andrewsii*	71	0.1	0.2	0.2
	ACMI2	*Achillea millefolium*	29	0.3	0.2	2
	MOANB	*Monardella antonina* subsp. *benitensis*	29	0.2	0.2	1
	GAPO	*Galium porrigens*	14	0.0	0.2	0.2
	LUCO	*Lupinus concinnus*	14	0.0	0.2	0.2
	VIPUQ	*Viola purpurea* subsp. *quercetorum*	14	0.0	0.2	0.2

***Pinus coulteri-Quercus chrysolepis* Alliance** (no association defined)

Coulter Pine - Canyon Live Oak Alliance

LOCAL VEGETATION DESCRIPTION

Stands of *Pinus coulteri-Quercus chrysolepis* Woodland form an intermittent tree layer (48-50%, mean 49%), with conifers at 15-20m tall and hardwoods at 5-15m tall. In the two stands sampled, *Quercus chrysolepis* is dominant and *Pinus coulteri* is sub-dominant in the tree overstory, and both species can be regenerating in the understory. The shrub layer is open to intermittent (5-45%, mean 25%) with low shrubs at 0-0.5 tall and with tall shrubs at 2-5m tall. The herbaceous layer is open (0.2%, mean 0.2%) at 0-0.5m tall. Total vegetation cover is 53-85%, mean 69%.

In this alliance, *Calocedrus decurrens* and *Pinus sabiniana* may be present at sparse cover in the overstory tree layer, and they may be regenerating in the understory. The shrub layer may include species such as *Toxicodendron diversilobum, Quercus durata,* and *Ceanothus cuneatus*. The herb understory consists of native grasses and forbs such as *Claytonia perfoliata*, *Poa secunda*, and *Melica torreyana*.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 4000-4497ft, mean 4249ft
Aspect: NE
Slope: steep, range 30-40 degrees, mean 35 degrees
Topography: convex; lower to upper slopes
Small Rock Cover: range 13-15%, mean 14%
Large Rock Cover: range 1-4%, mean 2.5%
Litter Cover: range 72-74%, mean 73%
Bare Ground: range 5-5%, mean 5%
Parent Material: serpentine or sedimentary
Soil Texture: moderately coarse sandy loam

This alliance was sampled in the East Fork San Carlos Creek and the Sawmill Creek watersheds within the Western Non-Serpentine and the Serpentine portions of the study area.

Samples used to describe alliance: (n=2)
CCBLM011, CCBLM303

Rank: G5S5

GLOBAL DISTRIBUTION

montane Central Coast, montane Transverse Ranges, montane Peninsular Ranges, Baja CA

REFERENCES CITED

Klein and Evens 2005, NatureServe 2005, Sawyer and Keeler-Wolf 1995, Holland 1986

***Pinus coulteri-Quercus chrysolepis* Alliance** (no association defined)

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUCH2-t	*Quercus chrysolepis*	100	46.0	40	52
	PICO3-t	*Pinus coulteri*	100	7.5	7	8
	CADE27-t	*Calocedrus decurrens*	100	0.2	0.2	0.2
	PISA2-t	*Pinus sabiniana*	50	0.5	1	1
Tree Understory	PICO3-m	*Pinus coulteri*	50	2.5	5	5
	PICO3-l	*Pinus coulteri*	50	0.1	0.2	0.2
	PISA2-m	*Pinus sabiniana*	50	0.1	0.2	0.2
Shrub	TODI	*Toxicodendron diversilobum*	100	2.1	0.2	4
	QUDU4	*Quercus durata*	100	1.1	0.2	2
	CECU	*Ceanothus cuneatus*	100	0.2	0.2	0.2
	CELE2	*Ceanothus leucodermis*	50	11.5	23	23
	FRCA6	*Fremontodendron californicum*	50	1.0	2	2
	RHTO6	*Rhamnus tomentella*	50	1.0	2	2
	BEAQD	*Berberis aquifolium* var. *dictyota*	50	0.1	0.2	0.2
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	50	0.1	0.2	0.2
	PRVID2	*Prunus virginiana* subsp. *demissa*	50	0.1	0.2	0.2
	RICAC	*Ribes californicum* var. *californicum*	50	0.1	0.2	0.2
Herb	CLPE	*Claytonia perfoliata*	50	1.0	2	2
	METO	*Melica torreyana*	50	0.1	0.2	0.2
	POSE	*Poa secunda*	50	0.1	0.2	0.2

***Pinus jeffreyi* Alliance** (no association defined)

Jeffrey Pine Alliance

LOCAL VEGETATION DESCRIPTION

Stands of *Pinus sabiniana jeffreyi* Woodland form an open tree layer (13-17%, mean 15.0%), with conifers at 10-20m tall and hardwoods at 5-10m tall. *Pinus jeffreyi* dominates in the tree overstory, or it may co-dominate with *Pinus sabiniana.* The shrub layer is open to continuous (25-70%, mean 47.5%) with low shrubs at 0-2m tall and with tall shrubs at 1-5m tall. The herbaceous layer is open to continuous (3-30%, mean 16.5%) at 0-0.5m tall. Total vegetation cover is 37-80%, mean 58.5%.

In this alliance, *Pinus jeffreyi* is dominant in the tree overstory, or it may sometimes co-dominate with *Pinus sabiniana*. Both tree species may be regenerating in the understory. The shrub layer has higher cover than the tree layer in the two stands sampled, with *Prunus virginiana* highly abundant in one stand and *Arctostaphylos glauca* dominant in the other. The herb understory exclusively contains native species, with *Viola purpurea* subsp. *quercetorum* characteristic in two stands and with *Claytonia perfoliata* highly abundant in one stand.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3675-4013ft, mean 3844ft
Aspect: NE or NW
Slope: moderate to somewhat steep, range 11-24 degrees, mean 17.5 degrees
Topography: concave; lower to upper slopes
Small Rock Cover: range 20-24%, mean 22%
Large Rock Cover: range 0-0.3%, mean 0.2%
Litter Cover: range 45-64%, mean 54.5%
Bare Ground: range 8-33%, mean 20.5%
Parent Material: sedimentary
Soil Texture: coarse loamy sand, medium loam

This association was sampled in the Clear Creek and Sawmill Creek watersheds within the Serpentine portion of the study area.

Samples used to describe alliance: (n=2)
CCBLM001, CCBLM016

Rank: G4S4 (Alliance)

GLOBAL DISTRIBUTION

montane North Coast Ranges, montane Central Coast Ranges, low elevations of the Klamath Ranges, montane Klamath Ranges, subalpine Klamath Ranges, inner montane Transverse Ranges, montane Peninsular Ranges, Baja CA

REFERENCES CITED

NatureServe 2005, Jimerson et al. 1995, Sawyer and Keeler-Wolf 1995, Holland 1986, Kruckeberg 1984

***Pinus jeffreyi* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PIJE-t	*Pinus jeffreyi*	100	10.0	10	10
	PISA2-t	*Pinus sabiniana*	100	4.0	3	5
	CADE27-t	*Calocedrus decurrens*	50	1.0	2	2
Tree Understory	PISA2-m	*Pinus sabiniana*	50	1.5	3	3
	PIJE-m	*Pinus jeffreyi*	50	1.0	2	2
	PIJE-l	*Pinus jeffreyi*	50	0.1	0.2	0.2
Shrub	PRVID2	*Prunus virginiana* subsp. *demissa*	50	35.0	70	70
	ARGL4	*Arctostaphylos glauca*	50	9.0	18	18
	ERCA6	*Eriodictyon californicum*	50	1.5	3	3
	RHTO6	*Rhamnus tomentella*	50	1.5	3	3
	AMUT	*Amelanchier utahensis*	50	0.5	1	1
	CECU	*Ceanothus cuneatus*	50	0.5	1	1
	BEAQD	*Berberis aquifolium* var. *dictyota*	50	0.1	0.2	0.2
Herb	VIPUQ	*Viola purpurea* subsp. *quercetorum*	100	1.0	1	1
	CLPE	*Claytonia perfoliata*	50	15.0	30	30
	CRYPT	*Cryptantha*	50	0.5	1	1
	LILE3	*Linum lewisii*	50	0.5	1	1
	ACMI2	*Achillea millefolium*	50	0.1	0.2	0.2
	ALBU	*Allium burlewii*	50	0.1	0.2	0.2
	ARDO3	*Artemisia douglasiana*	50	0.1	0.2	0.2
	ELMU3	*Elymus multisetus*	50	0.1	0.2	0.2
	GAAN	*Galium andrewsii*	50	0.1	0.2	0.2
	GAPO	*Galium porrigens*	50	0.1	0.2	0.2
	SILE2	*Silene lemmonii*	50	0.1	0.2	0.2
Cryptogam	MOSS	*Moss*	50	1.0	2	2

***Pinus sabiniana/Juniperus californica/*Annual-Perennial Herb Association**

Foothill Pine / California Juniper / Annual - Perennial Herb Association

LOCAL VEGETATION DESCRIPTION

Stands of *Pinus sabiniana/Juniperus californica/*Annual-Perennial Herb Woodland form an open tree layer (10-20%, mean 14.0%), with conifers at 10-20m tall and hardwoods at 5-10m tall. *Pinus sabiniana* dominates in the tree overstory and is infrequently regenerating in the understory. The shrub layer is open to intermittent (13-65%, mean 30.1%) with low shrubs at 0-2m tall and with tall shrubs at 1-5m tall. The herbaceous layer is open to continuous (20-70%, mean 45%) at 0-0.5m tall. Total vegetation cover is 45-90%, mean 69.7%.

In this association, *Pinus sabiniana* is dominant in the tree overstory, while *Quercus douglasii* is occasionally present in at lower cover in the overstory or understory. In the shrub layer, *Juniperus californica* and *Eriophyllum confertiflorum* are characteristically present at low cover, and *Eriogonum fasciculatum* var*. foliolosum* often occurs and may be dominant in this layer. Non-native grasses *Bromus madritensis* and *Avena* spp., and native grasses *Vulpia microstachys*, and *Poa secunda* are often present with a variety of other grass and forb species in the herb understory.

Eriogonum nudum var. *indictum*, *Acanthomintha obovata* subsp. *obovata*, *Clarkia breweri* and *Monardella antonina* subsp. *benitensis* are CNPS List 4 species. Each species was found in 1 of the 7stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 1970-3768ft, mean 3203ft
Aspect: most often NW, less often SW or SE
Slope: somewhat steep to steep, range 25-40 degrees, mean 31.1 degrees
Topography: most often undulating, less often flat, concave or convex; lower to top slopes
Small Rock Cover: range 0-75%, mean 14.6%
Large Rock Cover: range 0-7%, mean 1.3%
Litter Cover: range 4.2-76%, mean 40.7%
Bare Ground: range 7-91%, mean 39.8%
Parent Material: sedimentary
Soil Texture: coarse sand, moderately fine clay loam, moderately fine silty clay loam, fine sandy clay

This association was sampled in the Ne Hi Canyon, Pine Canyon and Urruttia Canyon watersheds within the Eastern Non-Serpentine portion of the study area.

Samples used to describe association: (n=7)
CCBLM420, CCBLM425, CCBLM467, CCBLM469, CCBLM507, CCBLM537, CCBLM549

Rank: G3S3

GLOBAL DISTRIBUTION

Coast Ranges, western Transverse Ranges, Sierra Nevada

REFERENCES CITED

Holland 1986

***Pinus sabiniana*/*Juniperus californica*/Annual-Perennial Herb Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	100	11.4	9	15
	QUDO-t	*Quercus douglasii*	43	1.3	0.2	5
Tree Understory	QUDO-m	*Quercus douglasii*	29	1.1	2	6
	PISA2-m	*Pinus sabiniana*	14	0.4	3	3
	QUWI2-m	*Quercus wislizeni*	14	0.0	0.2	0.2
Shrub	JUCA7	*Juniperus californica*	86	4.6	1	10
	ERLI6	*Ericameria linearifolia*	71	1.7	0.2	7
	ERCO25	*Eriophyllum confertiflorum*	71	1.2	0.2	5
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	43	6.0	0.2	40
	QUJO3	*Quercus john-tuckeri*	29	2.6	5	13
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	29	1.1	1	7
	CEBE3	*Cercocarpus betuloides*	29	0.1	0.2	0.2
	LUAL4	*Lupinus albifrons*	29	0.1	0.2	0.2
	RHIL	*Rhamnus ilicifolia*	29	0.1	0.2	0.2
	YUWH	*Yucca whipplei*	14	2.9	20	20
	ERFAP	*Eriogonum fasciculatum* var. *polifolium*	14	0.7	5	5
	FRDI2	*Fraxinus dipetala*	14	0.7	5	5
	ARCA11	*Artemisia californica*	14	0.6	4	4
	CECU	*Ceanothus cuneatus*	14	0.1	1	1
	ERCA6	*Eriodictyon californicum*	14	0.1	1	1
	GUCA	*Gutierrezia californica*	14	0.1	1	1
	CELE2	*Ceanothus leucodermis*	14	0.0	0.2	0.2
	RIQU	*Ribes quercetorum*	14	0.0	0.2	0.2
	SAME5	*Sambucus mexicana*	14	0.0	0.2	0.2
	SYALL	*Symphoricarpos albus* var. *laevigatus*	14	0.0	0.2	0.2
	SYMO	*Symphoricarpos mollis*	14	0.0	0.2	0.2
Herb	BRMA3	*Bromus madritensis*	71	8.9	5	25
	AVENA	*Avena*	71	7.7	1	30
	VUMI	*Vulpia microstachys*	71	2.3	0.2	10
	POSE	*Poa secunda*	71	0.3	0.2	1
	BRHO2	*Bromus hordeaceus*	57	15.0	5	45
	VUMY	*Vulpia myuros*	57	5.3	0.2	25
	BRAR3	*Bromus arenarius*	57	2.9	0.2	20
	ERCI6	*Erodium cicutarium*	29	1.7	2	10
	BRDI3	*Bromus diandrus*	29	0.1	0.2	0.2
	GAPO	*Galium porrigens*	29	0.1	0.2	0.2
	CEME2	*Centaurea melitensis*	14	0.3	2	2
	PLER3	*Plantago erecta*	14	0.3	2	2

***Pinus sabiniana*/*Juniperus californica*/Annual-Perennial Herb Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Herb	ERNUI	*Eriogonum nudum* var. *indictum*	14	0.1	1	1
	MOVI2	*Monardella villosa*	14	0.1	1	1
	NAPU2	*Navarretia pubescens*	14	0.1	1	1
	ACOB	*Acanthomintha obovata*	14	0.0	0.2	0.2
	CLBR	*Clarkia breweri*	14	0.0	0.2	0.2
	CORI2	*Cordylanthus rigidus*	14	0.0	0.2	0.2
	GAAN	*Galium andrewsii*	14	0.0	0.2	0.2
	LINAN2	*Linanthus*	14	0.0	0.2	0.2
	LOUT	*Lomatium utriculatum*	14	0.0	0.2	0.2
	MECA2	*Melica californica*	14	0.0	0.2	0.2
	MEIM	*Melica imperfecta*	14	0.0	0.2	0.2
	MOANB	*Monardella antonina* subsp. *benitensis*	14	0.0	0.2	0.2
	MODO	*Monardella douglasii*	14	0.0	0.2	0.2
	NAPR2	*Navarretia prostrata*	14	0.0	0.2	0.2
	TRWI3	*Trifolium willdenowii*	14	0.0	0.2	0.2
	LUPIN	*Lupinus*	14	0.0	0.2	0.2

***Populus fremontii* Alliance** (no association defined)

Fremont Cottonwood Alliance

LOCAL VEGETATION DESCRIPTION
In one stand of *Populus fremontii* Woodland, the tree layer is open (12%), with hardwoods at 10-15m tall. *Populus fremontii* dominates in the tree overstory. The shrub layer is open (20%) with low shrubs at 0.5-1, and tall shrubs at 2-5m tall. The herbaceous layer is open (5%) at 0-0.5m tall. Total vegetation cover is 16%.

In one stand of this alliance, *Tamarix* sp. is present in the tree understory. A combination of xeric and riparian shrubs may occur in the shrub layer (see species table), with *Baccharis salicifolia* dominant. A variety of non-native herbs occupy the herb understory, including various grasses such as *Bromus* spp., *Distichlis spicata*, and *Vulpia myuros,* and the forb *Centaurea melitensis.*

LOCAL ENVIRONMENTAL DESCRIPTION
Elevation: 1672ft
Aspect: SW
Slope: gentle, 2 degrees
Topography: undulating; bottom
Small Rock Cover: 65.4%
Large Rock Cover: 4.4%
Litter Cover: range 10.9%
Bare Ground: range 17.4%
Parent Material: sandy alluvium
Soil Texture: medium to very fine sandy loam

This alliance was sampled in the Pine Canyon watershed within the Eastern Non-Serpentine portion of the study area.

Samples used to describe alliance: (n=1)
CCBLM506

Rank: G5S5 (Alliance)

GLOBAL DISTRIBUTION
North Coast, northern Central Coast, Central Valley, Klamath foothills, Cascade Range foothills, Sierra Nevada foothills, South Coast, inner montane Transverse Ranges, montane Peninsular Ranges, Great Basin, Mojave Desert, Colorado Desert, Baja CA

REFERENCES CITED
Klein and Evens 2005, NatureServe 2005, Thomas et al. 2004, Sawyer and Keeler-Wolf 1995

***Populus fremontii* Alliance** (no association defined)

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	POFR2-t	*Populus fremontii*	100	10.0	10	10
Tree Understory	TAMAR2	*Tamarix*	100	0.2	0.2	0.2
Shrub	BASA4	*Baccharis salicifolia*	100	18.0	18	18
	JUCA7	*Juniperus californica*	100	2.0	2	2
	HASQ2	*Hazardia squarrosa*	100	1.0	1	1
	ARCA11	*Artemisia californica*	100	0.2	0.2	0.2
	GUCA	*Gutierrezia californica*	100	0.2	0.2	0.2
	NIGL	*Nicotiana glauca*	100	0.2	0.2	0.2
Herb	BRDI3	*Bromus diandrus*	100	3.0	3	3
	BRHO2	*Bromus hordeaceus*	100	2.0	2	2
	BRMA3	*Bromus madritensis*	100	1.0	1	1
	CEME2	*Centaurea melitensis*	100	0.2	0.2	0.2
	DISP	*Distichlis spicata*	100	0.2	0.2	0.2
	VUMY	*Vulpia myuros*	100	0.2	0.2	0.2

***Quercus chrysolepis* Association**

Canyon Live Oak Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus chrysolepis* Woodland and Forest form an open to continuous tree layer (9-75%, mean 44.3%), with conifers at 10-20m tall and hardwoods at 5-10m tall. *Quercus chrysolepis* dominates the overstory and may be regenerating in the understory. The shrub layer is open to continuous (3-70%, mean 30.4%) with low shrubs at 0-2m and tall shrubs at 0.5-5m tall. The herbaceous layer is open to intermittent (1-60%, mean 19.3%) at 0-0.5m tall. Total vegetation cover is 65-80%, mean 74.4%.

In this association, *Quercus chrysolepis* is dominant as an overstory tree or as a regenerating, understory tree. *Pinus sabiniana, Quercus douglasii,* and *Pinus jeffreyi* may occur in the tree canopy and in the understory at low cover. In the shrub layer, *Symphoricarpos albus* var. *laevigatus* and *Garrya (flavescens)* are often present at low cover, and they co-occur with a variety of other chaparral species (see species table). Mixtures of native and non-native forbs and grasses occupy the herb understory.

Acanthomintha obovata subsp. *obovata*, a CNPS list 4 species, was found in 1 of the 7 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3290-4644ft, mean 4090ft
Aspect: most often NE, less often NW, rarely none/flat
Slope: somewhat steep to steep (rarely flat), range (0)26-35 degrees, mean 25 degrees
Topography: most often convex, less often flat, concave or undulating; mid to top slopes
Small Rock Cover: range 0.2-20%, mean 11.5%
Large Rock Cover: range 1-23%, mean 7.8%
Litter Cover: range 38-85%, mean 62%
Bare Ground: range 3-39%, mean 15.3%
Parent Material: most often sedimentary, less often serpentine
Soil Texture: varies from coarse loamy sand to moderately fine clay loam

This association was sampled in the Arroyo Leona and Urruttia Canyon watersheds in the Eastern Non-Serpentine portion of the study area; the Duckworth Canyon and Larious Canyon watersheds within the western non-serpentine portion of the study area; and the Sawmill Creek and East Fork San Carlos Creek watersheds within the Serpentine portion of the study area.

Samples used to describe alliance: (n=7)
CCBLM017, CCBLM024, CCBLM121, CCBLM124, CCBLM 380, CCBLM545, CCBLM553

Rank: G5S4 (Alliance)

GLOBAL DISTRIBUTION

Probably the same as the alliance: outer North Coast, montane North Coast, montane Central Coast Ranges, low elevations of the Klamath Ranges, montane Klamath Ranges, montane Cascade Range, montane Sierra Nevada, montane Transverse Ranges, montane Peninsular Ranges, Baja CA

REFERENCES CITED

Klein and Evens 2005, NatureServe 2005, Borchert 2004, Ertter and Bowerman 2002, Sawyer and Keeler-Wolf 1995, Gordon & White 1994, Holland 1986

***Quercus chrysolepis* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUCH2-t	*Quercus chrysolepis*	86	47.7	25	75
	PISA2-t	*Pinus sabiniana*	71	1.5	0.2	8
	QUWI2-t	*Quercus wislizeni*	14	0.7	5	5
	QUDO-t	*Quercus douglasii*	14	0.1	1	1
	PIJE-t	*Pinus jeffreyi*	14	0.0	0.2	0.2
Tree Understory	PISA2-m	*Pinus sabiniana*	43	0.2	0.2	1
	QUWI2-m	*Quercus wislizeni*	29	1.2	0.2	8
	QUCH2-m	*Quercus chrysolepis*	14	8.6	60	60
	PISA2-l	*Pinus sabiniana*	14	0.0	0.2	0.2
Shrub	SYALL	*Symphoricarpos albus* var. *laevigatus*	57	2.7	0.2	18
	GARRY	*Garrya*	57	1.6	0.2	10
	FRDI2	*Fraxinus dipetala*	43	0.9	0.2	4
	CEBE3	*Cercocarpus betuloides*	43	0.7	0.2	3
	QUJO3	*Quercus john-tuckeri*	43	0.2	0.2	1
	TODI	*Toxicodendron diversilobum*	29	3.1	2	20
	CLLA3	*Clematis lasiantha*	29	0.3	0.2	2
	LUAL4	*Lupinus albifrons*	29	0.1	0.2	0.2
	RHIL	*Rhamnus ilicifolia*	29	0.1	0.2	0.2
	ERCO25	*Eriophyllum confertiflorum*	14	0.6	4	4
	HEAR5	*Heteromeles arbutifolia*	14	0.6	4	4
	RICAC	*Ribes californicum* var. *californicum*	14	0.1	1	1
	ARGL4	*Arctostaphylos glauca*	14	0.0	0.2	0.2
	CECU	*Ceanothus cuneatus*	14	0.0	0.2	0.2
	ERWR	*Eriogonum wrightii*	14	0.0	0.2	0.2
	FRCA6	*Fremontodendron californicum*	14	0.0	0.2	0.2
	JUCA7	*Juniperus californica*	14	0.0	0.2	0.2
	KEBRB	*Keckiella breviflora* subsp. *breviflora*	14	0.0	0.2	0.2
	LOSUD	*Lonicera subspicata* var. *denudata*	14	0.0	0.2	0.2
	PRIL	*Prunus ilicifolia*	14	0.0	0.2	0.2
	RHTO6	*Rhamnus tomentella*	14	0.0	0.2	0.2
Shrub	YUWH	*Yucca whipplei*	14	0.0	0.2	0.2
Herb	BRDI3	*Bromus diandrus*	57	6.4	5	30
	BRMA3	*Bromus madritensis*	57	2.3	0.2	10
	VUMI	*Vulpia microstachys*	43	0.3	0.2	1
	POSE	*Poa secunda*	43	0.2	0.2	1
	GAAN	*Galium andrewsii*	43	0.1	0.2	0.2

***Quercus chrysolepis* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Herb	BRHO2	*Bromus hordeaceus*	29	5.7	5	35
	GALIU	*Galium*	29	0.3	0.2	2
	GAPO	*Galium porrigens*	29	0.3	0.2	2
	CLUN	*Clarkia unguiculata*	29	0.2	0.2	1
	BRCA5	*Bromus carinatus*	29	0.1	0.2	0.2
	OSBR	*Osmorhiza brachypoda*	29	0.1	0.2	0.2
	VUMY	*Vulpia myuros*	14	1.4	10	10
	BRTE	*Bromus tectorum*	14	0.7	5	5
	CLPE	*Claytonia perfoliata*	14	0.3	2	2
	ACOBO	*Acanthomintha obovata* subsp. *obovata*	14	0.0	0.2	0.2
	APAN	*Apiastrum angustifolium*	14	0.0	0.2	0.2
	COHE	*Collinsia heterophylla*	14	0.0	0.2	0.2
	DEHEP	*Delphinium hesperium* subsp. *pallescens*	14	0.0	0.2	0.2
	LEFI11	*Lessingia filaginifolia*	14	0.0	0.2	0.2
	MEIM	*Melica imperfecta*	14	0.0	0.2	0.2
	ZIVEV	*Zigadenus venenosus* var. *venenosus*	14	0.0	0.2	0.2
Cryptogam	LICHEN	*Lichen*	14	0.7	5	5
	MOSS	*Moss*	14	0.3	2	2
Epiphyte	PHVI9	*Phoradendron villosum*	14	0.1	1	1
	CASTI2	*Castilleja*	14	0.0	0.2	0.2

***Quercus douglasii-Pinus sabiniana/Cercocarpus betuloides* Association**

Blue Oak - Foothill Pine / Birchleaf Mountain-mahogany Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus douglasii-Pinus sabiniana/Cercocarpus betuloides* Woodland form an open to continuous tree layer (34-55%, mean 41.7%), with conifers at 5-20m tall and hardwoods at 5-15m tall. *Quercus douglasii* is usually dominant while *Pinus sabiniana* is sub-dominant to co-dominant in the tree overstory. Both species are sometimes regenerating in the understory. The shrub layer is open to intermittent (9-50%, mean 23.2%) at low: 0-2, tall: 2-5m tall, and the herbaceous layer is open to intermittent (8-60%, mean 33.3%) at 0-1m tall. Total vegetation cover is 53-90%, mean 76.7%.

In this association, *Cercocarpus betuloides* is consistently present in the understory usually as the dominant shrub. Shrubs *Fraxinus dipetala, Rhamnus ilicifolia, Ericameria linearifolia* and *Juniperus californica* are often present at relatively low cover. *Bromus hordeaceus, Avena* sp., and *Poa secunda* consistently occur in the herb layer with a variety of other native and non-native grass and forb species.

Monardella antonina subsp. *benitensis,* a CNPS list 4 species, was found on 1 of 6 stands sampled. *Calystegia collina* subsp. *venusta,* a CNPS list 4 species, was found on 1 of 6 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 2684-4320ft, mean 3492ft
Aspect: NE, NW and variable
Slope: somewhat steep to steep, range 23-40 degrees, mean 29.7 degrees
Topography: undulating; lower to upper slopes
Small Rock Cover: range 1-15%, mean 7.7%
Large Rock Cover: range 0.2-20%, mean 4.4%
Litter Cover: range 17-84%, mean 61%
Bare Ground: range 2-68%, mean 22.5%
Parent Material: sedimentary
Soil Texture: most often moderately fine sandy clay loam, less often moderately fine clay

This association was sampled in the Arroyo Leona, Duckworth Canyon and Sawmill Creek watersheds within the Eastern and Western Non-Serpentine portions of the study area.

Samples used to describe association: (n=6)
CCBLM047, CCBLM166, CCBLM176, CCBLM220, CCBLM237, CCBLM246

Rank: G4S4

GLOBAL DISTRIBUTION

Inner North Coast, montane Central coast, South Coast, Central Valley, Sierra Nevada foothills

REFERENCES CITED

Allen et al. 1989, Holland 1986

***Quercus douglasii-Pinus sabiniana/Cercocarpus betuloides* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUDO-t	*Quercus douglasii*	100	32.7	30	40
	PISA2-t	*Pinus sabiniana*	100	9.0	4	20
	AECA-t	*Aesculus californica*	17	0.0	0.2	0.2
Tree Understory	QUDO-m	*Quercus douglasii*	50	1.0	2	2
	PISA2-m	*Pinus sabiniana*	33	0.3	1	1
	QUWI2-m	*Quercus wislizeni*	17	0.0	0.2	0.2
Shrub	CEBE3	*Cercocarpus betuloides*	100	12.0	2	25
	FRDI2	*Fraxinus dipetala*	67	2.0	0.2	5
	RHIL	*Rhamnus ilicifolia*	67	1.0	1	3
	ERLI6	*Ericameria linearifolia*	67	0.7	0.2	2
	JUCA7	*Juniperus californica*	67	0.4	0.2	1
	CECU	*Ceanothus cuneatus*	33	4.2	0.2	25
	SYALL	*Symphoricarpos albus* var. *laevigatus*	33	0.3	1	1
	ERCO25	*Eriophyllum confertiflorum*	33	0.1	0.2	0.2
	ADFA	*Adenostoma fasciculatum*	17	0.3	2	2
	CEIN3	*Ceanothus integerrimus*	17	0.3	2	2
	CLLA3	*Clematis lasiantha*	17	0.2	1	1
	LOSUD	*Lonicera subspicata* var. *denudata*	17	0.2	1	1
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	17	0.0	0.2	0.2
	HEAR5	*Heteromeles arbutifolia*	17	0.0	0.2	0.2
	QUAL2	*Quercus ×alvordiana*	17	0.0	0.2	0.2
	QUJO3	*Quercus john-tuckeri*	17	0.0	0.2	0.2
	RIQU	*Ribes quercetorum*	17	0.0	0.2	0.2
	TODI	*Toxicodendron diversilobum*	17	0.0	0.2	0.2
Herb	BRHO2	*Bromus hordeaceus*	83	9.5	0.2	30
	AVENA	*Avena*	83	9.2	0.2	35
	POSE	*Poa secunda*	83	0.6	0.2	1
	VUMI	*Vulpia microstachys*	67	0.4	0.2	1
	BRAR3	*Bromus arenarius*	50	0.7	0.2	3
	MADIA	*Madia*	33	0.5	0.2	3
	BRMA3	*Bromus madritensis*	33	0.5	1	2
	MICAC2	*Micropus californicus* var. *californicus*	33	0.2	0.2	1
	ELMU3	*Elymus multisetus*	33	0.1	0.2	0.2
	BRDI3	*Bromus diandrus*	17	0.5	3	3
	ACMI2	*Achillea millefolium*	17	0.0	0.2	0.2
	BLCR	*Bloomeria crocea*	17	0.0	0.2	0.2
	BRCA5	*Bromus carinatus*	17	0.0	0.2	0.2

***Quercus douglasii-Pinus sabiniana/Cercocarpus betuloides* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Herb	CACOV	*Calystegia collina* subsp. *venusta*	17	0.0	0.2	0.2
	CLUN	*Clarkia unguiculata*	17	0.0	0.2	0.2
	GAAN	*Galium andrewsii*	17	0.0	0.2	0.2
	GAAN2	*Galium angustifolium*	17	0.0	0.2	0.2
	MECA2	*Melica californica*	17	0.0	0.2	0.2
	MOANB	*Monardella antonina* subsp. *benitensis*	17	0.0	0.2	0.2
	NAPU4	*Nassella pulchra*	17	0.0	0.2	0.2
	NAVAR	*Navarretia*	17	0.0	0.2	0.2

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

Blue Oak - Interior Live Oak - Foothill Pine Association

LOCAL VEGETATION DESCRIPTION

In one stand of *Quercus douglasii-Quercus wislizeni-Pinus sabiniana* Woodland, the tree layer is intermittent (40%) with conifers at 10-15m tall and hardwoods at 5-10m tall. *Quercus douglasii* and *Pinus sabiniana* dominate in the tree overstory and may be regenerating in the understory. *Quercus wislizeni* occurs as a sub-dominant in the tree overstory. The shrub layer is intermittent (40%) with low shrubs at 0-0.5m tall and tall shrubs at 2-5m tall, and the herbaceous layer is open (10%) at 0-0.5m tall. Total vegetation cover is 65%.

In the one stand sampled, *Quercus wislizeni* dominates the shrub layer while other shrubs occur at low cover including *Ceanothus cuneatus, Rhamnus ilicifolia, Cercocarpus betuloides,* and *Rhamnus ilicifolia.* The herb understory may include a variety of native and non-native forbs and grasses.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, 4462ft
Aspect: SE
Slope: steep, 30 degrees
Topography: undulating, upper slope
Small Rock Cover: 16%
Large Rock Cover: 0.2%
Litter Cover: range 70.8%
Bare Ground: 8%
Parent Material: serpentine
Soil Texture: moderately fine sandy clay loam

This association was sampled in the Duckworth Canyon watershed within the Serpentine portion of the study area.

Samples used to describe association: (n=1)
CCBLM037

Rank: G4S4

GLOBAL DISTRIBUTION

inner North Coast, Central Coast, South Coast, Sierra Nevada foothills

REFERENCES CITED

NatureServe 2005, Ertter and Bowerman 2002, Allen et al. 1989, Holland 1986

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

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	100	10.0	10	10
	QUDO-t	*Quercus douglasii*	100	10.0	10	10
	QUWI2-t	*Quercus wislizeni*	100	5.0	5	5
Tree Understory	QUWI2-m	*Quercus wislizeni*	100	20.0	20	20
Shrub	CECU	*Ceanothus cuneatus*	100	4.0	4	4
	CEBE3	*Cercocarpus betuloides*	100	1.0	1	1
	RHIL	*Rhamnus ilicifolia*	100	1.0	1	1
	ERWR	*Eriogonum wrightii*	100	0.2	0.2	0.2
Herb	BRHO2	*Bromus hordeaceus*	100	8.0	8	8
	BRAR3	*Bromus arenarius*	100	1.0	1	1
	BRDI3	*Bromus diandrus*	100	1.0	1	1
	GAAN	*Galium andrewsii*	100	1.0	1	1
	VIPUQ	*Viola purpurea* subsp. *quercetorum*	100	1.0	1	1
	COHE	*Collinsia heterophylla*	100	0.2	0.2	0.2
	ELMU3	*Elymus multisetus*	100	0.2	0.2	0.2
	MECA2	*Melica californica*	100	0.2	0.2	0.2
	POSE	*Poa secunda*	100	0.2	0.2	0.2

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

Blue Oak / Wedgeleaf Ceanothus Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus douglasii/Ceanothus cuneatus* Woodland form an open tree layer (12-21%, mean 16%), with conifers at 5-20m tall and hardwoods at 5-10m tall. *Quercus douglasii* dominates in the tree overstory and is sometimes regenerating in the understory. The shrub layer is open to intermittent (14-60%, mean 38.5%) with low shrubs at 0-2m tall and tall shrubs at 1-5m tall, and the herbaceous layer is open (0.2-25%, mean 17.0%) at 0-0.5m tall. Total vegetation cover is 45-80%, mean 63.2%.

In this association, *Quercus douglasii* dominates in the tree overstory while other hardwood and conifer species such as *Quercus wislizeni* and *Pinus sabiniana* can be found. In the shrub layer, *Ceanothus cuneatus* is consistently present as the dominant (or co-dominant with *Ceanothus leucodermis)*, and it also intermixes with a variety of other species (see species table). Native and non-native grasses occupy the open herb understory.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3609-4366ft, mean 3932ft
Aspect: neutral, mainly NW, SE
Slope: moderate to steep, range 7-32 degrees, mean 19.3 degrees
Topography: convex, concave, or undulating; middle to top slopes
Small Rock Cover: range 5-55%, mean 22%
Large Rock Cover: range 0.2-4%, mean 1.4%
Litter Cover: range 25-79%, mean 49.8%
Bare Ground: range 10-40%, mean 20.5%
Parent Material: sedimentary
Soil Texture: coarse loamy sand, moderately fine clay loam, moderately fine sandy clay loam

This association was sampled in the Domengine Creek and Pine Canyon watersheds within the Eastern Non-Serpentine portion of the study area and Duckworth Canyon watershed in the Western Non-Serpentine portion of the study area.

Samples used to describe association: (n=4)
CCBLM239, CCBLM385, CCBLM533, CCBLM535

Rank: G4S4

GLOBAL DISTRIBUTION

Central Coast, Central Valley

REFERENCES CITED

Allen et al. 1989

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

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUDO-t	*Quercus douglasii*	100	12.3	8	20
	PISA2-t	*Pinus sabiniana*	100	6.0	1	11
	QUWI2-t	*Quercus wislizeni*	25	0.5	2	2
Tree Understory	QUDO-m	*Quercus douglasii*	25	0.8	3	3
Shrub	CECU	*Ceanothus cuneatus*	100	19.8	6	45
	ERLI6	*Ericameria linearifolia*	75	2.8	2	5
	QUJO3	*Quercus john-tuckeri*	75	2.0	1	5
	JUCA7	*Juniperus californica*	75	0.3	0.2	1
	ERCO25	*Eriophyllum confertiflorum*	50	1.3	2	3
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	50	0.3	0.2	1
	CELE2	*Ceanothus leucodermis*	25	7.5	30	30
	ERWR	*Eriogonum wrightii*	25	1.5	6	6
	ADFA	*Adenostoma fasciculatum*	25	1.3	5	5
	ERFA2	*Eriogonum fasciculatum*	25	0.5	2	2
	CEBE3	*Cercocarpus betuloides*	25	0.3	1	1
	ERCA6	*Eriodictyon californicum*	25	0.3	1	1
	ERTO	*Eriodictyon tomentosum*	25	0.3	1	1
	ARGL4	*Arctostaphylos glauca*	25	0.1	0.2	0.2
	ARTR2	*Artemisia tridentata*	25	0.1	0.2	0.2
	RIQU	*Ribes quercetorum*	25	0.1	0.2	0.2
	SAME5	*Sambucus mexicana*	25	0.1	0.2	0.2
	TODI	*Toxicodendron diversilobum*	25	0.1	0.2	0.2
	YUWH	*Yucca whipplei*	25	0.1	0.2	0.2
Herb	BRAR3	*Bromus arenarius*	75	4.3	2	12
	BRMA3	*Bromus madritensis*	75	2.3	1	7
	NAPU4	*Nassella pulchra*	50	0.5	1	1
	POSE	*Poa secunda*	50	0.1	0.2	0.2
	BRHO2	*Bromus hordeaceus*	25	2.5	10	10
	VUMY	*Vulpia myuros*	25	2.0	8	8
	AVFA	*Avena fatua*	25	1.3	5	5
	VUMI	*Vulpia microstachys*	25	1.3	5	5
	AVENA	*Avena*	25	0.8	3	3
	KOMA	*Koeleria macrantha*	25	0.3	1	1
	CHORI2	*Chorizanthe*	25	0.1	0.2	0.2
	LICI	*Linanthus ciliatus*	25	0.1	0.2	0.2
	MEIM	*Melica imperfecta*	25	0.1	0.2	0.2
	SNAG	Standing snag	25	0.1	0.2	0.2

Quercus douglasii/Ericameria linearifolia-Juniperus californica Association

Blue Oak / Narrowleaf Goldenbush - California Juniper Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus douglasii/Ericameria linearifolia-Juniperus californica* Woodland form an open to intermittent tree layer (10-57%, mean 26.4%), with conifers at 5-20m tall and hardwoods at 5-15m tall. *Quercus douglasii* dominates in the tree overstory and is often regenerating in the understory. The shrub layer is open to intermittent (0.2-45%, mean 18.5%) with low shrubs at 0-2m and tall shrubs at 1-5m tall, and the herbaceous layer is open to intermittent (10-60%, mean 34%) at 0-1m tall. Total vegetation cover is 30-85%, mean 65.2%.

In this association, *Quercus douglasii* is dominant, and *Pinus sabiniana* is characteristically present in the tree overstory at low cover. Both of these trees are often regenerating in the understory, especially *Quercus douglasii*. *Ericameria linearifolia* and *Juniperus californica* are the two main shrub species that are characteristically present at low cover to moderate cover in the shrub layer. Non-native grasses *Bromus hordeaceus* and *Avena* spp., and native grass *Poa secunda* are characteristically present in the herb understory.

Monardella antonina subsp. *benitensis*, a CNPS list 4 species, was found in 8 of 37 stands sampled. *Lessingia occidentalis*, a CNPS List 4 species, was found in 1 of 37 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 2060-4139ft, mean 3506ft
Aspect: all aspects (except none/flat)
Slope: gentle to steep, range 5-40 degrees, mean 22.1 degrees
Topography: most often undulating, less often convex, rarely flat; lower to top slopes
Small Rock Cover: range 0-33%, mean 8.2%
Large Rock Cover: range 0-8%, mean 0.9%
Litter Cover: range 16.5-94%, mean 57.7%
Bare Ground: range 1-73%, mean 28.7%
Parent Material: frequently sedimentary, rarely serpentine
Soil Texture: most often moderately fine sandy clay loam, moderately fine clay loam or medium to fine silty clay loam; less often medium loamy sand, medium loam, fine sandy clay or fine silty clay

This association was sampled in Byles Canyon, Hernandez Reservoir, Larious Canyon, Lopez Creek and Picacho Creek watersheds in the Western Non-Serpentine portion of the study area; the Domengine Creek, Duckworth Canyon, Ne Hi Canyon, Pine Canyon, Twentyfive Canyon, Upper White Creek and Urruttia Canyon watersheds within the Eastern Non-Serpentine portion of the study area; and Duckworth Creek and Picacho Creek watersheds in the Serpentine portion of the study area.

Samples used to describe association: (n=37)
CCBLM025, CCBLM034, CCBLM042, CCBLM100, CCBLM129, CCBLM130, CCBLM134, CCBLM139, CCBLM142, CCBLM203, CCBLM214, CCBLM230, CCBLM319, CCBLM322, CCBLM333, CCBLM336, CCBLM337, CCBLM343, CCBLM344, CCBLM358, CCBLM361, CCBLM364, CCBLM366, CCBLM367, CCBLM374, CCBLM379, CCBLM509, CCBLM510, CCBLM515, CCBLM516, CCBLM531, CCBLM536, CCBLM540, CCBLM542, CCBLM560, CCBLM562, CCBLM565

Rank: G4S4?

GLOBAL DISTRIBUTION

Low to mid elevations of the Central Coast, and possibly extending into Central Valley, Sierra Nevada foothills, and Cascade Range foothills

REFERENCES CITED

Allen et al. 1989

***Quercus douglasii/Ericameria linearifolia-Juniperus californica* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUDO-t	*Quercus douglasii*	100	22.5	6	55
	PISA2-t	*Pinus sabiniana*	97	3.8	0.2	25
Tree Understory	QUDO-m	*Quercus douglasii*	57	2.2	0.2	25
	PISA2-m	*Pinus sabiniana*	41	0.2	0.2	1
	QUDO-l	*Quercus douglasii*	27	0.1	0.2	2
	PISA2-l	*Pinus sabiniana*	19	0.0	0.2	0.2
Shrub	JUCA7	*Juniperus californica*	97	8.6	0.2	25
	ERLI6	*Ericameria linearifolia*	95	4.6	0.2	15
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	54	1.8	0.2	20
	ERCO25	*Eriophyllum confertiflorum*	46	1.0	0.2	10
	CECU	*Ceanothus cuneatus*	32	0.5	0.2	5
	QUJO3	*Quercus john-tuckeri*	32	0.5	0.2	3
	CEBE3	*Cercocarpus betuloides*	32	0.3	0.2	3
	RHIL	*Rhamnus ilicifolia*	27	0.1	0.2	3
	SYALL	*Symphoricarpos albus* var. *laevigatus*	24	0.0	0.2	0.2
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	19	0.5	0.2	6
	YUWH	*Yucca whipplei*	14	0.7	0.2	15
	LOSUD	*Lonicera subspicata* var. *denudata*	14	0.0	0.2	0.2
	ADFA	*Adenostoma fasciculatum*	11	0.1	0.2	3
Herb	BRHO2	*Bromus hordeaceus*	92	13.4	1	38
	AVENA	*Avena*	89	8.3	0.2	45
	POSE	*Poa secunda*	86	1.3	0.2	7
	BRMA3	*Bromus madritensis*	68	2.0	0.2	10
	VUMI	*Vulpia microstachys*	62	3.8	0.2	25
	BRDI3	*Bromus diandrus*	43	0.9	0.2	10
	MICAC2	*Micropus californicus* var. *californicus*	43	0.6	0.2	5
	GAAN	*Galium andrewsii*	43	0.2	0.2	1
	VUMY	*Vulpia myuros*	41	1.6	0.2	30
	ERCI6	*Erodium cicutarium*	30	0.5	0.2	7
	BRAR3	*Bromus arenarius*	27	0.7	0.2	10
	CORI2	*Cordylanthus rigidus*	27	0.4	0.2	5
	NAPU4	*Nassella pulchra*	27	0.2	0.2	3
	LICI	*Linanthus ciliatus*	24	0.6	0.2	10

***Quercus douglasii/Ericameria linearifolia-Juniperus californica* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Herb	MOANB	*Monardella antonina* subsp. *benitensis*	22	0.1	0.2	1
	GAPO	*Galium porrigens*	22	0.0	0.2	0.2
	MECA2	*Melica californica*	19	0.1	0.2	1
	PLER3	*Plantago erecta*	14	0.2	0.2	4
	NAPR2	*Navarretia prostrata*	11	0.1	0.2	4
	BLCR	*Bloomeria crocea*	11	0.0	0.2	0.2
	ELMU3	*Elymus multisetus*	11	0.0	0.2	0.2

***Quercus douglasii/Eriogonum fasciculatum*/Annual-Perennial Herb Association**

Blue Oak / California Buckwheat / Annual - Perennial Herb Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus douglasii/Eriogonum fasciculatum*/Annual-Perennial Herb Woodland form an open tree layer (2-36%, mean 16.8%), with conifers at 5-20m tall and hardwoods at 5-15m tall. *Quercus douglasii* dominates in the tree overstory and is sometimes regenerating in the understory. The shrub layer is open to intermittent (12-45%, mean 25.5%) at low: 0-1, tall: 1-5m tall, and the herbaceous layer is intermittent (35-45%, mean 40%) at 0-0.5m tall. Total vegetation cover is 70-85%, mean 78.8%.

In this association, *Pinus sabiniana* is characteristically present as a sub-dominant in the tree overstory. In the understory, *Eriogonum fasciculatum* var. *foliolosum* is characteristically present as the dominant shrub, while *Rhamnus ilicifolia* is characteristically sub-dominant. A variety of native and non-native grasses intermix in the moderately dense herb layer (see species table).

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 2869-3855ft, mean 3410ft
Aspect: SE, SW
Slope: moderate to steep, range 8-30 degrees, mean 21.3 degrees
Topography: most often undulating, less often convex; lower to upper slopes
Small Rock Cover: range 0-30%, mean 10.5%
Large Rock Cover: range 0.2-35%, mean 10.1%
Litter Cover: range 35-70%, mean 55.6%
Bare Ground: range 10-28%, mean 19.5%
Parent Material: sedimentary
Soil Texture: medium to very fine loamy sand to moderately fine sandy clay loam

This association was sampled in the Arroyo Leona and Ne Hi Canyon watersheds within the Eastern Non-Serpentine portion of the study area and the Clear Creek watershed within the Western non-serpentine portion of the study area.

Samples used to describe association: (n=4)
CCBLM181, CCBLM225, CCBLM236, CCBLM416

Rank: G4S4?

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Quercus douglasii/Eriogonum fasciculatum*/Annual-Perennial Herb**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUDO-t	*Quercus douglasii*	100	18.0	10	35
	PISA2-t	*Pinus sabiniana*	100	1.8	0.2	4
Tree Understory	QUWI2-m	*Quercus wislizeni*	50	0.1	0.2	0.2
	PISA2-l	*Pinus sabiniana*	25	0.1	0.2	0.2
	QUDO-l	*Quercus douglasii*	25	0.1	0.2	0.2
Shrub	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	100	25.3	10	40
	RHIL	*Rhamnus ilicifolia*	100	0.6	0.2	1
	ERLI6	*Ericameria linearifolia*	75	1.5	0.2	5
	ERCO25	*Eriophyllum confertiflorum*	50	0.6	0.2	2
	ARTR2	*Artemisia tridentata*	25	5.0	20	20
	QUJO3	*Quercus john-tuckeri*	25	1.5	6	6
	CEBE3	*Cercocarpus betuloides*	25	0.5	2	2
	JUCA7	*Juniperus californica*	25	0.5	2	2
	CECU	*Ceanothus cuneatus*	25	0.3	1	1
	FRDI2	*Fraxinus dipetala*	25	0.3	1	1
	PRIL	*Prunus ilicifolia*	25	0.3	1	1
	ADFA	*Adenostoma fasciculatum*	25	0.1	0.2	0.2
	ERTO	*Eriodictyon tomentosum*	25	0.1	0.2	0.2
	GARRY	*Garrya*	25	0.1	0.2	0.2
	KEBRB	*Keckiella breviflora* subsp. *breviflora*	25	0.1	0.2	0.2
	LUAL4	*Lupinus albifrons*	25	0.1	0.2	0.2
	SAME5	*Sambucus mexicana*	25	0.1	0.2	0.2
	SYALL	*Symphoricarpos albus* var. *laevigatus*	25	0.1	0.2	0.2
	YUWH	*Yucca whipplei*	25	0.1	0.2	0.2
Herb	BRMA3	*Bromus madritensis*	100	3.3	1	5
	AVENA	*Avena*	75	13.8	5	25
	BRHO2	*Bromus hordeaceus*	75	10.5	10	20
	POSE	*Poa secunda*	75	0.2	0.2	0.2
	VUMY	*Vulpia myuros*	50	12.5	25	25
	BRAR3	*Bromus arenarius*	50	4.0	1	15
	BRDI3	*Bromus diandrus*	50	0.8	1	2
	MECA2	*Melica californica*	50	0.6	0.2	2
	NAPU4	*Nassella pulchra*	50	0.3	0.2	1
	NAPR2	*Navarretia prostrata*	50	0.1	0.2	0.2
	MICAC2	*Micropus californicus* var. *californicus*	25	0.5	2	2
	BRTE	*Bromus tectorum*	25	0.3	1	1
	ERCI6	*Erodium cicutarium*	25	0.3	1	1
	AMME	*Amsinckia menziesii*	25	0.1	0.2	0.2

***Quercus douglasii/Eriogonum fasciculatum*/Annual-Perennial Herb**

Stratum	Code	Species Name	Con	Avg	Min	Max
Herb	SACO6	*Salvia columbariae*	25	0.1	0.2	0.2
Cryptogam	LICHEN	Lichen	25	2.5	10	10
	MOSS	Moss	25	1.3	5	5

***Quercus douglasii/Juniperus californica-Cercocarpus betuloides* Association**

Blue Oak / California Juniper - Birchleaf Mountain-mahogany Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus douglasii/Juniperus californica-Cercocarpus betuloides* Woodland form an open to intermittent tree layer (6-45%, mean 21.1%), with conifers at 5-20m tall and hardwoods at 5-15m tall. *Quercus douglasii* dominates in the tree overstory and is sometimes regenerating in the understory. The shrub layer is open to intermittent (20-60%, mean 35.0%) at low: 0.5-2, tall: 1-5m tall, and the herbaceous layer is open to intermittent (5-65%, mean 30.3%) at 0-1m tall. Total vegetation cover is 48-90%, mean 70.4%.

In this association, *Quercus douglasii* is dominant, and *Pinus sabiniana* is characteristically present in the tree overstory at low cover. *Juniperus californica* and *Cercocarpus betuloides* are usually co-dominant in the shrub layer, and *Ericameria linearifolia* is characteristically present as a sub-dominant. There usually is a variety of chaparral species that also occur (see species table). Mixtures of native and non-native species occupy the herb understory, including characteristically present grasses *Poa secunda, Bromus hordeaceus,* and *Vulpia microstachys.*

Monardella antonina subsp. *benitensis*, a CNPS list 4 species, was found in 2 of the 14 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 2526-4117ft, mean 3675ft
Aspect: most often NE, less often NW or SE
Slope: moderate to steep, range 13-40 degrees, mean 26.9 degrees
Topography: undulating, convex or flat; lower to upper slopes
Small Rock Cover: range 0.2-15%, mean 6.0%
Large Rock Cover: range 0-10%, mean 0.9%
Litter Cover: range 24-90%, mean 59.8%
Bare Ground: range 3-66%, mean 28.7%
Parent Material: sedimentary
Soil Texture: most often moderately fine sandy clay loam, less often moderately fine clay loam, moderately fine silty clay loam, fine silty clay

This association was sampled in the Arroyo Leona, Ne Hi Canyon, Pine Canyon, Twentyfive Canyon, Upper White Creek and Urruttia Canyon watersheds within the Eastern non-serpentine portion of the study area and Byles Canyon and Larious Canyon watersheds in the Western Non-Serpentine portions of the study area.

Samples used to describe association: (n=14)
CCBLM135, CCBLM136, CCBLM247, CCBLM318, CCBLM320, CCBLM321, CCBLM370, CCBLM511, CCBLM518, CCBLM528, CCBLM539, CCBLM541, CCBLM551, CCBLM552

Rank: G3S3

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Quercus douglasii/Juniperus californica-Cercocarpus betuloides* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUDO-t	*Quercus douglasii*	100	16.0	3	38
	PISA2-t	*Pinus sabiniana*	86	3.2	0.2	12
Tree Understory	QUDO-m	*Quercus douglasii*	43	2.2	0.2	15
	PISA2-m	*Pinus sabiniana*	14	0.1	0.2	1
	PISA2-l	*Pinus sabiniana*	14	0.0	0.2	0.2
Shrub	JUCA7	*Juniperus californica*	100	14.9	2	40
	CEBE3	*Cercocarpus betuloides*	100	10.9	3	30
	ERLI6	*Ericameria linearifolia*	93	5.2	0.2	16
	ERCO25	*Eriophyllum confertiflorum*	64	0.7	0.2	3
	QUJO3	*Quercus john-tuckeri*	43	1.1	0.2	8
	RHIL	*Rhamnus ilicifolia*	43	0.4	0.2	4
	FRDI2	*Fraxinus dipetala*	29	0.3	1	1
	CECU	*Ceanothus cuneatus*	21	0.7	3	4
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	21	0.5	0.2	5
	LOSUD	*Lonicera subspicata* var. *denudata*	21	0.0	0.2	0.2
	ERWR	*Eriogonum wrightii*	14	0.6	3	6
	SAME5	*Sambucus mexicana*	14	0.0	0.2	0.2
Herb	POSE	*Poa secunda*	100	2.7	0.2	9
	BRHO2	*Bromus hordeaceus*	86	8.1	1	20
	VUMI	*Vulpia microstachys*	86	6.6	0.2	20
	BRMA3	*Bromus madritensis*	71	1.4	0.2	5
	AVENA	*Avena*	57	3.4	1	15
	BRDI3	*Bromus diandrus*	50	0.9	0.2	6
	GAPO	*Galium porrigens*	36	0.1	0.2	0.2
	LICI	*Linanthus ciliatus*	29	1.0	0.2	10
	BRAR3	*Bromus arenarius*	29	0.4	0.2	3
	MICAC2	*Micropus californicus* var. *californicus*	29	0.3	0.2	3
	ELMU3	*Elymus multisetus*	29	0.1	0.2	1
	MECA2	*Melica californica*	29	0.1	0.2	1
	GAAN	*Galium andrewsii*	29	0.1	0.2	0.2
	MADIA	*Madia*	21	0.3	0.2	4
	MAFA3	*Marah fabaceus*	21	0.0	0.2	0.2
	VUMY	*Vulpia myuros*	14	0.3	2	2
	DAPU3	*Daucus pusillus*	14	0.1	0.2	1
	AMME	*Amsinckia menziesii*	14	0.0	0.2	0.2
	CLARK	*Clarkia*	14	0.0	0.2	0.2
	CLUN	*Clarkia unguiculata*	14	0.0	0.2	0.2
	COHE	*Collinsia heterophylla*	14	0.0	0.2	0.2

***Quercus douglasii/Juniperus californica-Cercocarpus betuloides* association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Herb	CORI2	*Cordylanthus rigidus*	14	0.0	0.2	0.2
	MOANB	*Monardella antonina* subsp. *benitensis*	14	0.0	0.2	0.2
Cryptogam	MOSS	Moss	29	0.8	0.2	5

***Quercus douglasii/Juniperus californica-Quercus john-tuckeri* Association**

Blue Oak / California Juniper - Tucker Oak Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus douglasii/Juniperus californica-Quercus john-tuckeri* Woodland form an open to intermittent tree layer (5.2-36%, mean 20.8%), with conifers at 5-20m tall and hardwoods at 5-10m tall. *Quercus douglasii* dominates in the tree overstory and is sometimes regenerating in the understory. The shrub layer is open to intermittent (12-75%, mean 34.0%) with low shrubs at 0-2m tall and tall shrubs at 1-5m tall. The herbaceous layer is open to intermittent (1-65%, mean 31.9%) at 0-0.5m tall. Total vegetation cover is 45-85%, mean 70.4%.

In this association, *Pinus sabiniana* is characteristically present in the tree overstory and may be regenerating in the understory. *Juniperus californica* and *Quercus john-tuckeri* are usually co-dominant and characteristically present with *Ericameria linearifolia* in the shrub layer, and mixtures of other shrubs also occur in this layer (see species table). A variety of native and non-native grass and forb species can be found in the herb understory, including characteristically present *Bromus hordeaceus, B. madritensis* and *Poa secunda* and often present *Avena* sp. and *Vulpia microstachys.*

Monardella antonina subsp. *benitensis,* a CNPS list 4 species, was found in 2 of 11 stands sampled. *Calystegia collina* subsp. *venusta* and *Eriogonum nudum* var. *indictum,* also CNPS list 4 species, were both found in 1 of 11 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 3008-4210ft, mean 3475ft
Aspect: most often NE or NW, rarely SE or variable
Slope: somewhat steep to steep, range 18-30 degrees, mean 23.4 degrees
Topography: most often undulating, less often convex or concave; most often lower to middle slopes, rarely upper to top slopes
Small Rock Cover: range 0-30%, mean 6.5%
Large Rock Cover: range 0-1%, mean 0.2%
Litter Cover: range 30-90%, mean 62.3%
Bare Ground: range 5-66%, mean 26.4%
Parent Material: frequently sedimentary, rarely serpentine
Soil Texture: most often moderately fine sandy clay loam, less often moderately coarse sandy loam and moderately fine silty clay loam, rarely fine silty clay

This association was sampled in the Arroyo Leona, Ne Hi Canyon and Urruttia Canyon watersheds within the Eastern Non-Serpentine portion of the study area; Byles Canyon, Hernandez Reservoir and Larious Canyon in the Western Non-Serpentine portion of the study area; and East Fork San Carlos Creek watershed in the Serpentine portion of the study area.

Samples used to describe association: (n=11)
CCBLM108, CCBLM133, CCBLM179, CCBLM221, CCBLM325, CCBLM330, CCBLM339, CCBLM359, CCBLM426, CCBLM428, CCBLM513

Rank: G3S3

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Quercus douglasii/Juniperus californica-Quercus john-tuckeri* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUDO-t	*Quercus douglasii*	100	19.6	5	35
	PISA2-t	*Pinus sabiniana*	73	0.7	0.2	1
Tree Understory	PISA2-m	*Pinus sabiniana*	45	0.2	0.2	1
	QUDO-m	*Quercus douglasii*	27	0.5	1	2
	PISA2-l	*Pinus sabiniana*	27	0.1	0.2	1
Shrub	JUCA7	*Juniperus californica*	100	5.3	0.2	30
	QUJO3	*Quercus john-tuckeri*	91	11.7	5	25
	ERLI6	*Ericameria linearifolia*	91	3.1	0.2	8
	CEBE3	*Cercocarpus betuloides*	73	1.5	0.2	5
	ERCO25	*Eriophyllum confertiflorum*	55	3.3	0.2	15
	RHIL	*Rhamnus ilicifolia*	45	0.2	0.2	1
	CECU	*Ceanothus cuneatus*	36	1.2	0.2	8
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	27	1.0	0.2	8
	GARRY	*Garrya*	27	0.2	0.2	1
	LUAL4	*Lupinus albifrons*	27	0.1	0.2	1
	LOSUD	*Lonicera subspicata* var. *denudata*	27	0.1	0.2	0.2
	SYALL	*Symphoricarpos albus* var. *laevigatus*	27	0.1	0.2	0.2
	FRDI2	*Fraxinus dipetala*	18	0.5	1	5
Herb	BRHO2	*Bromus hordeaceus*	91	12.1	2	25
	BRMA3	*Bromus madritensis*	82	4.1	2	8
	POSE	*Poa secunda*	82	0.7	0.2	2
	AVENA	*Avena*	64	10.3	1	50
	VUMI	*Vulpia microstachys*	64	2.6	0.2	7
	MECA2	*Melica californica*	45	0.1	0.2	0.2
	BRAR3	*Bromus arenarius*	36	1.2	0.2	10
	CORI2	*Cordylanthus rigidus*	36	0.6	0.2	3
	GAAN	*Galium andrewsii*	36	0.1	0.2	0.2
	VUMY	*Vulpia myuros*	27	0.5	0.2	5
	GAPO	*Galium porrigens*	27	0.1	0.2	0.2
	MICAC2	*Micropus californicus* var. *californicus*	18	0.2	0.2	2
	LICI	*Linanthus ciliatus*	18	0.1	0.2	1
	ACMI2	*Achillea millefolium*	18	0.0	0.2	0.2
	MOANB	*Monardella antonina* subsp. *benitensis*	18	0.0	0.2	0.2

***Quercus douglasii*/Annual-Perennial Herb Association**

Blue Oak / Annual - Perennial Herb Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus douglasii*/Annual-Perennial Herb Woodland form an open tree layer (8.2-27%, mean 20.1%), with conifers at 5-15m tall and hardwoods at 5-10m tall. *Quercus douglasii* dominates the tree overstory and is frequently regenerating in the understory. The shrub layer is open (0-0.2%, mean 0.2%) with low shrubs at 1-2m tall, and the herbaceous layer is open to continuous (32-70%, mean 57.3%) at 0-0.5m tall. Total vegetation cover is 35-85%, mean 66.7%.

In this association, hardwood and conifer species such as *Pinus sabiniana* and *Quercus lobata* can be found in the tree overstory at low cover, and they may be regenerating in the understory. Shrubs occur in the understory at sparse cover, including *Symphoricarpos albus*. Non-native grasses *Bromus hordeaceus* and *Avena* spp. may be abundant, though a variety of native grasses often occur such as *Vulpia microstachys, Melica californica,* and *Nassella pulchra.* Forb species vary depending on yearly rainfall, and they may be diverse (see species table for partial list).

Calystegia collina subsp. *venusta*, a CNPS list 4 species, was found in 1 of the 3 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 2489-3028ft, mean 2810ft
Aspect: SW or variable
Slope: somewhat steep, range 15-20 degrees, mean 17.5 degrees
Topography: undulating; lower to upper slopes
Small Rock Cover: range 0.2-34%, mean 13.9%
Large Rock Cover: range 0-9%, mean 3%
Litter Cover: range 5.1-92%, mean 34.3%
Bare Ground: range 7-86%, mean 47.8%
Parent Material: sedimentary, serpentine
Soil Texture: moderately fine sandy clay loam

This association was sampled in the Clear Creek and Duckworth Canyon watersheds within the Serpentine and Western Non-Serpentine portions of the study area.

Samples used to describe association: (n=3)
CCBLM021, CCBLM023, CCBLM045

Rank: G5S5

GLOBAL DISTRIBUTION

Inner North Coast, South Coast, Sierra Nevada foothills

REFERENCES CITED

Allen et al. 1989, Holland 1986

***Quercus douglasii*/Annual-Perennial Herb Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUDO-t	*Quercus douglasii*	100	19.0	7	25
	PISA2-t	*Pinus sabiniana*	67	0.1	0.2	0.2
	QULO-t	*Quercus lobata*	33	0.7	2	2
Tree Understory	QUDO-m	*Quercus douglasii*	100	1.0	1	1
	QUDO-l	*Quercus douglasii*	67	0.7	1	1
	PISA2-m	*Pinus sabiniana*	33	0.3	1	1
Shrub	SYALL	*Symphoricarpos albus* var. *laevigatus*	67	0.1	0.2	0.2
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	33	0.1	0.2	0.2
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	33	0.1	0.2	0.2
	ERCO25	*Eriophyllum confertiflorum*	33	0.1	0.2	0.2
	SAME5	*Sambucus mexicana*	33	0.1	0.2	0.2
Herb	BRHO2	*Bromus hordeaceus*	100	18.0	9	30
	AVENA	*Avena*	100	15.1	0.2	30
	VUMI	*Vulpia microstachys*	67	1.7	1	4
	MECA2	*Melica californica*	67	0.1	0.2	0.2
	NAPU4	*Nassella pulchra*	67	0.1	0.2	0.2
	NAPU2	*Navarretia pubescens*	67	0.1	0.2	0.2
	PLER3	*Plantago erecta*	67	0.1	0.2	0.2
	ERCI6	*Erodium cicutarium*	33	6.7	20	20
	CESO3	*Centaurea solstitialis*	33	5.0	15	15
	TACA8	*Taeniatherum caput-medusae*	33	3.3	10	10
	BRAR3	*Bromus arenarius*	33	2.7	8	8
	BRMA3	*Bromus madritensis*	33	0.3	1	1
	ESCA2	*Eschscholzia californica*	33	0.3	1	1
	MADIA	*Madia*	33	0.3	1	1
	ACMO2	*Achyrachaena mollis*	33	0.1	0.2	0.2
	AMME	*Amsinckia menziesii*	33	0.1	0.2	0.2
	CACOV	*Calystegia collina* subsp. *venusta*	33	0.1	0.2	0.2
	KOMA	*Koeleria macrantha*	33	0.1	0.2	0.2
	LOPU3	*Lotus purshianus*	33	0.1	0.2	0.2
	SABI3	*Sanicula bipinnatifida*	33	0.1	0.2	0.2
Epiphyte	PHVI9	*Phoradendron villosum*	67	0.1	0.2	0.2

***Quercus lobata* Alliance** (no association defined)

Valley Oak Alliance

LOCAL VEGETATION DESCRIPTION

In one stand of *Quercus lobata* Woodland Alliance, the tree layer is open (20.2%) with hardwoods at 5-10m tall. *Quercus lobata* dominates in the tree overstory, and no oak regeneration was found. The shrub layer is open (1%) at 1-2m tall, and the herbaceous layer is intermittent (40%) at 0-0.5m tall. Total vegetation cover is 55%.

In the one stand sampled, *Quercus douglasii* is present at sparse cover in the tree overstory while *Quercus lobata* is dominant. The understory has no shrub species, though it includes a variety of native and non-native grasses and forbs (see species table).

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low, 2484ft
Aspect: none/flat
Slope: flat, 0 degrees
Topography: undulating; bottom
Small Rock Cover: 5%
Large Rock Cover: 0.2%
Litter Cover: range 64.8%
Bare Ground: range 25%
Parent Material: serpentine
Soil Texture: moderately fine sandy clay loam

This alliance was sampled in the Byles Canyon watershed within the Serpentine portion of the study area.

Samples used to describe alliance: (n=1)
CCBLM028

Rank: G4S4 (Alliance)

GLOBAL DISTRIBUTION

North Coast, Central Coast, Central Valley, Klamath foothills, Cascade Range foothills, Sierra Nevada foothills, South Coast

REFERENCES CITED

NatureServe 2005, Sawyer and Keeler-Wolf 1995, Allen et al. 1989, Shuford and Timossii 1989, Holland 1986

***Quercus lobata* Alliance** (no association defined)

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QULO-t	*Quercus lobata*	100	20.0	20	20
	QUDO-t	*Quercus douglasii*	100	0.2	0.2	0.2
Herb	BRHO2	*Bromus hordeaceus*	100	25.0	25	25
	ELGL	*Elymus glaucus*	100	5.0	5	5
	POSE	*Poa secunda*	100	1.0	1	1
	AVENA	*Avena*	100	0.2	0.2	0.2
	CHENO	*Chenopodium*	100	0.2	0.2	0.2
	CIOCV	*Cirsium occidentale* var. *venustum*	100	0.2	0.2	0.2
	HIIN3	*Hirschfeldia incana*	100	0.2	0.2	0.2
	MECA2	*Melica californica*	100	0.2	0.2	0.2
	MEIM	*Melica imperfecta*	100	0.2	0.2	0.2

***Quercus wislizeni* Alliance** (no association defined)

Interior Live Oak Alliance

LOCAL VEGETATION DESCRIPTION

In one stand of *Quercus wislizeni* Woodland Alliance, the tree layer is intermittent to continuous (60.2%) with conifers at 15-20m tall and hardwoods at 10-15m tall. *Quercus wislizeni* dominates in the tree overstory and may be regenerating in the understory. The shrub layer is intermittent (33%) with low shrubs at 1-2m and tall shrubs at 2-5m tall. The herbaceous layer is open (20%) at 0-0.5m tall. Total vegetation cover is 70%.

In one stand of this alliance, *Quercus douglasii, Populus fremontii,* and *Pinus sabiniana* occur at low cover in the tree overstory while *Quercus wislizeni* is dominant. A variety of chaparral shrubs and native and non-native herbs occur in the understory (see species table).

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low, 2586ft
Aspect: none/flat
Slope: flat, 0 degrees
Topography: flat; lower slope
Small Rock Cover: 20%
Large Rock Cover: 1%
Litter Cover: 44%
Bare Ground: 30%
Parent Material: sedimentary
Soil Texture: moderately fine sandy clay loam

This alliance was sampled in the Arroyo Leona watershed within the Eastern Non-Serpentine portion of the study area.

Samples used to describe alliance: (n=1)
CCBLM175

Rank: G5S5 (Alliance)

GLOBAL DISTRIBUTION

southern part of outer North Coast, inner North Coast, Central Coast, Klamath foothills, Cascade Range foothills, Sierra Nevada foothills, inner montane Transverse Ranges, montane Peninsular Ranges

REFERENCES CITED

Klein and Evens 2005, NatureServe 2005, Borchert 2004, Sawyer and Keeler-Wolf 1995, Gordon & White 1994, Allen et al. 1989, Holland 1986

***Quercus wislizeni* Alliance** (no association defined)

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUWI2-t	*Quercus wislizeni*	100	60.0	60	60
	QUDO-t	*Quercus douglasii*	100	1.0	1	1
	PISA2-t	*Pinus sabiniana*	100	0.2	0.2	0.2
	POFR2-t	*Populus fremontii*	100	0.2	0.2	0.2
Shrub	RHTO6	*Rhamnus tomentella*	100	32.0	32	32
	CEIN3	*Ceanothus integerrimus*	100	1.0	1	1
	FRDI2	*Fraxinus dipetala*	100	1.0	1	1
	TODI	*Toxicodendron diversilobum*	100	1.0	1	1
	SYALL	*Symphoricarpos albus* var. *laevigatus*	100	0.2	0.2	0.2
Herb	ARDO3	*Artemisia douglasiana*	100	5.0	5	5
	BRMA3	*Bromus madritensis*	100	5.0	5	5
	POMO5	*Polypogon monspeliensis*	100	5.0	5	5
	CIVU	*Cirsium vulgare*	100	0.2	0.2	0.2
	GNLU	*Gnaphalium luteoalbum*	100	0.2	0.2	0.2
	JUXI	*Juncus xiphioides*	100	0.2	0.2	0.2
	MICA3	*Mimulus cardinalis*	100	0.2	0.2	0.2
	RUMEX	*Rumex*	100	0.2	0.2	0.2

***Quercus wislizeni-Quercus chrysolepis* Association**

Interior Live Oak - Canyon Live Oak Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus wislizeni-Quercus chrysolepis* Woodland form an open to continuous tree layer (0.2-82%, mean 30.5%), with conifers at 5-20m tall and hardwoods at 5-10m tall. *Quercus chrysolepis* is dominant and *Quercus wislizeni* is sub-dominant in the tree overstory. Both species are often regenerating in the understory. The shrub layer is open to continuous (10-90%, mean 51%) at low: 1-2, tall: 1-5m tall, and the herbaceous layer is open (0.2-30%, mean 6.2%) at 0-1m tall. Total vegetation cover is 65-90%, mean 80%.

In this association, *Quercus chrysolepis* and *Quercus wislizeni* may have moderate to high cover in the understory as well as in the overstory. *Pinus sabiniana* is often present in the tree layer and understory at sparse cover. *Cercocarpus betuloides* is often present in the shrub layer. The herb layer consists of native and non-native forbs and grasses, including occasionally present *Bromus hordeaceus, Poa secunda,* and *Galium andrewsii.*

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3871-4822ft, mean 4412ft
Aspect: most often NE, less often SW
Slope: somewhat steep, range 20-25 degrees, mean 22.8 degrees
Topography: undulating, convex or concave; mid to top slopes
Small Rock Cover: range 5-35%, mean 14.5%
Large Rock Cover: range 0.2-30%, mean 6.3%
Litter Cover: range 29-84%, mean 59.6%
Bare Ground: range 5-30%, mean 15.6%
Parent Material: most often sedimentary, sometimes shale or serpentine
Soil Texture: most often moderately coarse sandy loam, less often coarse to very fine loamy sand

This association was sampled in the Domengine Creek and Sawmill Creek watersheds within the Eastern Non-Serpentine portion of the study area; the Clear Creek and East Fork San Carlos Creek watersheds in the Western Non-Serpentine portion of the study area; and the Duckworth Canyon watershed in the Serpentine portion of the study area.

Samples used to describe association: (n=5)
CCBLM041, CCBLM050, CCBLM204, CCBLM263, CCBLM412

Rank: G4S4

GLOBAL DISTRIBUTION

Montane Central Coast, Transverse Ranges, montane Peninsular Ranges

REFERENCES CITED

Klein and Evens 2005, NatureServe 2005, Gordon & White 1994, Holland 1986

***Quercus wislizeni-Quercus chrysolepis* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUCH2-t	*Quercus chrysolepis*	60	23.0	30	50
	PISA2-t	*Pinus sabiniana*	60	1.0	0.2	3
	QUWI2-t	*Quercus wislizeni*	40	7.4	2	35
Tree Understory	QUWI2-m	*Quercus wislizeni*	100	28.2	5	55
	QUCH2-m	*Quercus chrysolepis*	40	11.2	26	30
	PISA2-m	*Pinus sabiniana*	40	0.1	0.2	0.2
	PISA2-l	*Pinus sabiniana*	20	0.0	0.2	0.2
Shrub	CEBE3	*Cercocarpus betuloides*	60	2.2	0.2	10
	QUJO3	*Quercus john-tuckeri*	40	4.0	5	15
	CECU	*Ceanothus cuneatus*	40	2.0	0.2	10
	QUAL2	*Quercus ×alvordiana*	20	1.0	5	5
	ARGL4	*Arctostaphylos glauca*	20	0.4	2	2
	CELE2	*Ceanothus leucodermis*	20	0.4	2	2
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	20	0.2	1	1
	FRCA6	*Fremontodendron californicum*	20	0.2	1	1
	TODI	*Toxicodendron diversilobum*	20	0.2	1	1
	ERCUS	*Ericameria cuneata* var. *spathulata*	20	0.0	0.2	0.2
	ERLI6	*Ericameria linearifolia*	20	0.0	0.2	0.2
	ERCA6	*Eriodictyon californicum*	20	0.0	0.2	0.2
	ERCO25	*Eriophyllum confertiflorum*	20	0.0	0.2	0.2
	GUCA	*Gutierrezia californica*	20	0.0	0.2	0.2
	JUCA7	*Juniperus californica*	20	0.0	0.2	0.2
	KEBRB	*Keckiella breviflora* subsp. *breviflora*	20	0.0	0.2	0.2
	LOSUD	*Lonicera subspicata* var. *denudata*	20	0.0	0.2	0.2
	RHIL	*Rhamnus ilicifolia*	20	0.0	0.2	0.2
Herb	BRHO2	*Bromus hordeaceus*	40	3.0	0.2	15
	POSE	*Poa secunda*	40	0.6	0.2	3
	GAAN	*Galium andrewsii*	40	0.1	0.2	0.2
	BRDI3	*Bromus diandrus*	20	2.0	10	10
	BRAR3	*Bromus arenarius*	20	0.0	0.2	0.2
	CLARK	*Clarkia*	20	0.0	0.2	0.2
Herb	ERFO2	*Erigeron foliosus*	20	0.0	0.2	0.2
	GANU	*Galium nuttallii*	20	0.0	0.2	0.2
	MENTZ	*Mentzelia*	20	0.0	0.2	0.2
	MIFR2	*Mimulus fremontii*	20	0.0	0.2	0.2
	VIPUQ	*Viola purpurea* subsp. *quercetorum*	20	0.0	0.2	0.2

Adenostoma fasciculatum Association
Chamise Association

LOCAL VEGETATION DESCRIPTION
Stands of *Adenostoma fasciculatum* Shrubland form an intermittent to continuous shrub layer (45-90%, mean 75.2%), where *Adenostoma fasciculatum* dominates. Shrubs frequently occur in two different strata, with lo shrubs at 0-2m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (0.2-12%, mean 2.3%) at 0-1m tall. Trees occur frequently as emergents (0-4% cover, mean 0.7%) with hardwoods at 5-10m tall and conifers at 5-15m tall. Total vegetation cover is 45-90%, mean 75.7%.

In this association, Adenostoma fasciculatum is the obvious dominant in the shrub layer. Other chaparral species can intermix at low cover, including *Ceanothus cuneatus* which is often present. *Pinus sabiniana* and *Quercus douglasii* are often present at sparse cover as emergent trees. Annual non-native grass *Bromus madritensis* is often present in the herb layer with other native and non-native grass and forb species.

LOCAL ENVIRONMENTAL DESCRIPTION
Elevation: low to mid, range 2360-4496ft, mean 3480ft
Aspect: frequently SE to SW, infrequently NW or variable
Slope: moderate to somewhat steep, range 12-33degrees, mean 19.8 degrees
Topography: convex or undulating; bottom to top slopes; most often middle to top slopes
Small Rock Cover: range 1-71%, mean 17.8%
Large Rock Cover: range 0-11%, mean 2.6%
Litter Cover: range 10.7-90%, mean 44.5%
Bare Ground: range 5-77%, mean 30.8%
Parent Material: sedimentary
Soil Texture: most often moderately fine clay loam or sandy clay loam; can vary from coarse sand to fine silty clay

This association was sampled in the Arroyo Leona, Byles Canyon, Canada Azul, Duckworth Canyon, East Fork San Carlos Creek, Hernandez Reservoir, Larious Canyon and Pine Canyon watersheds within the Eastern and Western Non-Serpentine portions of the study area.

Samples used to describe association: (n=17)
CCBLM029, CCBLM046, CCBLM087, CCBLM164, CCBLM219, CCBLM234, CCBLM238, CCBLM240, CCBLM242, CCBLM302, CCBLM334, CCBLM341, CCBLM345, CCBLM353, CCBLM355, CCBLM362, CCBLM559

Rank: G5S5

GLOBAL DISTRIBUTION
inner North Coast, Central Coast, inner Klamath Ranges, South Coast, Sierra Nevada foothills, inner Transverse Ranges, Peninsular Ranges

REFERENCES CITED
Klein and Evens 2005, NatureServe 2005, Borchert 2004, Evens and San 2004, Gordon & White 1994, Shuford and Timossii 1989, Holland 1986

***Adenostoma fasciculatum* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	59	0.3	0.2	3
	QUDO-t	*Quercus douglasii*	53	0.4	0.2	3
Tree Understory	PISA2-m	*Pinus sabiniana*	18	0.1	0.2	1
	QUDO-m	*Quercus douglasii*	18	0.0	0.2	0.2
Shrub	ADFA	*Adenostoma fasciculatum*	100	68.6	42	84
	CECU	*Ceanothus cuneatus*	65	3.9	0.2	18
	ERTO	*Eriodictyon tomentosum*	47	1.4	0.2	15
	ARGL4	*Arctostaphylos glauca*	47	0.6	0.2	5
	JUCA7	*Juniperus californica*	41	0.3	0.2	3
	YUWH	*Yucca whipplei*	35	0.2	0.2	2
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	35	0.2	0.2	1
	QUJO3	*Quercus john-tuckeri*	29	0.3	0.2	2
	ERCO25	*Eriophyllum confertiflorum*	29	0.1	0.2	1
	ERLI6	*Ericameria linearifolia*	24	0.1	0.2	1
	CEBE3	*Cercocarpus betuloides*	18	0.2	0.2	3
	ERCA6	*Eriodictyon californicum*	18	0.1	0.2	1
	RHIL	*Rhamnus ilicifolia*	18	0.0	0.2	0.2
	ARCA11	*Artemisia californica*	12	0.1	0.2	2
	SYALL	*Symphoricarpos albus* var. *laevigatus*	12	0.1	0.2	1
	LOSUD	*Lonicera subspicata* var. *denudata*	12	0.0	0.2	0.2
	LOSC2	*Lotus scoparius*	12	0.0	0.2	0.2
Herb	BRMA3	*Bromus madritensis*	65	1.0	0.2	8
	BRHO2	*Bromus hordeaceus*	35	0.4	0.2	5
	VUMY	*Vulpia myuros*	24	0.1	0.2	1
	GAAN	*Galium andrewsii*	24	0.0	0.2	0.2
	NAPU4	*Nassella pulchra*	24	0.0	0.2	0.2
	POSE	*Poa secunda*	18	0.0	0.2	0.2
	VUMI	*Vulpia microstachys*	12	0.1	0.2	1
	APAN	*Apiastrum angustifolium*	12	0.0	0.2	0.2
Cryptogam	MOSS	Moss	18	0.2	1	2
	LICHEN	Lichen	12	0.1	0.2	1

***Adenostoma fasciculatum Serpentine* Association**

Chamise Serpentine Association

LOCAL VEGETATION DESCRIPTION

Stands of *Adenostoma fasciculatum* Serpentine Shrubland form an intermittent to continuous shrub layer (65-90%, mean 77.7%), where *Adenostoma fasciculatum* dominates. Shrubs often occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (0-3%, mean 0.8%) at 0-0.5m tall. Trees occur frequently as emergents (0-7% cover, mean 1.7%) with hardwoods at 5-10m tall and conifers at 5-20m tall. Total vegetation cover is 65-90%, mean 77.8%.

In this association, *Adenostoma fasciculatum* is the obvious dominant in the shrub layer while *Ceanothus cuneatus* and *Arctostaphylos glauca* are characteristically present with a variety of other chaparral species. *Pinus sabiniana* is frequently found in the tree layer at trace cover. Native forbs and grasses predominate in the sparse herb layer, including *Galium andrewsii*.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3001-4393ft, mean 3705ft
Aspect: frequently SE or SW, rarely NW or variable
Slope: moderate to steep, range 10-33 degrees, mean 18.3 degrees
Topography: most often undulating, less often convex; middle to top slopes
Small Rock Cover: range 15-77%, mean 41.3%
Large Rock Cover: range 0.2-4%, mean 1.5%
Litter Cover: range 1.2-71%, mean 29.75%
Bare Ground: range 3-60%, mean 22.1%
Parent Material: serpentine
Soil Texture: most often moderately fine sandy clay loam, though also varies from coarse loamy sand to fine sandy clay

This association was sampled in the Clear Creek, Duckworth Canyon, Picacho Creek and Upper White Creek watersheds within the Serpentine portion of the study area.

Samples used to describe association: (n=12)
CCBLM005, CCBLM027, CCBLM030, CCBLM091, CCBLM095, CCBLM096, CCBLM099, CCBLM114, CCBLM116, CCBLM172, CCBLM251, CCBLM258

Rank: G4S4

GLOBAL DISTRIBUTION

North Coast, Central Coast

REFERENCES CITED

Holland 1986, Kruckeberg 1984

***Adenostoma fasciculatum Serpentine* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	75	0.9	0.2	4
Tree Understory	PISA2-m	*Pinus sabiniana*	25	0.1	0.2	1
Shrub	ADFA	*Adenostoma fasciculatum*	100	68.8	50	90
	CECU	*Ceanothus cuneatus*	100	2.5	0.2	15
	ARGL4	*Arctostaphylos glauca*	92	2.6	0.2	15
	ERCA6	*Eriodictyon californicum*	67	1.1	0.2	10
	HEAR5	*Heteromeles arbutifolia*	50	0.5	0.2	4
	ERCO25	*Eriophyllum confertiflorum*	50	0.4	0.2	4
	YUWH	*Yucca whipplei*	50	0.3	0.2	2
	ARPU5	*Arctostaphylos pungens*	42	2.4	0.2	25
	RHIL	*Rhamnus ilicifolia*	33	0.1	0.2	0.2
	QUDU4	*Quercus durata*	25	0.6	0.2	7
	GARRY	*Garrya*	25	0.1	0.2	1
	CEBE3	*Cercocarpus betuloides*	25	0.1	0.2	0.2
	QUJO3	*Quercus john-tuckeri*	17	0.2	1	1
	ERTO	*Eriodictyon tomentosum*	17	0.1	0.2	1
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	17	0.0	0.2	0.2
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	17	0.0	0.2	0.2
Herb	GAAN	*Galium andrewsii*	42	0.1	0.2	0.2
	HEDI4	*Hesperolinon disjunctum*	33	0.1	0.2	0.2
	LODA	*Lomatium dasycarpum*	25	0.3	0.2	3
	MECA2	*Melica californica*	25	0.1	0.2	1
	BRMA3	*Bromus madritensis*	17	0.1	0.2	1
Cryptogam	LICHEN	Lichen	17	0.2	1	1

***Adenostoma fasciculatum-Arctostaphylos glauca Serpentine* Association**

Chamise - Bigberry Manzanita Serpentine Association

LOCAL VEGETATION DESCRIPTION

Stands of *Adenostoma fasciculatum-Arctostaphylos glauca* Serpentine Shrubland form an intermittent to continuous shrub layer (52-85%, mean 72.2%), where *Adenostoma fasciculatum* and *Arctostaphylos glauca* co-dominate. Shrubs frequently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (0.2-2%, mean 0.5%) at 0-0.5m tall. Trees occur consistently as emergents (0.2-5% cover, mean 2.7%) at 5-15m tall. Total vegetation cover is 55-85%, mean 73.1%.

In this association, a variety of chaparral species intermix at low cover in the shrub layer, including characteristically present *Garrya* sp., *Quercus durata, Ceanothus cuneatus,* and *Rhamnus ilicifolia*, while *Adenostoma fasciculatum* and *Arctostaphylos glauca* are the most abundant, co-dominant species. *Pinus sabiniana* and *Pinus coulteri* may occur in the tree layer at trace cover. *Monardella antonina* subsp. *benitensis*, *Galium andrewsii,* and *Elymus multisetus* are often to occasionally present in the herb layer with other native forbs and grasses.

Monardella antonina subsp. *benitensis*, a CNPS List 4 species, was found on 5 of 10 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3200-4443ft, mean 3792ft
Aspect: most often SW, less often SE, NE or variable
Slope: somewhat steep to steep, range 20-35 degrees, mean 25 degrees
Topography: most often undulating, less often convex; lower to top slopes
Small Rock Cover: range 16.1-66%, mean 45.4%
Large Rock Cover: range 0-12%, mean 2.3%
Litter Cover: range 0-64%, mean 23.6%
Bare Ground: range 13-36%, mean 24.3%
Parent Material: serpentine
Soil Texture: often coarse loamy sand or moderately coarse sandy loam, less often medium loam to moderately fine silty clay loam

This association was sampled in the Clear Creek, Larious Canyon and Upper White Creek watersheds within the Serpentine portion of the study area.

Samples used to describe association: (n=10)
CCBLM004, CCBLM090, CCBLM103, CCBLM111, CCBLM112, CCBLM173, CCBLM209, CCBLM210, CCBLM213, CCBLM257

Rank: G3S3

GLOBAL DISTRIBUTION

Scattered in Central and Northern California, where serpentine occurs

REFERENCES CITED

Holland 1986

***Adenostoma fasciculatum-Arctostaphylos glauca Serpentine* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	80	2.1	0.2	5
	PICO3-t	*Pinus coulteri*	20	0.4	1	3
Tree Understory	PISA2-m	*Pinus sabiniana*	60	0.2	0.2	1
	PISA2-l	*Pinus sabiniana*	10	0.0	0.2	0.2
	QUDO-m	*Quercus douglasii*	10	0.0	0.2	0.2
Shrub	ADFA	*Adenostoma fasciculatum*	100	35.7	20	55
	ARGL4	*Arctostaphylos glauca*	100	33.5	15	45
	GARRY	*Garrya*	90	0.2	0.2	0.2
	QUDU4	*Quercus durata*	80	3.2	0.2	12
	CECU	*Ceanothus cuneatus*	80	1.3	0.2	5
	RHIL	*Rhamnus ilicifolia*	80	0.2	0.2	0.2
	HEAR5	*Heteromeles arbutifolia*	60	0.2	0.2	1
	ERCA6	*Eriodictyon californicum*	60	0.1	0.2	0.2
	YUWH	*Yucca whipplei*	40	0.1	0.2	0.2
	RHTO6	*Rhamnus tomentella*	30	0.1	0.2	0.2
	ERCO25	*Eriophyllum confertiflorum*	20	0.2	0.2	2
	QUBE5	*Quercus berberidifolia*	20	0.1	0.2	1
	ARPU5	*Arctostaphylos pungens*	20	0.0	0.2	0.2
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	20	0.0	0.2	0.2
	CEBE3	*Cercocarpus betuloides*	10	0.0	0.2	0.2
	ERLI6	*Ericameria linearifolia*	10	0.0	0.2	0.2
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	10	0.0	0.2	0.2
	GUCA	*Gutierrezia californica*	10	0.0	0.2	0.2
	JUCA7	*Juniperus californica*	10	0.0	0.2	0.2
Herb	MOANB	*Monardella antonina* subsp. *benitensis*	50	0.2	0.2	1
	GAAN	*Galium andrewsii*	50	0.1	0.2	0.2
	ELMU3	*Elymus multisetus*	30	0.1	0.2	1
	HEDI4	*Hesperolinon disjunctum*	20	0.0	0.2	0.2
	LODA	*Lomatium dasycarpum*	10	0.1	1	1
	BRMA3	*Bromus madritensis*	10	0.0	0.2	0.2

***Adenostoma fasciculatum–Arctostaphylos glauca-Salvia mellifera* Association**

Chamise - Bigberry Manzanita - Black Sage Association

LOCAL VEGETATION DESCRIPTION

Stands of *Adenostoma fasciculatum - Arctostaphylos glauca* Shrubland form an intermittent to continuous shrub layer (60-90%, mean 75%) off of serpentine, where *Adenostoma fasciculatum* and *Arctostaphylos glauca* co-dominate. Shrubs often occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 2-5m tall. The herbaceous layer is open (0-6%, mean 2.4%) at 0-0.5m tall. Trees occur sometimes as emergents (0-1.2% cover, mean 0.5%) with conifers at 5-15m tall. Total vegetation cover is 65-90%, mean 76.7%.

In the shrub layer, *Adenostoma fasciculatum* and *Arctostaphylos glauca* are co-dominant, and *Salvia mellifera* is characteristically present and sub-dominant with a variety of other chaparral species. *Pinus sabiniana* and *Quercus douglasii* can be found in the tree layer at trace cover. Native forbs and grasses often occur in the herb layer at sparse cover, and non-native *Bromus madritensis* also may regularly occur at low cover.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 2350-2964ft, mean 2565ft
Aspect: SE
Slope: moderate, range 17-18 degrees, mean 17.5 degrees
Topography: undulating; lower to upper slopes
Small Rock Cover: range 2-5%, mean 3.5%
Large Rock Cover: range 1-1%, mean 1%
Litter Cover: range 58-69%, mean 63.5%
Bare Ground: range 20-34%, mean 27%
Parent Material: sedimentary
Soil Texture: medium loamy sand to fine silty clay

This alliance was sampled in the Duckworth Canyon and Upper White Creek watersheds within the Western and Eastern Non-Serpentine portions of the study area.

Samples used to describe association: (n=3)
CCBLM048, CCBLM215, CCBLM570

Rank: G4S4?

GLOBAL DISTRIBUTION

Central Coast, possibly to the South Coast, inner montane Transverse Ranges, montane Peninsular Ranges, and Baja CA

REFERENCES CITED

Klein and Evens 2005, Borchert 2004, Evens and San 2004, Ertter and Bowerman 2002, Sawyer and Keeler-Wolf 1995, Gordon & White 1994, Holland 1986

***Adenostoma fasciculatum-Arctostaphylos glauca-Salvia mellifera* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	33	0.3	1	1
Shrub	ADFA	*Adenostoma fasciculatum*	100	39.3	33	45
	ARGL4	*Arctostaphylos glauca*	100	27.7	18	35
	SAME3	*Salvia mellifera*	100	7.0	1	12
	CECU	*Ceanothus cuneatus*	67	3.7	1	10
	JUCA7	*Juniperus californica*	67	0.1	0.2	0.2
	QUJO3	*Quercus john-tuckeri*	67	0.1	0.2	0.2
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	33	0.3	1	1
	YUWH	*Yucca whipplei*	33	0.1	0.2	0.2
Herb	BRMA3	*Bromus madritensis*	67	1.4	0.2	4
	GAAN	*Galium andrewsii*	67	0.1	0.2	0.2
	POSE	*Poa secunda*	67	0.1	0.2	0.2
	APAN	*Apiastrum angustifolium*	33	0.1	0.2	0.2
	CAGR14	*Camissonia graciliflora*	33	0.1	0.2	0.2
	CORI2	*Cordylanthus rigidus*	33	0.1	0.2	0.2
	FIGA	*Filago gallica*	33	0.1	0.2	0.2
	HEDI4	*Hesperolinon disjunctum*	33	0.1	0.2	0.2
	LOWR2	*Lotus wrangelianus*	33	0.1	0.2	0.2
	NALE2	*Nassella lepida*	33	0.1	0.2	0.2

***Adenostoma fasciculatum - Salvia mellifera* Alliance** (no association defined)

Chamise - Black Sage Association

LOCAL VEGETATION DESCRIPTION

One stand of *Adenostoma fasciculatum - Salvia mellifera* Shrubland forms an intermittent shrub layer (50%), where *Adenostoma fasciculatum* and *Salvia mellifera* co-dominate. Shrubs occur in two different strata, with low shrubs at 0-1m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (7%) at 0-0.5m tall. Trees may occur as emergents (0.5% cover) with hardwoods at 5-10m tall. Total vegetation cover is 55%.

In this stand, the dominant shrub species are the Adenostoma fasciculatum and Salvia mellifera. Other shrubs such as Arctostaphylos glauca or Eriodictyon tomentosum may be present but at low cover. Emergent trees, particularly *Quercus douglasii,* may be present at sparse cover. Non-native and native grasses and herbs are present, including *Bromus madritensis, Castilleja foliolosa*, and *Lotus* spp.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low, 2270 ft
Aspect: most often SE to SW
Slope: somewhat steep, usually >25 degrees (26 degrees in one stand)
Topography: concave to convex, lower to upper slopes
Small Rock Cover: 15%
Large Rock Cover: 5%
Litter Cover: 6%
Bare Ground: 70%
Parent Material: sedimentary
Soil Texture: no data

This alliance was sampled in the Upper White Creek watershed within the Eastern Non-Serpentine portions of the study area.

Samples used to describe alliance: (n=1)
CCBLM569

Rank: G4S4 (Alliance)

GLOBAL DISTRIBUTION

Central Coast, Southern CA

REFERENCES CITED

Klein and Evens 2005, Evens and San 2004, Sawyer and Keeler-Wolf 1995, Gordon & White 1994, Holland 1986

***Adenostoma fasciculatum-Salvia mellifera* Alliance** (no association defined)

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUDO-t	*Quercus douglasii*	100	0.2	0.2	0.2
Tree Understory	QUDO-m	*Quercus douglasii*	100	0.2	0.2	0.2
Shrub	ADFA	*Adenostoma fasciculatum*	100	23.0	23	23
	SAME3	*Salvia mellifera*	100	23.0	23	23
	ARGL4	*Arctostaphylos glauca*	100	5.0	5	5
	ERLI6	*Ericameria linearifolia*	100	1.0	1	1
	ERFA2	*Eriogonum fasciculatum*	100	1.0	1	1
	ERTO	*Eriodictyon tomentosum*	100	0.2	0.2	0.2
Herb	BRMA3	*Bromus madritensis*	100	6.0	6	6
	LOSAS	*Lotus salsuginosus* var. *salsuginosus*	100	1.0	1	1
	CAFO2	*Castilleja foliolosa*	100	0.2	0.2	0.2
	POSE	*Poa secunda*	100	0.2	0.2	0.2

***Arctostaphylos glauca-Quercus durata*/Pinus sabiniana Association**

Bigberry Manzanita - Leather Oak / Foothill Pine Association

LOCAL VEGETATION DESCRIPTION

Stands of *Arctostaphylos glauca-Quercus durata/Pinus sabiniana* Shrubland form an open to continuous shrub layer (11-87%, mean 62.4%), where *Arctostaphylos glauca* is dominant. Shrubs frequently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (0-1%, mean 0.2%) at 0-0.5m tall. Trees occur consistently as emergents (0.2-12% cover, mean 7.8%) at 5-20m tall. Total vegetation cover is 15-90%, mean 65.8%.

In this association, *Quercus durata* is usually present at low cover while *Arctostaphylos glauca* is dominant. Other shrubs often intermix in the shrub layer, including *Adenostoma fasciculatum, Ceanothus cuneatus,* and *Eriodictyon californicum*. *Pinus sabiniana* is consistently present in the tree layer at less than 15% cover. Other trees occurring at low cover include *Pinus coulteri, Calocedrus decurrens,* and *Pinus jeffreyi.* Native grasses and forbs occur at trace cover in the simple herb layer.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3419-4542ft, mean 3956ft
Aspect: most often SW, less often NW, NE or variable
Slope: moderate to steep, range 10-40 degrees, mean 19.4 degrees
Topography: most often undulating, less often concave or convex; mid to top slopes
Small Rock Cover: range 3-45%, mean 22.8%
Large Rock Cover: range 0.2-10%, mean 2.5%
Litter Cover: range 5-88%, mean 49.7%
Bare Ground: range 2-62%, mean 21.1%
Parent Material: serpentine
Soil Texture: varies from coarse sand to moderately fine silty clay loam

This association was sampled in the Clear Creek, Picacho Creek, Sawmill Creek and Upper White Creek watersheds within the Serpentine portion of the study area.

Samples used to describe association: (n=17)
CCBLM098, CCBLM243, CCBLM245, CCBLM249, CCBLM252, CCBLM254, CCBLM255, CCBLM259, CCBLM260, CCBLM261, CCBLM264, CCBLM265, CCBLM266, CCBLM268, CCBLM269, CCBLM270, CCBLM317

Rank: G3S3

GLOBAL DISTRIBUTION

montane Central Coast Ranges

REFERENCES CITED

Sawyer and Keeler-Wolf 1995, Holland 1986

***Arctostaphylos glauca-Quercus durata/Pinus sabiniana* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	100	6.4	0.2	12
	PICO3-t	*Pinus coulteri*	35	0.9	0.2	7
	CADE27-t	*Calocedrus decurrens*	18	0.0	0.2	0.2
	PIJE-t	*Pinus jeffreyi*	12	0.5	1	8
Tree Understory	PISA2-m	*Pinus sabiniana*	76	1.4	0.2	5
	PISA2-l	*Pinus sabiniana*	29	0.1	0.2	1
Shrub	ARGL4	*Arctostaphylos glauca*	100	43.5	10	63
	QUDU4	*Quercus durata*	88	8.5	0.2	25
	ADFA	*Adenostoma fasciculatum*	76	5.4	0.2	33
	CECU	*Ceanothus cuneatus*	71	1.2	0.2	5
	ERCA6	*Eriodictyon californicum*	65	0.1	0.2	0.2
	ARPU5	*Arctostaphylos pungens*	59	3.5	0.2	24
	HEAR5	*Heteromeles arbutifolia*	47	0.4	0.2	3
	RHTO6	*Rhamnus tomentella*	35	0.3	0.2	3
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	35	0.1	0.2	0.2
	GARRY	*Garrya*	12	0.0	0.2	0.2
	YUWH	*Yucca whipplei*	12	0.0	0.2	0.2
Herb	ELMU3	*Elymus multisetus*	35	0.1	0.2	0.2
	GAAN	*Galium andrewsii*	24	0.0	0.2	0.2
	METO	*Melica torreyana*	12	0.2	0.2	3
	GAPO	*Galium porrigens*	12	0.0	0.2	0.2

***Artemisia californica-Lepidospartum squamatum*/Annual Herb Association**

California Sagebrush - Scalebroom Scrub / Annual Herb Association

LOCAL VEGETATION DESCRIPTION

Stands of *Artemisia californica-Lepidospartum squamatum/Annual Herb* Shrubland form an open shrub layer (18-18%, mean 18%), where *Artemisia californica* is dominant. Shrubs may occur in two different strata, with low shrubs at 0-1m tall and tall shrubs at 1-5m tall. The herbaceous layer is open to intermittent (30-38%, mean 34%) at 0-0.5m tall. Total vegetation cover is 45-52%, mean 48.5%.

In this association, *Artemisia californica* is dominant in the shrub layer while *Lepidospartum squamatum* is sub-dominant*. Eriodictyon californica* and *Hazardia squarrosa* also often occur. Non-native grasses and forbs (e.g., *Bromus hordeaceus*, *Bromus madritensis*, and *Centaurea melitensis*) frequent the herb layer.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low, range 1712-1755ft, mean 1734ft
Aspect: none/flat or SW
Slope: flat to somewhat steep, range 0-25 degrees, mean 12.5 degrees
Topography: undulating; bottom to mid slope
Small Rock Cover: range 1-3%, mean 2%
Large Rock Cover: range 0.2-0.2%, mean 0.2%
Litter Cover: range 62-65%, mean 63.5%
Bare Ground: range 30-30%, mean 30%
Parent Material: sedimentary, sandy alluvium
Soil Texture: medium to very fine sandy loam, moderately fine sandy clay loam

This association was sampled in the Ne Hi Canyon and Pine Canyon watersheds within the Eastern Non-Serpentine portion of the study area.

Samples used to describe association: (n=2)
CCBLM505, CCBLM524

Rank: G3S3

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Artemisia californica-Lepidospartum squamatum*/Annual Herb Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	ARCA11	*Artemisia californica*	100	10.5	10	11
	LESQ	*Lepidospartum squamatum*	100	3.1	0.2	6
	ERCA6	*Eriodictyon californicum*	100	0.6	0.2	1
	HASQ2	*Hazardia squarrosa*	100	0.2	0.2	0.2
	JUCA7	*Juniperus californica*	50	3.0	6	6
	ERLI6	*Ericameria linearifolia*	50	1.5	3	3
	ERFAP	*Eriogonum fasciculatum* var. *polifolium*	50	0.5	1	1
	EPCA2	*Ephedra californica*	50	0.1	0.2	0.2
	GUCA	*Gutierrezia californica*	50	0.1	0.2	0.2
	SAME3	*Salvia mellifera*	50	0.1	0.2	0.2
Herb	BRHO2	*Bromus hordeaceus*	100	25.0	20	30
	BRMA3	*Bromus madritensis*	100	4.0	3	5
	CEME2	*Centaurea melitensis*	50	3.0	6	6
	AMME	*Amsinckia menziesii*	50	0.1	0.2	0.2
	AVENA	*Avena*	50	0.1	0.2	0.2
	POSE	*Poa secunda*	50	0.1	0.2	0.2

***Artemisia californica-Malacothamnus aboriginum* Unique Stand**

California Sagebrush - Indian Valley Bush Mallow Unique Stand

LOCAL VEGETATION DESCRIPTION

In one stand of *Artemisia californica-Malacothamnus aboriginum* Shrubland, the shrub layer is open (14%), where *Artemisia californica* and *Malacothamnus aboriginum* co-dominate. Shrubs occur in two different strata, with low shrubs at 0.5-1m tall and tall shrubs at 1-2m tall. The herbaceous layer is open (33%) at 0-0.5m tall. Total vegetation cover is 37%.

In the one stand sampled, *Malacothamnus aboriginum* is co-dominant with *Artemisia californica* in the shrub layer. *Gutierrezia californica* and *Ephedra californica* also occur at low cover. Non-native grasses predominate in the simple understory.

Malacothamnus aboriginum, a CNPS list 1B species, was found in the stand. *Eriogonum nudum* var. *indictum*, a CNPS list 4 species, also was found in the stand.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low, 1675ft
Aspect: NE
Slope: steep, 28 degrees
Topography: undulating; low to upper slope
Small Rock Cover: 1%
Large Rock Cover: 15%
Litter Cover: 20%
Bare Ground: 60%
Parent Material: sedimentary
Soil Texture: medium loam

This association was sampled in the Ne Hi Canyon watershed within the Eastern Non-Serpentine portion of the study area.

Samples used to describe association: (n=1)
CCBLM523

Rank: G2S2?

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Artemisia californica-Malacothamnus aboriginum* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	MAAB2	*Malacothamnus aboriginum*	100	6.0	6	6
	ARCA11	*Artemisia californica*	100	4.0	4	4
	GUCA	*Gutierrezia californica*	100	2.0	2	2
	EPCA2	*Ephedra californica*	100	1.0	1	1
	ERLI6	*Ericameria linearifolia*	100	0.2	0.2	0.2
	ERFAP	*Eriogonum fasciculatum* var. *polifolium*	100	0.2	0.2	0.2
	LOSC2	*Lotus scoparius*	100	0.2	0.2	0.2
Herb	BRHO2	*Bromus hordeaceus*	100	20.0	20	20
	BRMA3	*Bromus madritensis*	100	5.0	5	5
	ERNUI	*Eriogonum nudum* var. *indictum*	100	0.2	0.2	0.2
	PEAN2	*Pellaea andromedifolia*	100	0.2	0.2	0.2
	PETR7	*Pentagramma triangularis*	100	0.2	0.2	0.2
	POSE	*Poa secunda*	100	0.2	0.2	0.2
Cryptogam	MOSS	Moss	100	2.0	2	2

***Artemisia californica*/Annual Herb Association**

California Sagebrush / Annual Herb Association

LOCAL VEGETATION DESCRIPTION

Stands of *Artemisia californica*/Annual Herb Shrubland form an open to continuous shrub layer (25-75%, mean 48.8%), where *Artemisia californica* is dominant. Shrubs frequently occur in two different strata, with low shrubs at 0-1m tall and tall shrubs at 0.5-5m tall. The herbaceous layer is open to intermittent (0.2-45%, mean 21.3%) at 0-0.5m tall. Trees occur often as emergents (0-1% cover, mean 0.4%) with hardwoods at 5-10m tall and conifers at 5-10m tall. Total vegetation cover is 35-85%, mean 65%.

In this association, *Artemisia californica* is dominant in the shrub layer. *Eriogonum fasciculatum* var. *foliolosum* is also frequently present but al low cover. *Juniperus californica* is characteristically present at trace cover in the four plots sampled, and *Quercus douglasii* and *Pinus sabiniana* are often present at trace cover in the tree layer. Various non-native and native grasses and forbs occupy the herb understory, including often present *Avena* sp., *Bromus hordeaceus* and *Bromus madritensis.*

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 2378-3203ft, mean 2965ft
Aspect: SE, SW
Slope: gentle to steep, range 4-45 degrees, mean 24.3 degrees
Topography: undulating or concave; bottom to mid slopes
Small Rock Cover: range 0.2-52%, mean 16%
Large Rock Cover: range 0.3-4%, mean 1.8%
Litter Cover: range 1.2-43%, mean 14.5%
Bare Ground: range 39-90%, mean 63.1%
Parent Material: sedimentary
Soil Texture: moderately fine clay loam, moderately fine silty clay loam

This association was sampled in the Canada Azul, Duckworth Canyon and Ne Hi Canyon watersheds within the Eastern Non-Serpentine portion of the study area.

Samples used to describe association: (n=4)
CCBLM036, CCBLM088, CCBLM397, CCBLM398

Rank: G5S5

GLOBAL DISTRIBUTION

inner South Coast

REFERENCES CITED

Klein and Evens 2005

***Artemisia californica*/Annual Herb Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUDO-t	*Quercus douglasii*	50	0.3	0.2	1
	PISA2-t	*Pinus sabiniana*	50	0.1	0.2	0.2
Tree Understory	QUDO-m	*Quercus douglasii*	25	0.1	0.2	0.2
Shrub	ARCA11	*Artemisia californica*	100	43.3	23	60
	JUCA7	*Juniperus californica*	100	0.2	0.2	0.2
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	75	0.8	0.2	2
	YUWH	*Yucca whipplei*	50	3.3	3	10
	GUCA	*Gutierrezia californica*	50	0.6	0.2	2
	ERFAP	*Eriogonum fasciculatum* var. *polifolium*	50	0.1	0.2	0.2
	ISME5	*Isocoma menziesii*	50	0.1	0.2	0.2
	ERLI6	*Ericameria linearifolia*	25	1.3	5	5
	CECU	*Ceanothus cuneatus*	25	0.1	0.2	0.2
	ISACB	*Isocoma acradenia* var. *bracteosa*	25	0.1	0.2	0.2
Herb	AVENA	*Avena*	75	0.6	0.2	2
	BRHO2	*Bromus hordeaceus*	50	6.3	10	15
	BRMA3	*Bromus madritensis*	50	3.8	0.2	15
	ERCI6	*Erodium cicutarium*	25	5.0	20	20
	BRDI3	*Bromus diandrus*	25	1.3	5	5
	ERNU3	*Eriogonum nudum*	25	0.5	2	2
	CAMIS	*Camissonia*	25	0.1	0.2	0.2
	CAEXE	*Castilleja exserta* subsp. *exserta*	25	0.1	0.2	0.2
	CEME2	*Centaurea melitensis*	25	0.1	0.2	0.2
	CLPUQ	*Clarkia purpurea* subsp. *quadrivulnera*	25	0.1	0.2	0.2
	POSE	*Poa secunda*	25	0.1	0.2	0.2
	TRWI3	*Trifolium willdenowii*	25	0.1	0.2	0.2
Cryptogam	MOSS	Moss	25	0.1	0.2	0.2

Artemisia californica-Eriogonum fasciculatum-Ephedra californica Association
California Sagebrush - California Buckwheat - California Ephedra Association

LOCAL VEGETATION DESCRIPTION
Stands of *Artemisia californica-Eriogonum fasciculatum-Ephedra californica* Shrubland form an open to intermittent shrub layer (18-60%, mean 42.3%), where *Artemisia californica* co-dominates with *Eriogonum fasciculatum*. Shrubs frequently occur in two different strata, with low shrubs at 0-1m tall and tall shrubs at 1-5m tall. The herbaceous layer is open to intermittent (9-50%, mean 29.6%) at 0-1m tall. Trees occur infrequently as emergents (0-0.2% cover, mean 0.1%) with hardwoods at 5-10m tall and conifers at 5-15m tall. Total vegetation cover is 35-75%, mean 58.8%.

In this association, *Ephedra californica* is sub-dominant to co-dominant with *Artemisia californica* and *Eriogonum fasciculatum* in the shrub layer, and *Yucca whipplei* is also characteristically present. *Quercus douglasii* occurs infrequently in the tree layer at sparse cover. Non-native annual grasses such as *Avena* spp., *Bromus hordeaceus,* and *Bromus madritensis* occur characteristically in the herb understory, and a variety of native grasses and forbs often intermix such as *Poa secunda, Nassella pulchra,* and *Salvia columbariae*.

Eriogonum nudum var. *indictum*, a CNPS list 4 species, was found on 1 of the 8 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION
Elevation: low to mid, range 1720-3731ft, mean 2680ft
Aspect: all aspects (except none/flat)
Slope: somewhat steep to steep, range 20-36 degrees, mean 28 degrees
Topography: most often undulating, less often convex or concave; lower to upper slopes
Small Rock Cover: range 0.3-77%, mean 23.3%
Large Rock Cover: range 0.3-10%, mean 4.4%
Litter Cover: range 0.3-75%, mean 29.6%
Bare Ground: range 15-84%, mean 39.6%
Parent Material: sedimentary
Soil Texture: most often moderately fine sandy clay loam however, varies from coarse loamy sand to fine silty clay

This association was sampled in the Arroyo Leona, Ne Hi Canyon, Oil Canyon, Pine Canyon, Urruttia Canyon watersheds within the Eastern Non-Serpentine portion of the study area.

Samples used to describe association: (n=8)
CCBLM178, CCBLM387, CCBLM435, CCBLM436, CCBLM504, CCBLM512, CCBLM526, CCBLM556

Rank: G3S3?

GLOBAL DISTRIBUTION
Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED
No reference citations

***Artemisia californica-Eriogonum fasciculatum-Ephedra californica* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUDO-t	*Quercus douglasii*	13	0.0	0.2	0.2
Shrub	ARCA11	*Artemisia californica*	100	16.9	8	35
	EPCA2	*Ephedra californica*	88	4.6	0.2	25
	YUWH	*Yucca whipplei*	88	0.9	0.2	3
	ERLI6	*Ericameria linearifolia*	75	2.3	0.2	10
	GUCA	*Gutierrezia californica*	63	0.1	0.2	0.2
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	50	11.0	3	35
	ERFAP	*Eriogonum fasciculatum* var. *polifolium*	50	7.4	2	25
	JUCA7	*Juniperus californica*	50	1.8	0.2	5
	SAME3	*Salvia mellifera*	25	0.9	3	4
	ERTO	*Eriodictyon tomentosum*	25	0.8	1	5
	ERCA6	*Eriodictyon californicum*	25	0.1	0.2	0.2
	LOSC2	*Lotus scoparius*	25	0.1	0.2	0.2
	CELE2	*Ceanothus leucodermis*	13	0.4	3	3
	ERCO25	*Eriophyllum confertiflorum*	13	0.1	1	1
	ERCUS	*Ericameria cuneata* var. *spathulata*	13	0.0	0.2	0.2
	QUJO3	*Quercus john-tuckeri*	13	0.0	0.2	0.2
Herb	AVENA	*Avena*	100	3.2	0.2	12
	BRHO2	*Bromus hordeaceus*	88	13.5	0.2	40
	BRMA3	*Bromus madritensis*	88	10.3	1	30
	POSE	*Poa secunda*	63	1.4	0.2	7
	ERCI6	*Erodium cicutarium*	50	2.8	1	10
	NAPU4	*Nassella pulchra*	38	0.1	0.2	0.2
	SACO6	*Salvia columbariae*	25	0.3	0.2	2
	BRAR3	*Bromus arenarius*	25	0.2	0.2	1
	DAPU3	*Daucus pusillus*	25	0.2	0.2	1
	MICAC2	*Micropus californicus* var. *californicus*	25	0.2	0.2	1
	BRDI3	*Bromus diandrus*	25	0.1	0.2	0.2
	CAFO2	*Castilleja foliolosa*	13	0.1	1	1
	AMME	*Amsinckia menziesii*	13	0.0	0.2	0.2
	BRTE	*Bromus tectorum*	13	0.0	0.2	0.2
	CAMIS	*Camissonia*	13	0.0	0.2	0.2
	CAAPD	*Castilleja applegatei* subsp. *disticha*	13	0.0	0.2	0.2
	CHME2	*Chorizanthe membranacea*	13	0.0	0.2	0.2
	ERSP3	*Eriastrum sparsiflorum*	13	0.0	0.2	0.2
	ERNUI	*Eriogonum nudum* var. *indictum*	13	0.0	0.2	0.2

***Artemisia californica-Eriogonum fasciculatum-Ephedra californica* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Herb	FICA2	*Filago californica*	13	0.0	0.2	0.2
	MEIM	*Melica imperfecta*	13	0.0	0.2	0.2
	NALE2	*Nassella lepida*	13	0.0	0.2	0.2
	VUMI	*Vulpia microstachys*	13	0.0	0.2	0.2
	VUMY	*Vulpia myuros*	13	0.0	0.2	0.2
Cryptogam	CRYPTO	*Cryptogamic crust*	13	1.9	15	15
	MOSS	Moss	13	0.6	5	5

***Artemisia californica-Salvia mellifera* Alliance** (no association defined)

California Sagebrush - Black Sage Alliance

LOCAL VEGETATION DESCRIPTION

In one stand of *Artemisia californica-Salvia mellifera* Shrubland the shrub layer is intermittent (55%), where *Artemisia californica* and *Salvia mellifera* co-dominate. Shrubs occur in two different strata, with low shrubs at 1-2m tall and tall shrubs at 2-5m tall. The herbaceous layer is intermittent (35%) at 0-0.5m tall. Total vegetation cover is 75%.

In one stand of this alliance, the shrub layer is co-dominated by *Artemisia californica* and *Salvia mellifera,* while a mixture of other shrubs also occur at low cover (see species table). Native and non-native grasses and forbs occupy the herb understory, including *Bromus madritensis, Bromus hordeaceus,* and the uncommon species *Eriogonum vestitum*.

Eriogonum vestitum, a CNPS list 4 species, was found in the one stand sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low, 2355ft
Aspect: SE
Slope: somewhat steep, 25 degrees
Topography: undulating; mid-slope
Small Rock Cover: 5%
Large Rock Cover: 8%
Litter Cover: range 64%
Bare Ground: range 18%
Parent Material: sedimentary
Soil Texture: moderately fine silty clay loam

This alliance was sampled in the Canada Azul watershed within the Eastern Non-Serpentine portion of the study area.

Samples used to describe alliance: (n=1)
CCBLM086

Rank: G5S5 (Alliance)

GLOBAL DISTRIBUTION

Central Coast, South Coast, inner montane Transverse Ranges, montane Peninsular Ranges, Mojave Desert

REFERENCES CITED

Klein and Evens 2005, NatureServe 2005, Evens and San 2004, Sawyer and Keeler-Wolf 1995, Gordon & White 1994, Holland 1986

***Artemisia californica-Salvia mellifera* Alliance** (no association defined)

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	SAME3	*Salvia mellifera*	100	30.0	30	30
	ARCA11	*Artemisia californica*	100	25.0	25	25
	ERCA6	*Eriodictyon californicum*	100	1.0	1	1
	ADFA	*Adenostoma fasciculatum*	100	0.2	0.2	0.2
	ERLI6	*Ericameria linearifolia*	100	0.2	0.2	0.2
	ERFAP	*Eriogonum fasciculatum* var. *polifolium*	100	0.2	0.2	0.2
	GUCA	*Gutierrezia californica*	100	0.2	0.2	0.2
	ISACB	*Isocoma acradenia* var. *bracteosa*	100	0.2	0.2	0.2
Herb	BRMA3	*Bromus madritensis*	100	20.0	20	20
	BRHO2	*Bromus hordeaceus*	100	5.0	5	5
	ERCI6	*Erodium cicutarium*	100	5.0	5	5
	VUMY	*Vulpia myuros*	100	5.0	5	5
	AVENA	*Avena*	100	0.2	0.2	0.2
	ERVE4	*Eriogonum vestitum*	100	0.2	0.2	0.2
	FICA2	*Filago californica*	100	0.2	0.2	0.2
	MAFA3	*Marah fabaceus*	100	0.2	0.2	0.2
	NAPU4	*Nassella pulchra*	100	0.2	0.2	0.2
	NAPU2	*Navarretia pubescens*	100	0.2	0.2	0.2
	TRLA4	*Trichostema lanceolatum*	100	0.2	0.2	0.2

***Atriplex spinifera*/Annual Herb Association**

Spinescale / Annual Herb Association

LOCAL VEGETATION DESCRIPTION

Stands of *Atriplex spinifera*/Annual Herb Shrubland form an open to intermittent shrub layer (15-60%, mean 27.3%), where *Atriplex spinifera* dominates. Shrubs frequently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 1-5m tall. The herbaceous layer is open to intermittent (25-60%, mean 36.3%) at 0-0.5m tall. Total vegetation cover is 40-90%, mean 60.5%.

In this association, *Atriplex spinifera* is the sole dominant species in a simple shrub overstory. Shrubs *Isocoma acradenia* var. *bracteosa* and *Gutierrezia californica* occur occasionally at trace cover. Non-native annual grasses such as *Bromus madritensis, Bromus hordeaceus,* and *Avena* spp. are most frequent in the herb understory, while a variety of other native grasses and forbs also occur (see species table).

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low, range 1203-1819ft, mean 1437ft
Aspect: NE, SE, SW, or none/flat
Slope: flat to steep, range 0-40 degrees, mean 17.5 degrees
Topography: undulating, convex, or flat; bottom to upper slopes
Small Rock Cover: range 1-72%, mean 41.8%
Large Rock Cover: range 0-1%, mean 0.4%
Litter Cover: range 0-29%, mean 9.5%
Bare Ground: range 24-65%, mean 44.9%
Parent Material: sedimentary, sandstone
Soil Texture: moderately fine sandy clay loam, fine silty clay

This association was sampled in the Monocline Ridge watershed within the Monocline Ridge portion of the study area.

Samples used to describe association: (n=4)
CCBLM473, CCBLM489, CCBLM492, CCBLM497

Rank: G3S3

GLOBAL DISTRIBUTION

Central Coast, Central Valley, Mojave Desert

REFERENCES CITED

Thomas et al. 2004, Holland 1986

***Atriplex spinifera*/Annual Herb Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	ATSP	*Atriplex spinifera*	100	27.8	15	60
	GUCA	*Gutierrezia californica*	25	0.1	0.2	0.2
	ISACB	*Isocoma acradenia* var. *bracteosa*	25	0.1	0.2	0.2
Herb	BRMA3	*Bromus madritensis*	100	26.3	15	40
	BRHO2	*Bromus hordeaceus*	75	2.8	0.2	10
	AVENA	*Avena*	75	0.2	0.2	0.2
	LENI	*Lepidium nitidum*	50	0.3	0.2	1
	POSE	*Poa secunda*	50	0.1	0.2	0.2
	ERCI6	*Erodium cicutarium*	25	1.5	6	6
	BRDI3	*Bromus diandrus*	25	0.8	3	3
	VUMY	*Vulpia myuros*	25	0.8	3	3
	ACSP12	*Achnatherum speciosum*	25	0.1	0.2	0.2
	AMME	*Amsinckia menziesii*	25	0.1	0.2	0.2
	HOMUL	*Hordeum murinum* subsp. *leporinum*	25	0.1	0.2	0.2
	POAN	*Poa annua*	25	0.1	0.2	0.2

***Baccharis salicifolia-Lepidospartum squamatum-Hazardia squarrosa* Association**
Mulefat - Scalebroom - Saw-toothed Goldenbush Association

LOCAL VEGETATION DESCRIPTION
Stands of *Baccharis salicifolia-Lepidospartum squamatum-Hazardia squarrosa* Shrubland form an open shrub layer (15-19%, mean 17%), where *Baccharis salicifolia* is dominant. Shrubs may occur in two different strata, with low shrubs at 0.5-1m tall and tall shrubs at 2-5m tall. The herbaceous layer is open (15-27%, mean 21%) at 0-0.5m tall. Trees may occur as emergents (0-0.2% cover, mean 0.1%) with hardwoods at 5-10m tall and conifers at 5-15m tall. Total vegetation cover is 29-45%, mean 37%.

In this association, *Baccharis salicifolia* is dominant while *Lepidospartum squamatum* and *Hazardia squarrosa* are characteristically present at low cover. *Artemisia californica* is often present at trace cover in the shrub overstory. *Pinus sabiniana* and *Quercus douglasii* may occur as emergent trees. Non-native annual grasses and forbs such as *Bromus madritensis, Bromus hordeaceus, Vulpia myuros,* and *Medicago polymorpha* occur in the herb understory, and native species may include *Eremocarpus setigerus* and *Heliotropium curassavicum*.

LOCAL ENVIRONMENTAL DESCRIPTION
Elevation: low to mid, range 1728-4134ft, mean 2931ft
Aspect: SE or SW
Slope: gentle, range 3-3 degrees, mean 3 degrees
Topography: concave or undulating; bottom
Small Rock Cover: range 17-45%, mean 31%
Large Rock Cover: range 35-37%, mean 36%
Litter Cover: range 2-30%, mean 16%
Bare Ground: range 12-15%, mean 13.5%
Parent Material: sedimentary, silty alluvium
Soil Texture: coarse sand, medium silt

This association was sampled in the Pine Canyon watershed within the Eastern Non-Serpentine portion of the study area.

Samples used to describe association: (n=2)
CCBLM525, CCBLM548

Rank: G3S3

GLOBAL DISTRIBUTION
South Coast, Peninsular Ranges

REFERENCES CITED
Klein and Evens 2005

***Baccharis salicifolia-Lepidospartum squamatum-Hazardia squarrosa* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	BASA4	*Baccharis salicifolia*	100	14.0	13	15
	HASQ2	*Hazardia squarrosa*	100	2.5	2	3
	LESQ	*Lepidospartum squamatum*	100	0.6	0.2	1
	ARCA11	*Artemisia californica*	100	0.2	0.2	0.2
	ERCA6	*Eriodictyon californicum*	50	0.1	0.2	0.2
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	50	0.1	0.2	0.2
	GUCA	*Gutierrezia californica*	50	0.1	0.2	0.2
	JUCA7	*Juniperus californica*	50	0.1	0.2	0.2
	NIGL	*Nicotiana glauca*	50	0.1	0.2	0.2
Herb	BRMA3	*Bromus madritensis*	100	9.5	9	10
	BRHO2	*Bromus hordeaceus*	100	5.0	2	8
	VUMY	*Vulpia myuros*	100	1.0	1	1
	MEPO3	*Medicago polymorpha*	100	0.6	0.2	1
	AVENA	*Avena*	50	2.5	5	5
	BRAR3	*Bromus arenarius*	50	0.1	0.2	0.2
	CEME2	*Centaurea melitensis*	50	0.1	0.2	0.2
	CYDA	*Cynodon dactylon*	50	0.1	0.2	0.2
	ERSE3	*Eremocarpus setigerus*	50	0.1	0.2	0.2
	ERCI6	*Erodium cicutarium*	50	0.1	0.2	0.2
	HECU3	*Heliotropium curassavicum*	50	0.1	0.2	0.2

***Ceanothus cuneatus* Alliance** (no association defined)

Wedgeleaf Ceanothus Alliance

LOCAL VEGETATION DESCRIPTION

In two stands of *Ceanothus cuneatus* Shrubland Alliance, the shrub layer is intermittent to continuous (62-80%, mean 71%), where *Ceanothus cuneatus* dominates. Shrubs occur in two different strata, with low shrubs at 0.5-1m tall and tall shrubs at 2-5m tall. The herbaceous layer is open (10-20%, mean 15%) at 0-0.5m tall. Trees occur as emergents (0.2-0.4%, mean 0.3%) at 5-15m tall. Total vegetation cover is 75-85%, mean 80%.

While the dominant shrub is *Ceanothus cuneatus* in the overstory, other shrubs such as *Juniperus californica, Quercus john-tuckeri* and *Q. wislizeni* also occur at low cover. Emergent trees, particularly *Pinus sabiniana* and *Quercus douglasii,* may occur at trace cover. A variety of herbs occur in the understory, including *Bromus hordeaceus, B. madritensis, Marah fabaceus,* and *Poa secunda*.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3875-3884ft, mean 3880ft
Aspect: NE, SE
Slope: 20-22 degrees, mean 22 degrees
Topography: flat; middle to upper slopes
Small Rock Cover: 16%
Large Rock Cover: 0%
Litter Cover: 75%
Bare Ground: 5%
Parent Material: sedimentary
Soil Texture: medium loam

This alliance was sampled in the Ne Hi Canyon watershed within the Eastern Non-Serpentine portion of the study area.

Samples used to describe alliance: (n=2)
CCBLM514, CCBLM567

Rank: G5S5 (Alliance)

GLOBAL DISTRIBUTION

North Coast, montane Central Coast Ranges, Klamath Ranges, Cascade Ranges, Sierra Nevada, outer montane Transverse Ranges, Peninsular Ranges, OR, Baja CA

REFERENCES CITED

Klein and Evens 2005, NatureServe 2005, Borchert 2004, Sawyer and Keeler-Wolf 1995, Holland 1986

***Ceanothus cuneatus* Alliance** (no association defined)

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUDO-t	*Quercus douglasii*	100	0.6	0.2	1
	PISA2-t	*Pinus sabiniana*	50	0.1	0.2	0.2
Tree Understory	QUWI2-m	*Quercus wislizeni*	100	1.6	0.2	3
	QUDO-m	*Quercus douglasii*	100	1.1	0.2	2
Shrub	CECU	*Ceanothus cuneatus*	100	65.0	55	75
	JUCA7	*Juniperus californica*	100	0.6	0.2	1
	ERLI6	*Ericameria linearifolia*	50	2.5	5	5
	QUJO3	*Quercus john-tuckeri*	50	2.5	5	5
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	50	0.5	1	1
	ERCA6	*Eriodictyon californicum*	50	0.1	0.2	0.2
	YUWH	*Yucca whipplei*	50	0.1	0.2	0.2
Herb	BRMA3	*Bromus madritensis*	100	6.5	5	8
	BRHO2	*Bromus hordeaceus*	100	3.0	1	5
	POSE	*Poa secunda*	100	1.1	0.2	2
	MAFA3	*Marah fabaceus*	100	0.6	0.2	1
	AMME	*Amsinckia menziesii*	50	0.5	1	1
	BRAR3	*Bromus arenarius*	50	0.5	1	1
	MAVU	*Marrubium vulgare*	50	0.5	1	1
	VUMY	*Vulpia myuros*	50	0.5	1	1
	BRDI3	*Bromus diandrus*	50	0.1	0.2	0.2
	CRYPT	*Cryptantha*	50	0.1	0.2	0.2
	LICI	*Linanthus ciliatus*	50	0.1	0.2	0.2

***Ceanothus leucodermis* Alliance** (no association defined)

Chaparral Whitethorn Alliance

LOCAL VEGETATION DESCRIPTION

Stands of *Ceanothus leucodermis* Shrubland form an intermittent to continuous shrub layer (60-85%, mean 72.5%), where *Ceanothus leucodermis* dominates. Shrubs may occur in two different strata, with low shrubs at 0.5-1m tall and tall shrubs at 2-5m tall. The herbaceous layer is open (5-15%, mean 10%) at 0-1m tall. Trees may occur as emergents (1-1% cover, mean 1%) at 5-20m tall. Total vegetation cover is 65-85%, mean 75%.

In two stands sampled, *Ceanothus leucodermis* is predominant while other shrubs may occur as sub-dominants such as *Eriogonum fasciculatum* var. *foliolosum*, *Quercus john-tuckeri,* and *Ceanothus cuneatus*. *Quercus douglasii* occurs at trace cover in the tree layer. Non-native and native grasses and forbs occupy the herb understory (see species table).

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3474-3773ft, mean 3624ft
Aspect: SW
Slope: moderate, range 12-12 degrees, mean 12 degrees
Topography: flat or undulating; upper slopes
Small Rock Cover: range 2-10%, mean 6%
Large Rock Cover: range 1-15%, mean 8%
Litter Cover: range 60-70%, mean 65%
Bare Ground: range 15-22%, mean 18.5%
Parent Material: sedimentary
Soil Texture: moderately fine sandy clay loam to clay loam

This alliance was sampled in the Coyote Canyon and Ne Hi Canyon watersheds within the Eastern Non-Serpentine portion of the study area.

Samples used to describe alliance: (n=2)
CCBLM383, CCBLM410

Rank: G5S5 (Alliance)

GLOBAL DISTRIBUTION

Sierra Nevada foothills, montane Central Coast Ranges, Transverse Ranges, Peninsular Ranges, Baja CA

REFERENCES CITED

Klein and Evens 2005, NatureServe 2005, Sawyer and Keeler-Wolf 1995, Gordon & White 1994, Holland 1986

***Ceanothus leucodermis* Alliance** (no association defined)

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUDO-t	*Quercus douglasii*	50	0.1	0.2	0.2
Shrub	CELE2	*Ceanothus leucodermis*	100	60.0	45	75
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	100	7.6	0.2	15
	QUJO3	*Quercus john-tuckeri*	100	3.5	1	6
	CECU	*Ceanothus cuneatus*	50	5.0	10	10
	GUCA	*Gutierrezia californica*	50	0.5	1	1
	KEBRB	*Keckiella breviflora* subsp. *breviflora*	50	0.5	1	1
	ARCA11	*Artemisia californica*	50	0.1	0.2	0.2
	ARTR2	*Artemisia tridentata*	50	0.1	0.2	0.2
	ERCUS	*Ericameria cuneata* var. *spathulata*	50	0.1	0.2	0.2
	ERLI6	*Ericameria linearifolia*	50	0.1	0.2	0.2
	ERTO	*Eriodictyon tomentosum*	50	0.1	0.2	0.2
	LOSC2	*Lotus scoparius*	50	0.1	0.2	0.2
Herb	AVENA	*Avena*	50	2.5	5	5
	BRHO2	*Bromus hordeaceus*	50	0.5	1	1
	BRMA3	*Bromus madritensis*	50	0.5	1	1
	EREL6	*Eriogonum elongatum*	50	0.5	1	1
	POSE	*Poa secunda*	50	0.5	1	1
	BRDI3	*Bromus diandrus*	50	0.1	0.2	0.2

***Cercocarpus betuloides-Ceanothus cuneatus-Quercus john-tuckeri* Association**

Birchleaf Mountain-mahogany - Wedgeleaf Ceanothus - Tucker Oak Association

LOCAL VEGETATION DESCRIPTION

Stands of *Cercocarpus betuloides-Ceanothus cuneatus-Quercus john-tuckeri* Shrubland form an open to continuous shrub layer (33-85%, mean 69.5%), where *Cercocarpus betuloides* co-dominates with *Ceanothus cuneatus* and *Quercus john-tuckeri*. Shrubs consistently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 2-5m tall. The herbaceous layer is open to intermittent (1-40%, mean 13.9%) at 0-1m tall. Trees occur frequently as emergents (0-3% cover, mean 0.4%) with at hardwoods at 2-10m tall and conifers at 5-20m tall. Total vegetation cover is 43-86%, mean 75.6%.

In this association, *Cercocarpus betuloides, Ceanothus cuneatus* and *Quercus john-tuckeri* generally co-dominate though one may sometimes be higher in cover than the other two. A mixture of other shrubs also occur in this layer, including *Garrya* spp., *Adenostoma fasciculatum,* and *Rhamnus ilicifolia*. Hardwood and conifers such as *Pinus sabiniana* and *Quercus douglasii* can be found as emergents at trace cover. A variety of non-native and native grasses and forbs occur in the herb understory (see species table).

Eriogonum umbellatum was found in 1 of 10 stands sampled, though there are no vouchers to confirm its variety designation. *Eriogonum umbellatum* var. *bahiiforme,* a CNPS List 4 species, occurs frequently on serpentinite soils and may occur within this association.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3078-4679ft, mean 4176ft
Aspect: all aspects (sometimes none/flat), most often SE
Slope: gentle to steep, range 1-34 degrees, mean 20 degrees
Topography: most often convex, less often undulating or flat; lower to top slopes
Small Rock Cover: range 2-23%, mean 8.3%
Large Rock Cover: range 0.2-20%, mean 3.8%
Litter Cover: range 32-85%, mean 67.7%
Bare Ground: range 5-36%, mean 14.9%
Parent Material: most often sedimentary, less often serpentine
Soil Texture: moderately coarse sandy loam, moderately fine sandy clay loam or silty clay loam

This association was sampled in Domengine Creek, Oil Canyon and Urruttia Canyon watersheds within the Eastern Non-Serpentine portion of the study area; the East Fork San Carlos Creek watershed in the Western Non-Serpentine portion of the study area; and Arroyo Leona and Larious Canyon watersheds in the Serpentine portion of the study area.

Samples used to describe association: (n=10)
CCBLM063, CCBLM066, CCBLM082, CCBLM122, CCBLM304, CCBLM305, CCBLM386, CCBLM406, CCBLM413, CCBLM465

Rank: G3S3?

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas.

REFERENCES CITED

No reference citations

***Cercocarpus betuloides-Ceanothus cuneatus-Quercus john-tuckeri* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	50	0.1	0.2	0.2
	QUDO-t	*Quercus douglasii*	10	0.0	0.2	0.2
Tree Understory	QUCH2-m	*Quercus chrysolepis*	20	0.6	0.2	6
	QUWI2-m	*Quercus wislizeni*	10	0.2	2	2
	PICO3-m	*Pinus coulteri*	10	0.0	0.2	0.2
	QUDO-m	*Quercus douglasii*	10	0.0	0.2	0.2
Shrub	CECU	*Ceanothus cuneatus*	100	23.0	2	45
	CEBE3	*Cercocarpus betuloides*	100	16.3	8	35
	QUJO3	*Quercus john-tuckeri*	80	16.4	2	50
	GARRY	*Garrya*	60	1.9	0.2	10
	ADFA	*Adenostoma fasciculatum*	50	3.4	1	30
	ERCO25	*Eriophyllum confertiflorum*	50	1.4	0.2	6
	RHIL	*Rhamnus ilicifolia*	50	0.4	0.2	2
	YUWH	*Yucca whipplei*	30	1.4	2	8
	ARGL4	*Arctostaphylos glauca*	30	1.1	2	7
	ERLI6	*Ericameria linearifolia*	30	0.9	0.2	7
	ARTR2	*Artemisia tridentata*	30	0.6	0.2	5
	JUCA7	*Juniperus californica*	30	0.3	0.2	3
	FRCA6	*Fremontodendron californicum*	30	0.3	0.2	2
	QUBE5	*Quercus berberidifolia*	20	3.1	1	30
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	20	1.7	7	10
	CELE2	*Ceanothus leucodermis*	20	0.1	0.2	1
	SYMO	*Symphoricarpos mollis*	20	0.0	0.2	0.2
	LOSUD	*Lonicera subspicata* var. *denudata*	10	0.2	2	2
	QUDU4	*Quercus durata*	10	0.1	1	1
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	10	0.0	0.2	0.2
	ERCA6	*Eriodictyon californicum*	10	0.0	0.2	0.2
	ERTO	*Eriodictyon tomentosum*	10	0.0	0.2	0.2
	RIQU	*Ribes quercetorum*	10	0.0	0.2	0.2
	SAME5	*Sambucus mexicana*	10	0.0	0.2	0.2
	SYALL	*Symphoricarpos albus* var. *laevigatus*	10	0.0	0.2	0.2

***Cercocarpus betuloides-Ceanothus cuneatus-Quercus john-tuckeri* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Herb	BRMA3	*Bromus madritensis*	60	3.9	1	20
	POSE	*Poa secunda*	40	1.7	0.2	15
	VUMY	*Vulpia myuros*	20	3.5	5	30
	BRDI3	*Bromus diandrus*	20	1.4	4	10
	VUMI	*Vulpia microstachys*	20	1.0	0.2	10
	BRAR3	*Bromus arenarius*	20	0.8	0.2	8
	MAFA3	*Marah fabaceus*	20	0.0	0.2	0.2
	MECA2	*Melica californica*	20	0.0	0.2	0.2
	BRHO2	*Bromus hordeaceus*	10	2.0	20	20
	AVENA	*Avena*	10	0.1	1	1
	CLRH	*Clarkia rhomboidea*	10	0.0	0.2	0.2
	CORI2	*Cordylanthus rigidus*	10	0.0	0.2	0.2
	ELMU3	*Elymus multisetus*	10	0.0	0.2	0.2
	GAAN2	*Galium angustifolium*	10	0.0	0.2	0.2
	LODA	*Lomatium dasycarpum*	10	0.0	0.2	0.2
	MEIM	*Melica imperfecta*	10	0.0	0.2	0.2
	NASSE	*Nassella*	10	0.0	0.2	0.2
	PHACE	*Phacelia*	10	0.0	0.2	0.2
Epiphyte	PHVI9	*Phoradendron villosum*	10	0.0	0.2	0.2
	SNAG	Standing snag	10	0.9	9	9
Herb	ERUM	*Eriogonum umbellatum*	10	0.1	1	1

***Cercocarpus betuloides-Juniperus californica*/Annual-Perennial Herb Association**

Birchleaf Mountain-mahogany - California Juniper / Annual - Perennial Herb Association

LOCAL VEGETATION DESCRIPTION

Stands of *Cercocarpus betuloides-Juniperus californica*/Annual-Perennial Herb Shrubland form an intermittent to continuous shrub layer (35-80%, mean 51.8%), where *Cercocarpus betuloides* is dominant. Shrubs consistently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 2-5m tall. The herbaceous layer is open to intermittent (4-40%, mean 28.6%) at 0-0.5m tall. Trees occur frequently as emergents (0.2-6.2% cover, mean 2.6%) with hardwoods at 5-10m tall and conifers at 5-20m tall. Total vegetation cover is 50-80%, mean 71.6%.

In this association, *Juniperus californica* is sub-dominant while *Cercocarpus betuloides* is dominant in the shrub overstory. *Ericameria linearifolia* and *Rhamnus ilicifolia* often intermix as sub-dominant shrubs. *Pinus sabiniana* and *Quercus douglasii* are often present in the tree layer at trace cover. Native and non-native grasses *Poa secunda*, *Bromus hordeaceus*, *Bromus madritensis*, and *Vulpia microstachys* often occur in the herb understory.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 2451-4440ft, mean 3601ft
Aspect: NE, NW
Slope: somewhat steep to steep, range 22-40 degrees, mean 26.4 degrees
Topography: most often undulating, less often convex or flat; low to top slopes
Small Rock Cover: range 0-50%, mean 13.1%
Large Rock Cover: range 0-45%, mean 4.7%
Litter Cover: range 5.5-84%, mean 44.2%
Bare Ground: range 5-66%, mean 33.7%
Parent Material: frequently sedimentary, infrequently serpentine
Soil Texture: moderately coarse to very fine sandy loam, moderately fine sandy clay loam, moderately fine silty clay loam, fine sandy clay

This association was sampled in the Arroyo Leona, Ne Hi Canyon, Pine Canyon and Upper White Creek watersheds within the Eastern Non-Serpentine portion of the study area; Byles Canyon, Larious Canyon, Lopez Creek watersheds within the Western Non-Serpentine portion of the study area; and Duckworth Canyon watershed within the Serpentine portion of the study area.

Samples used to describe association: (n=11)
CCBLM026, CCBLM137, CCBLM141, CCBLM184, CCBLM226, CCBLM273, CCBLM338, CCBLM368, CCBLM424, CCBLM520, CCBLM561

Rank: G4S4?

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Cercocarpus betuloides-Juniperus californica*/Annual-Perennial Herb Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	82	0.9	0.2	2
	QUDO-t	*Quercus douglasii*	64	1.6	0.2	5
Tree Understory	QUDO-m	*Quercus douglasii*	18	0.8	1	8
Shrub	CEBE3	*Cercocarpus betuloides*	100	38.5	15	80
	JUCA7	*Juniperus californica*	91	5.2	0.2	25
	ERLI6	*Ericameria linearifolia*	64	2.0	0.2	7
	RHIL	*Rhamnus ilicifolia*	64	0.5	0.2	4
	QUJO3	*Quercus john-tuckeri*	55	4.3	0.2	20
	ERCO25	*Eriophyllum confertiflorum*	55	0.5	0.2	5
	CECU	*Ceanothus cuneatus*	45	1.6	1	5
	FRDI2	*Fraxinus dipetala*	27	0.6	1	5
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	27	0.2	0.2	1
	SYALL	*Symphoricarpos albus* var. *laevigatus*	27	0.1	0.2	0.2
	FRCA6	*Fremontodendron californicum*	18	0.8	4	5
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	18	0.3	0.2	3
	SAME5	*Sambucus mexicana*	18	0.2	1	1
	RIQU	*Ribes quercetorum*	18	0.1	0.2	1
	GARRY	*Garrya*	18	0.0	0.2	0.2
	RICAC	*Ribes californicum* var. *californicum*	18	0.0	0.2	0.2
Herb	POSE	*Poa secunda*	100	2.0	0.2	8
	BRHO2	*Bromus hordeaceus*	91	14.8	0.2	35
	BRMA3	*Bromus madritensis*	82	2.7	0.2	12
	VUMI	*Vulpia microstachys*	73	3.8	0.2	25
	GAPO	*Galium porrigens*	45	0.2	0.2	1
	VUMY	*Vulpia myuros*	36	1.2	0.2	10
	BRDI3	*Bromus diandrus*	36	0.9	1	5
	AVENA	*Avena*	36	0.8	0.2	5
	MAFA3	*Marah fabaceus*	36	0.1	0.2	1
	MADIA	*Madia*	27	2.0	5	10
	MECA2	*Melica californica*	27	0.1	0.2	0.2
	LICI	*Linanthus ciliatus*	18	0.6	2	5
Herb	BRAR3	*Bromus arenarius*	18	0.2	1	1
	SACR2	*Sanicula crassicaulis*	18	0.0	0.2	0.2
Cryptogam	MOSS	Moss	18	1.8	5	15

***Cercocarpus betuloides-Eriogonum fasciculatum* Alliance** (no association defined)
Birchleaf Mountain-mahogany - California Buckwheat Alliance

LOCAL VEGETATION DESCRIPTION
One stand of *Cercocarpus betuloides-Eriogonum fasciculatum* Shrubland forms an intermittent shrub layer (3535%), where *Eriogonum fasciculatum* var. *foliolosum* is co-dominant with *Cercocarpus betuloides*. Shrubs consistently occur in two different strata, with low shrubs at 0-1m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (25%) at 0-0.5m tall. Trees occur sometimes as emergents (0.4%) with hardwoods at 2-5m tall and conifers at 5-10m tall. Total vegetation cover is 60%.

In the shrub overstory, *Cercocarpus betuloides* co-dominates with *Eriogonum fasciculatum*. *Pinus sabiniana*, *Quercus chrysolepis*, and *Quercus douglasii* may be found in the tree layer at trace cover. Non-native and native grasses may predominate in the herb understory, including *Avena* spp., *Bromus* spp., and *Poa secunda.*

LOCAL ENVIRONMENTAL DESCRIPTION
Elevation: mid, 4372ft
Aspect: variable
Slope: steep, 40 degrees
Topography: undulating
Small Rock Cover: 40%
Large Rock Cover: 2%
Litter Cover: 38%
Bare Ground: 15%
Parent Material: serpentine
Soil Texture: moderately coarse sandy loam

This alliance was sampled in the Duckworth Canyon watershed within the Serpentine portion of the study area.

Samples used to describe alliance: (n=1)
CCBLM032

Rank: G4S4

GLOBAL DISTRIBUTION
South Coast, inner montane Transverse Ranges, Peninsular Ranges, western Mojave Desert, western Colorado Desert

REFERENCES CITED
Klein and Evens 2005, Sawyer and Keeler-Wolf 1995, Gordon & White 1994

***Cercocarpus betuloides-Eriogonum fasciculatum* Alliance** (no association defined)

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	100	0.2	0.2	0.2
	QUCH2-t	*Quercus chrysolepis*	100	0.2	0.2	0.2
Shrub	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	100	25.0	25	25
	CEBE3	*Cercocarpus betuloides*	100	15.0	15	15
	CECU	*Ceanothus cuneatus*	100	2.0	2	2
	FRCA6	*Fremontodendron californicum*	100	1.0	1	1
	JUCA7	*Juniperus californica*	100	1.0	1	1
	ERLI6	*Ericameria linearifolia*	100	0.2	0.2	0.2
	YUWH	*Yucca whipplei*	100	0.2	0.2	0.2
Herb	AVENA	*Avena*	100	22.0	22	22
	BRDI3	*Bromus diandrus*	100	1.0	1	1
	LICI	*Linanthus ciliatus*	100	1.0	1	1
	POSE	*Poa secunda*	100	1.0	1	1
	BRHO2	*Bromus hordeaceus*	100	0.2	0.2	0.2
	BRMA3	*Bromus madritensis*	100	0.2	0.2	0.2
	CLPUQ	*Clarkia purpurea* subsp. *quadrivulnera*	100	0.2	0.2	0.2
	LENI	*Lepidium nitidum*	100	0.2	0.2	0.2

***Chrysothamnus nauseosus-Juniperus californica*/Annual-Perennial Herb Association**

Rubber Rabbitbrush - California Juniper / Annual - Perennial Herb Association

LOCAL VEGETATION DESCRIPTION

Stands of *Chrysothamnus nauseosus-Juniperus californica*/Annual-Perennial Herb Shrubland form an open shrub layer (7-30%, mean 17.9%), where *Chrysothamnus nauseosus* is dominant. Shrubs consistently occur in two different strata, with low shrubs at 0-1m tall and tall shrubs at 1-5m tall. The herbaceous layer is intermittent to continuous (35-80%, mean 60.9%) at 0-0.5m tall. Trees occur infrequently as emergents (0-2% cover, mean 0.2%) at 10-35m tall. Total vegetation cover is 55-85%, mean 73.3%.

In this association, *Chrysothamnus nauseosus* is dominant in the shrub overstory while *Juniperus californica* is characteristically present at low cover, and *Ericameria linearifolia* often intermixes at trace cover. *Pinus sabiniana* is infrequently present as an emergent tree at sparse cover. The herb layer is moderately dense to dense and is comprised of a variety of native and non-native grass and forb species, including *Bromus hordeaceus*, *Poa secunda*, *Avena* spp., *Vulpia microstachys*, and *Navarretia prostrata.*

Acanthomintha obovata subsp. *obovata, Eriogonum nudum* var. *indictum* and *Monardella antonina* subsp. *benitensis* are CNPS list 4 species. *Acanthomintha obovata* subsp. *obovata* was found in 3 of 11 stands sampled. *Eriogonum nudum* var. *indictum* was found on 2 of 11 stands sampled. *Monardella antonina* subsp. *benitensis* was found on 1 of 11 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3178-3768ft, mean 3509ft
Aspect: all aspects (sometimes none/flat)
Slope: moderate to steep, range 8-28 degrees, mean 19 degrees
Topography: most often undulating, less often concave or convex; middle to top slopes
Small Rock Cover: range 0-3%, mean 0.9%
Large Rock Cover: range 0-0.2%, mean 0.1%
Litter Cover: range 1.3-87%, mean 49.8%
Bare Ground: range 8-91%, mean 44.3%
Parent Material: sedimentary
Soil Texture: most often moderately fine silty clay loam, infrequently moderately fine clay loam or fine sandy clay

This association was sampled in Coyote Canyon, Domengine Creek, Ne Hi Canyon, Twentyfive Canyon and Urruttia Canyon watersheds within the Eastern Non-Serpentine portion of the study area and Hernandez Reservoir within the Western Non-Serpentine portion of the study area.

Samples used to describe association: (n=11)
CCBLM357, CCBLM388, CCBLM399, CCBLM402, CCBLM403, CCBLM423, CCBLM427, CCBLM454, CCBLM464, CCBLM529, CCBLM530

Rank: G4S4

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Chrysothamnus nauseosus-Juniperus californica*/Annual-Perennial Herb Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	100	16.2	6	27
	JUCA7	*Juniperus californica*	100	1.6	0.2	5
	ERLI6	*Ericameria linearifolia*	55	0.2	0.2	1
	ERCO25	*Eriophyllum confertiflorum*	27	0.1	0.2	0.2
	GUCA	*Gutierrezia californica*	18	0.0	0.2	0.2
Herb	BRHO2	*Bromus hordeaceus*	100	15.9	2	35
	POSE	*Poa secunda*	100	0.8	0.2	4
	AVENA	*Avena*	91	27.2	3	52
	VUMI	*Vulpia microstachys*	91	9.5	0.2	30
	NAPR2	*Navarretia prostrata*	82	0.6	0.2	3
	BRAR3	*Bromus arenarius*	73	2.0	0.2	15
	AMME	*Amsinckia menziesii*	64	0.3	0.2	2
	BRMA3	*Bromus madritensis*	55	1.2	0.2	5
	BLCR	*Bloomeria crocea*	55	0.2	0.2	1
	BRDI3	*Bromus diandrus*	55	0.2	0.2	1
	ERCI6	*Erodium cicutarium*	45	0.6	0.2	5
	VUMY	*Vulpia myuros*	36	0.7	0.2	5
	MICAC2	*Micropus californicus* var. *californicus*	36	0.6	0.2	3
	PLER3	*Plantago erecta*	36	0.2	0.2	2
	CLPUQ	*Clarkia purpurea* subsp. *quadrivulnera*	36	0.1	0.2	0.2
	ACOB	*Acanthomintha obovata*	27	0.1	0.2	1
	ACMO2	*Achyrachaena mollis*	27	0.1	0.2	1
	LODA	*Lomatium dasycarpum*	27	0.1	0.2	0.2
	BRTE	*Bromus tectorum*	18	1.4	0.2	15
	ERNUI	*Eriogonum nudum* var. *indictum*	18	0.2	0.2	2
	ALPE	*Allium peninsulare*	18	0.0	0.2	0.2
	CASUS2	*Calystegia subacaulis* subsp. *subacaulis*	18	0.0	0.2	0.2
	LASE	*Lactuca serriola*	18	0.0	0.2	0.2
	NAPU4	*Nassella pulchra*	18	0.0	0.2	0.2
	TRWI3	*Trifolium willdenowii*	18	0.0	0.2	0.2

***Ephedra californica*/Annual-Perennial Herb Association**

California Ephedra / Annual - Perennial Herb Association

LOCAL VEGETATION DESCRIPTION

Stands of *Ephedra californica/*Annual-Perennial Herb Shrubland form an open shrub layer (7-7%, mean 7%), where *Ephedra californica* dominates. Shrubs may occur in two different strata, with low shrubs at 0.5-1m tall and tall shrubs at 1-2m tall. The herbaceous layer is continuous (70-75%, mean 72.5%) at 0-0.5m tall. Total vegetation cover is 75-80%, mean 77.5%.

In this association, *Ephedra californica* is dominant in open shrub stands, and other xeromorphic shrubs such as *Gutierrezia californica, Atriplex spinifera,* and *Eriogonum fasciculatum* var. *polifolium* may intermix at trace cover in the overstory. The understory is dense and comprised of a variety of native and non-native grasses and forbs, where grasses such as *Bromus diandrus* may occur at high cover.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low, range 1277-1320ft, mean 1299ft
Aspect: NW
Slope: steep, range 30-36 degrees, mean 33 degrees
Topography: undulating; low to upper slopes
Small Rock Cover: range 0.2-2%, mean 1.1%
Large Rock Cover: range 0.2-0.2%, mean 0.2%
Litter Cover: range 63-82%, mean 72.5%
Bare Ground: range 15-32%, mean 23.5%
Parent Material: sedimentary
Soil Texture: coarse loamy sand, moderately fine sandy clay loam

This association was sampled in the Monocline Ridge watershed within the Monocline Ridge portion of the study area.

Samples used to describe association: (n=2)
CCBLM482, CCBLM486

Rank: G3S3?

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Ephedra californica*/Annual-Perennial Herb Association**

Stratum	Code	Species Name	Con	Avg	Min	Max	
Shrub	EPCA2	*Ephedra californica*	100	7.0	7	7	
	ATSP	*Atriplex spinifera*	100	0.2	0.2	0.2	
	GUCA	*Gutierrezia californica*	100	0.2	0.2	0.2	
	ERFAP	*Eriogonum fasciculatum* var. *polifolium*	50	0.1	0.2	0.2	
Herb	BRDI3	*Bromus diandrus*	100	70.0	70	70	
	BRHO2	*Bromus hordeaceus*	100	3.0	1	5	
	AMME	*Amsinckia menziesii*	100	0.6	0.2	1	
	CLUN	*Clarkia unguiculata*	100	0.2	0.2	0.2	
	ERIOG	*Eriogonum*	100	0.2	0.2	0.2	
	MAFA3	*Marah fabaceus*	100	0.2	0.2	0.2	
	POSE	*Poa secunda*	100	0.2	0.2	0.2	
	SATR12	*Salsola tragus*	100	0.2	0.2	0.2	
	TRWI3	*Trifolium willdenowii*	100	0.2	0.2	0.2	
	BRMA3	*Bromus madritensis*	50	1.0	2	2	
	LOSC6	*Loeseliastrum schottii*	50	0.5	1	1	
	CAEXE	*Castilleja exserta* subsp. *exserta*	50	0.1	0.2	0.2	
	CEME2	*Centaurea melitensis*	50	0.1	0.2	0.2	
	ERSE3	*Eremocarpus setigerus*	50	0.1	0.2	0.2	
	MENTZ	*Mentzelia*	50	0.1	0.2	0.2	
	PHCIH2	*Phacelia cicutaria* var. *hispida*	50	0.1	0.2	0.2	

***Ephedra californica-Gutierrezia californica/Eriastrum pluriflorum* Association**

California Ephedra - California Matchweed / Many-flowered Eriastrum Association

LOCAL VEGETATION DESCRIPTION

Stands of *Ephedra californica-Gutierrezia californica/Eriastrum pluriflorum* Shrubland form an open to intermittent shrub layer (10-35%, mean 22.2%), where *Ephedra californica* and *Gutierrezia californica* co-dominate. Shrubs consistently occur in two different strata, with low shrubs at 0-1m tall and tall shrubs at 0.5-2m tall. The herbaceous layer is open to intermittent (5-42%, mean 22.3%) at 0-0.5m tall. Total vegetation cover is 17-75%, mean 43.3%.

In this association, shrubs such as *Eriogonum fasciculatum* var. *polifolium* and *Eastwoodia elegans* characteristically intermix in the overstory while *Ephedra californica* and *Gutierrezia californica* are most abundant and co-dominant. The herb understory is comprised of a variety of native and non-native grasses and forbs. *Bromus madritensis* and *Eriastrum pluriflorum* are including characteristically present while *Erodium cicutarium*, *Chorizanthe membranacea*, and *Phacelia cicutaria* var. *hispida* are often present.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low, range 1103-1800ft, mean 1539ft
Aspect: variable (NW, NE, SW)
Slope: gentle to steep, range 0-40 degrees, mean 18.2 degrees
Topography: convex or undulating; low to top slopes
Small Rock Cover: range 3-36%, mean 15.4%
Large Rock Cover: range 0-11%, mean 4.5%
Litter Cover: range 0-14%, mean 4.2%
Bare Ground: range 55-85%, mean 71.7%
Parent Material: sedimentary, sandstone
Soil Texture: most often coarse loamy sand, less often medium sand or moderately fine sandy clay loam

This association was sampled in the Monocline Ridge watershed within the Monocline Ridge portion of the study area.

Samples used to describe association: (n=6)
CCBLM472, CCBLM477, CCBLM478, CCBLM480, CCBLM485, CCBLM500

Rank: G2S2?

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Ephedra californica-Gutierrezia californica/Eriastrum pluriflorum* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	GUCA	*Gutierrezia californica*	100	10.0	1	20
	EPCA2	*Ephedra californica*	100	9.3	2	15
	ERFAP	*Eriogonum fasciculatum* var. *polifolium*	100	1.1	0.2	5
	EAEL	*Eastwoodia elegans*	83	0.3	0.2	1
	ERIOP2	*Eriophyllum*	33	0.1	0.2	0.2
	ATSP	*Atriplex spinifera*	17	1.2	7	7
Herb	BRMA3	*Bromus madritensis*	100	10.5	2	30
	ERPL2	*Eriastrum pluriflorum*	100	6.9	0.2	38
	ERCI6	*Erodium cicutarium*	67	5.3	1	19
	CHME2	*Chorizanthe membranacea*	67	0.6	0.2	3
	PHCIH2	*Phacelia cicutaria* var. *hispida*	67	0.1	0.2	0.2
	BRDI3	*Bromus diandrus*	50	0.7	0.2	2
	POAN	*Poa annua*	50	0.4	0.2	1
	ACHY	*Achnatherum hymenoides*	50	0.1	0.2	0.2
	AMME	*Amsinckia menziesii*	50	0.1	0.2	0.2
	VUMY	*Vulpia myuros*	50	0.1	0.2	0.2
	CHPE4	*Chorizanthe perfoliata*	33	0.1	0.2	0.2
	OEDEC2	*Oenothera deltoides* subsp. *cognata*	33	0.1	0.2	0.2
	POSE	*Poa secunda*	33	0.1	0.2	0.2
	SACO6	*Salvia columbariae*	33	0.1	0.2	0.2
	URLI5	*Uropappus lindleyi*	33	0.1	0.2	0.2
	VUMI	*Vulpia microstachys*	33	0.1	0.2	0.2
	BRHO2	*Bromus hordeaceus*	17	0.0	0.2	0.2
	CLUN	*Clarkia unguiculata*	17	0.0	0.2	0.2
	ERCO17	*Eriogonum covilleanum*	17	0.0	0.2	0.2
	LEGLG	*Lessingia glandulifera* var. *glandulifera*	17	0.0	0.2	0.2
	MAFA3	*Marah fabaceus*	17	0.0	0.2	0.2
	MICAC2	*Micropus californicus* var. *californicus*	17	0.0	0.2	0.2
	PHLOX	*Phlox*	17	0.0	0.2	0.2
	RUHY	*Rumex hymenosepalus*	17	0.0	0.2	0.2
Cryptogam	LICHEN	Lichen	33	0.2	0.2	1
	MOSS	Moss	17	0.0	0.2	0.2

***Eriogonum fasciculatum* var. *foliolosum*/Annual Herb Association**

California Buckwheat / Annual Herb Association

LOCAL VEGETATION DESCRIPTION

Stands of *Eriogonum fasciculatum* var. *foliolosum* /Annual Herb Shrubland form an open to intermittent shrub layer (25-60%, mean 41.9%), where *Eriogonum fasciculatum* var. *foliolosum* dominates. Shrubs frequently occur in two different strata, with low shrubs at 0-1m tall and tall shrubs at 0.5-6m tall. The herbaceous layer is open to intermittent (5-57%, mean 23.2%) at 0-1m tall. Trees occur sometimes as emergents (0-1.2% cover, mean 0.2%) with hardwoods at 5-10m tall and conifers at 10-20m tall. Total vegetation cover is 30-80%, mean 58.5%.

In this association, *Eriogonum fasciculatum* var. *foliolosum* is dominant though other shrubs may occur in low cover including *Ericameria linearifolia*, *Artemisia californica*, *Ceanothus cuneatus*, and *Juniperus californica. Pinus sabiniana* and *Quercus douglasii* can be found in the tree layer at trace cover. A variety of forbs and grasses occupy the herb layer, the most abundant species being non-native annual grasses (e.g., *Avena* spp., *Bromus madritensis,* and *Bromus hordeaceus*).

Acanthomintha lanceolata, a CNPS list 4 species, was found on 1 of 13 stands sampled. *Calystegia collina* subsp. *venusta*, a CNPS list 4 species was found on 2 of 13 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 2533-4832ft, mean 3500ft
Aspect: most often SW, less often SE or none/flat
Slope: gentle to steep, range 1-35 degrees, mean 24.9 degrees
Topography: most often undulating, less often convex or flat; lower to upper slopes
Small Rock Cover: range 0.2-86%, mean 24.7%
Large Rock Cover: range 0-11.5%, mean 2.9%
Litter Cover: range 0.2-85%, mean 30.9%
Bare Ground: range 0.2-78%, mean 37.1%
Parent Material: frequently sedimentary, infrequently serpentine
Soil Texture: most often moderately fine clay loam, less often coarse loamy sand, moderately coarse to very fine sandy loam, moderately fine silty clay loam, fine silty clay

This association was sampled in the Byles Canyon, Hernandez Reservoir and Duckworth Canyon watersheds in the Western Non-Serpentine portion of the study area; Coyote Canyon and Ne Hi Canyon watersheds within the Eastern Non-Serpentine portion of the study area; and Duckworth Canyon watershed within the Serpentine portion of the study area.

Samples used to describe association: (n=13)
CCBLM031, CCBLM038, CCBLM131, CCBLM244, CCBLM324, CCBLM329, CCBLM349, CCBLM365, CCBLM378, CCBLM382, CCBLM384, CCBLM389, CCBLM438

Rank: G4S4

GLOBAL DISTRIBUTION

South Coast and Peninsular Ranges

REFERENCES CITED

Klein and Evens 2005

***Eriogonum fasciculatum* var. *foliolosum*/Annual Herb Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	38	0.1	0.2	0.2
Shrub	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	100	38.6	20	60
	ERLI6	*Ericameria linearifolia*	62	1.5	0.2	10
	JUCA7	*Juniperus californica*	62	0.2	0.2	1
	YUWH	*Yucca whipplei*	46	0.5	0.2	2
	CECU	*Ceanothus cuneatus*	38	0.5	0.2	2
	RHIL	*Rhamnus ilicifolia*	31	0.3	0.2	2
	CEBE3	*Cercocarpus betuloides*	31	0.2	0.2	1
	QUJO3	*Quercus john-tuckeri*	31	0.1	0.2	1
	ARCA11	*Artemisia californica*	23	0.2	0.2	1
	ERCO25	*Eriophyllum confertiflorum*	23	0.1	0.2	1
	ERCA6	*Eriodictyon californicum*	15	0.2	0.2	2
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	15	0.1	0.2	1
Herb	AVENA	*Avena*	92	8.3	0.2	27
	BRMA3	*Bromus madritensis*	92	2.9	0.2	15
	BRHO2	*Bromus hordeaceus*	85	9.6	0.2	30
	MECA2	*Melica californica*	54	0.1	0.2	0.2
	ERCI6	*Erodium cicutarium*	38	1.1	0.2	10
	POSE	*Poa secunda*	38	0.1	0.2	1
	SACO6	*Salvia columbariae*	31	0.4	0.2	4
	BRDI3	*Bromus diandrus*	23	0.5	1	5
	MICAC2	*Micropus californicus* var. *californicus*	15	0.8	5	5
	BRTE	*Bromus tectorum*	15	0.4	0.2	5
	CACOV	*Calystegia collina* subsp. *venusta*	15	0.2	0.2	2
	CLUN	*Clarkia unguiculata*	15	0.0	0.2	0.2
	DEPA2	*Delphinium parryi*	15	0.0	0.2	0.2
	ELMU3	*Elymus multisetus*	15	0.0	0.2	0.2
	GAAN	*Galium andrewsii*	15	0.0	0.2	0.2
	NAPU4	*Nassella pulchra*	15	0.0	0.2	0.2

***Eriogonum fasciculatum* var. *foliolosum-Juniperus californica*/Annual-Perennial Herb Association**

California Buckwheat - California Juniper / Annual - Perennial Herb Association

LOCAL VEGETATION DESCRIPTION

Stands of *Eriogonum fasciculatum* var. *foliolosum-Juniperus californica*/Annual-Perennial Herb Shrubland form an open to intermittent shrub layer (18-55%, mean 38.5%), where *Eriogonum fasciculatum* var. *foliolosum* is dominant and *Juniperus californica* is sub-dominant. Shrubs frequently occur in two different strata, with low shrubs at 0-1m tall and tall shrubs at 1-5m tall. The herbaceous layer is open to intermittent (8-65%, mean 27.6%) at 0-0.5m tall. Trees occur often as emergents (0-6% cover, mean 1.2%) with hardwoods at 5-10m tall and conifers at 5-20m tall. Total vegetation cover is 40-90%, mean 58.8%.

In this association, *Eriogonum fasciculatum* var. *foliolosum* is usually dominant in the shrub layer, though *Juniperus californica* is characteristically present as a sub-dominant to co-dominant. A variety of other species intermix at low cover, where *Eriophyllum confertiflorum, Ericameria linearifolia,* and *Quercus john-tuckeri* are often present. *Pinus sabiniana* and *Quercus douglasii* can be found in the tree layer at trace cover. In the herb understory, non-natives species *Avena* spp., *Bromus madritensis*, *Erodium cicutarium*, and *Bromus hordeaceus* and native species *Poa secunda* are characteristically present.

Acanthomintha lanceolata and *Monardella antonina* subsp. *benitensis* are CNPS list 4 species. *Acanthomintha lanceolata* was found on 3 of 17 stands sampled, and *Monardella antonina* subsp. *benitensis* was found on 1 of 17 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 2081-4803ft, mean 3358ft
Aspect: most often SE or SW, less often NW
Slope: steep, range 23-45 degrees, mean 31.6 degrees
Topography: most often undulating, less often flat; bottom to top slopes
Small Rock Cover: range 0.3-60%, mean 14.6%
Large Rock Cover: range 0-7%, mean 1.1%
Litter Cover: range 0.2-63%, mean 23.6%
Bare Ground: range 25-92%, mean 55.8%
Parent Material: frequently sedimentary, rarely serpentine
Soil Texture: most often moderately fine sandy clay loam, less often medium to very fine sandy loam, medium silt loam, moderately fine silty clay loam, moderately fine clay loam, fine silty clay

This association was sampled in Byles Canyon, Hernandez Reservoir and Larious Canyon watersheds within the Western Non-Serpentine portion of the study area; Ne Hi Canyon watershed within the Eastern Non-Serpentine portion of the study area; and Duckworth Canyon watershed within the Serpentine portion of the study area.

Samples used to describe association: (n=17)
CCBLM040, CCBLM326, CCBLM331, CCBLM332, CCBLM335, CCBLM342, CCBLM369, CCBLM372, CCBLM375, CCBLM396, CCBLM401, CCBLM432, CCBLM442, CCBLM456, CCBLM461, CCBLM468, CCBLM527

Rank: G3S3

GLOBAL DISTRIBUTION

Inner South Coast, Transverse Ranges, Peninsular Ranges, bordering the Mojave and Colorado Deserts

REFERENCES CITED

Holland 1986

***Eriogonum fasciculatum* var. *foliolosum-Juniperus californica*/Annual-Perennial Herb Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	65	1.0	0.2	6
	QUDO-t	*Quercus douglasii*	24	0.2	0.2	2
Tree Understory	QUDO-m	*Quercus douglasii*	12	0.1	0.2	1
	PISA2-m	*Pinus sabiniana*	12	0.0	0.2	0.2
Shrub	JUCA7	*Juniperus californica*	100	8.6	1	25
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	94	27.5	10	45
	ERLI6	*Ericameria linearifolia*	65	1.0	0.2	8
	ERCO25	*Eriophyllum confertiflorum*	59	0.9	0.2	8
	QUJO3	*Quercus john-tuckeri*	53	0.8	0.2	5
	ARCA11	*Artemisia californica*	35	0.7	0.2	5
	EPCA2	*Ephedra californica*	35	0.7	0.2	8
	GUCA	*Gutierrezia californica*	35	0.2	0.2	1
	YUWH	*Yucca whipplei*	29	0.2	0.2	2
	ADFA	*Adenostoma fasciculatum*	24	0.2	0.2	3
	CECU	*Ceanothus cuneatus*	24	0.2	0.2	3
	CEBE3	*Cercocarpus betuloides*	24	0.2	0.2	1
	RHIL	*Rhamnus ilicifolia*	18	0.0	0.2	0.2
	ARGL4	*Arctostaphylos glauca*	12	0.1	0.2	2
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	12	0.1	0.2	2
	LUAL4	*Lupinus albifrons*	12	0.0	0.2	0.2
Herb	AVENA	*Avena*	94	7.7	0.2	30
	BRMA3	*Bromus madritensis*	94	5.7	0.2	25
	POSE	*Poa secunda*	94	1.3	0.2	10
	BRHO2	*Bromus hordeaceus*	71	10.6	2	65
	ERCI6	*Erodium cicutarium*	71	1.9	0.2	8
	MECA2	*Melica californica*	47	0.2	0.2	1
	MICAC2	*Micropus californicus* var. *californicus*	41	0.1	0.2	0.2
	SACO6	*Salvia columbariae*	41	0.1	0.2	0.2
	VUMI	*Vulpia microstachys*	35	2.2	0.2	30
	VUMY	*Vulpia myuros*	24	0.6	1	6
	GAAN2	*Galium angustifolium*	24	0.0	0.2	0.2
	BRTE	*Bromus tectorum*	18	0.5	1	5

***Eriogonum fasciculatum* var. *foliolosum-Juniperus californica*/Annual-Perennial Herb Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Herb	PLER3	*Plantago erecta*	18	0.1	0.2	2
	ACLA2	*Acanthomintha lanceolata*	18	0.0	0.2	0.2
	CAAPD	*Castilleja applegatei* subsp. *disticha*	18	0.0	0.2	0.2
	CORI2	*Cordylanthus rigidus*	18	0.0	0.2	0.2
	LOMI	*Lotus micranthus*	18	0.0	0.2	0.2
	BRDI3	*Bromus diandrus*	12	0.5	3	5
	ELMU3	*Elymus multisetus*	12	0.1	0.2	1
	AMME	*Amsinckia menziesii*	12	0.0	0.2	0.2
	HESPE10	*Hesperevax*	12	0.0	0.2	0.2
	LOTUS	*Lotus (argophyllus)*	12	0.0	0.2	0.2
	LOHU2	*Lotus humistratus*	12	0.0	0.2	0.2
	NALE2	*Nassella lepida*	12	0.0	0.2	0.2
	NAPU4	*Nassella pulchra*	12	0.0	0.2	0.2
Cryptogam	MOSS	Moss	12	0.5	4	5
Epiphyte	PHJU	*Phoradendron juniperinum*	12	0.1	0.2	1

***Eriogonum fasciculatum-Yucca whipplei*/Annual-Perennial Herb Association**

California Buckwheat - Chaparral Yucca / Annual - Perennial Herb Association

LOCAL VEGETATION DESCRIPTION

Stands of *Eriogonum fasciculatum -Yucca whipplei/Annual*-Perennial Herb Shrubland form an open to continuous shrub layer (30-75%, mean 51.5%), where *Eriogonum fasciculatum* var. *foliolosum* is dominant and *Yucca whipplei* is sub-dominant to co-dominant. Shrubs consistently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 0.5-5m tall. The herbaceous layer is open to intermittent (4-45%, mean 16.8%) at 0-0.5m tall. Trees occur occasionally as emergents (0-8% cover, mean 1.1%) with hardwoods at 5-10m tall and conifers at 5-20m tall. Total vegetation cover is 39-83%, mean 63.5%.

In this association, *Eriogonum fasciculatum* and *Yucca whipplei* are usually the most abundant species in the shrub overstory, while *Juniperus californica* is characteristically present and can sometimes be similar in cover to *Yucca whipplei*. A variety of chaparral and drought deciduous species also occur in this layer at low cover, including *Ericameria linearifolia. Pinus sabiniana* and *Quercus douglasii* are sometimes present in the tree layer at sparse cover. Grasses are most abundant and frequent in the herb understory, including non-natives *Avena* spp., *Bromus madritensis*, and *Bromus hordeaceus*, and native *Poa secunda.*

Acanthomintha lanceolata was found in 1 of 28 stands sampled. *Calystegia collina* subsp. *venusta* and *Monardella antonina* subsp. *benitensis* was found in 2 of 28 stands. Both are CNPS list 4 species.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 2705-4306ft, mean 3559ft
Aspect: most often SW, less often SE, NE or variable
Slope: somewhat steep to steep, range 15-40 degrees, mean 28.3 degrees
Topography: most often undulating, less often convex, flat or concave; lower to upper slopes
Small Rock Cover: range 1-75%, mean 17%
Large Rock Cover: range 0-16%, mean 2.6%
Litter Cover: range 2.8-72%, mean 33.3%
Bare Ground: range 8-84%, mean 42.4%
Parent Material: frequently sedimentary, rarely serpentine
Soil Texture: most often moderately coarse sandy loam, moderately fine clay loam, or moderately fine sandy clay loam; less often medium loam to moderately fine silty clay loam, or fine silty clay

This association was sampled in the Arroyo Leona, Coyote Canyon, Domengine Creek, Duckworth Canyon, Ne Hi Canyon, Pine Canyon, Upper White Creek and Urruttia Canyon watersheds in the Eastern Non-Serpentine portion of the study area; Byles Canyon and Duckworth Canyon watersheds within the Western Non-Serpentine portion of the study area; Duckworth Canyon watershed in the Serpentine portion of the study area.

Samples used to describe association: (n=28)
CCBLM033, CCBLM035, CCBLM138, CCBLM177, CCBLM216, CCBLM222, CCBLM231, CCBLM232, CCBLM235, CCBLM390, CCBLM392, CCBLM395, CCBLM418, CCBLM421, CCBLM433, CCBLM443, CCBLM447, CCBLM450, CCBLM452, CCBLM462, CCBLM470, CCBLM471, CCBLM517, CCBLM521, CCBLM532, CCBLM534, CCBLM538, CCBLM564

Rank: G4S4?

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Eriogonum fasciculatum* var. *foliolosum*-*Yucca whipplei*/Annual-Perennial Herb**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	43	0.5	0.2	4
	QUDO-t	*Quercus douglasii*	18	0.1	0.2	2
Shrub	YUWH	*Yucca whipplei*	100	14.2	5	30
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	86	29.4	18	50
	ERLI6	*Ericameria linearifolia*	86	3.1	0.2	15
	JUCA7	*Juniperus californica*	82	3.5	0.2	15
	ERCO25	*Eriophyllum confertiflorum*	54	0.4	0.2	3
	GUCA	*Gutierrezia californica*	39	0.6	0.2	5
	CECU	*Ceanothus cuneatus*	29	0.2	0.2	1
	CEBE3	*Cercocarpus betuloides*	25	0.2	0.2	3
	RHIL	*Rhamnus ilicifolia*	21	0.1	0.2	1
	EPCA2	*Ephedra californica*	18	0.3	0.2	3
	ERCA6	*Eriodictyon californicum*	18	0.1	0.2	2
	QUJO3	*Quercus john-tuckeri*	18	0.1	0.2	1
	ERFAP	*Eriogonum fasciculatum* var. *polifolium*	14	2.8	5	26
	ARCA11	*Artemisia californica*	11	0.2	0.2	4
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	11	0.0	0.2	0.2
	LUAL4	*Lupinus albifrons*	11	0.0	0.2	0.2
Herb	AVENA	*Avena*	89	6.8	0.2	20
	BRMA3	*Bromus madritensis*	86	2.5	0.2	10
	BRHO2	*Bromus hordeaceus*	57	5.1	0.2	20
	POSE	*Poa secunda*	57	0.6	0.2	4
	ERCI6	*Erodium cicutarium*	36	0.4	0.2	5
	GAAN2	*Galium angustifolium*	32	0.1	0.2	1
	CAAPD	*Castilleja applegatei* subsp. *disticha*	25	0.1	0.2	1
	MECA2	*Melica californica*	25	0.1	0.2	1
	NAPU4	*Nassella pulchra*	25	0.1	0.2	1
	ERIOG	*Eriogonum*	21	0.0	0.2	0.2
	SACO6	*Salvia columbariae*	18	0.1	0.2	2
	MICAC2	*Micropus californicus* var. *californicus*	14	0.1	0.2	2
	VUMI	*Vulpia microstachys*	14	0.1	0.2	2
	VUMY	*Vulpia myuros*	11	0.4	0.2	10
	BRAR3	*Bromus arenarius*	11	0.4	2	5
	CORI2	*Cordylanthus rigidus*	11	0.0	0.2	0.2
	PEMU	*Pellaea mucronata*	11	0.0	0.2	0.2
	PLER3	*Plantago erecta*	11	0.0	0.2	0.2

Eriogonum fasciculatum var. *polifolium/Eriastrum pluriflorum* Association
California Buckwheat / Many-flowered Eriastrum Association

LOCAL VEGETATION DESCRIPTION
Stands of *Eriogonum fasciculatum* var. *polifolium/Eriastrum pluriflorum* Shrubland form an open shrub layer (12-22%, mean 17.8%), where *Eriogonum fasciculatum* var. *polifolium* dominates. Shrubs consistently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (5-15%, mean 10%) at 0-0.5m tall. Total vegetation cover is 20-32%, mean 25.5%.

In this association, narrow-leaved and microphyllous species such as *Atriplex spinifera, Ephedra californica, Eastwoodia elegans,* and *Gutierrezia californica* frequently intermix in the shrub overstory as sub-dominants. Herbs *Bromus madritensis, Erodium cicutarium, Micropus californicus*, and *Eriastrum pluriflorum* are characteristically present in the understory at low cover.

LOCAL ENVIRONMENTAL DESCRIPTION
Elevation: low, range 1200-1840ft, mean 1520ft
Aspect: most often SE, less often variable
Slope: somewhat steep to steep, range 19-35 degrees, mean 27.3 degrees
Topography: undulating; lower to upper slope
Small Rock Cover: range 10-15%, mean 12.5%
Large Rock Cover: range 1-5%, mean 3%
Litter Cover: range 6-15%, mean 12.5%
Bare Ground: range 60-73%, mean 67%
Parent Material: sedimentary
Soil Texture: medium sand, coarse loamy sand, moderately fine sandy clay loam

This association was sampled in the Monocline Ridge watershed within the Monocline Ridge portion of the study area.

Samples used to describe association: (n=4)
CCBLM483, CCBLM484, CCBLM487, CCBLM501

Rank: G2S2

GLOBAL DISTRIBUTION
Central Coast, San Joaquin Valley, Central Valley, inner South Coast

REFERENCES CITED
Holland 1986

***Eriogonum fasciculatum* var. *polifolium/Eriastrum pluriflorum* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	ERFAP	*Eriogonum fasciculatum* var. *polifolium*	100	14.3	7	20
	ATSP	*Atriplex spinifera*	75	1.5	0.2	5
	EPCA2	*Ephedra californica*	75	1.5	1	3
	EAEL	*Eastwoodia elegans*	75	0.6	0.2	1
	GUCA	*Gutierrezia californica*	75	0.3	0.2	1
Herb	BRMA3	*Bromus madritensis*	100	7.0	3	10
	ERCI6	*Erodium cicutarium*	100	2.8	1	5
	ERPL2	*Eriastrum pluriflorum*	100	0.2	0.2	0.2
	MICAC2	*Micropus californicus* var. *californicus*	100	0.2	0.2	0.2
	CHPE4	*Chorizanthe perfoliata*	75	0.3	0.2	1
	CHME2	*Chorizanthe membranacea*	75	0.2	0.2	0.2
	SACO6	*Salvia columbariae*	75	0.2	0.2	0.2
	CAMIS	*Camissonia*	50	0.1	0.2	0.2
	POAN	*Poa annua*	50	0.1	0.2	0.2
	ERIOG	*Eriogonum*	25	0.1	0.2	0.2
	OEDEC2	*Oenothera deltoides* subsp. *cognata*	25	0.1	0.2	0.2
	VUMY	*Vulpia myuros*	25	0.1	0.2	0.2

***Eriogonum heermannii* Alliance** (no association defined)

Heermann's Buckwheat Alliance

LOCAL VEGETATION DESCRIPTION

In one stand of *Eriogonum heermannii* Shrubland, the shrub layer is open (6%), and *Eriogonum heermannii* dominates. Shrubs occur in one stratum, at 0.5-1m tall. The herbaceous layer is open (0.2%) at 0-0.5m tall. Trees occur as emergents (0.2%) at 5-10m tall. Total vegetation cover is 6%.

In one stand of this alliance, *Eriogonum heermannii* is the dominant species, and it occurs with *Arctostaphylos glauca* in the shrub layer. *Pinus sabiniana* is present at trace cover in the tree layer. Grasses and native forbs occupy a simple herb understory (see species table).

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low, 2497ft
Aspect: none/flat
Slope: flat, 0 degrees
Topography: undulating; bottom
Small Rock Cover: 30%
Large Rock Cover: 4%
Litter Cover: 1%
Bare Ground: 64%
Parent Material: sandy alluvium
Soil Texture: coarse sand

This alliance was sampled in the Clear Creek watershed within the Western Non-Serpentine portion of the study area.

Samples used to describe alliance: (n=1)
CCBLM020

Rank: G2S2?

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Eriogonum heermannii* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	100	0.2	0.2	0.2
Tree Understory	PISA2-m	*Pinus sabiniana*	100	0.2	0.2	0.2
Shrub	ERHE	*Eriogonum heermannii*	100	5.0	5	5
	ARGL4	*Arctostaphylos glauca*	100	0.2	0.2	0.2
Herb	AVENA	*Avena*	100	0.2	0.2	0.2
	BRMA3	*Bromus madritensis*	100	0.2	0.2	0.2
	CABOD	*Camissonia boothii* subsp. *decorticans*	100	0.2	0.2	0.2
	ELMU3	*Elymus multisetus*	100	0.2	0.2	0.2
	ESCA2	*Eschscholzia californica*	100	0.2	0.2	0.2
	MUAS	*Muhlenbergia asperifolia*	100	0.2	0.2	0.2

***Eriogonum wrightii-Eriophyllum confertiflorum/Monardella antonina* subsp. *benitensis* Association**

Wright's Buckwheat - Golden Yarrow / San Benito Monardella Association

LOCAL VEGETATION DESCRIPTION

Stands of *Eriogonum wrightii-Eriophyllum confertiflorum/Monardella antonina* subsp. *benitensis* Shrubland form an intermittent shrub layer (35-52%, mean 40.7%), where *Eriogonum wrightii* dominates or co-dominates with *Eriophyllum confertiflorum*. Shrubs consistently occur in two different strata, with low shrubs at 0-0.5m tall and tall shrubs at 0.5-1m tall. The herbaceous layer is open (4-25%, mean 16.3%) at 0-0.5m tall. Trees occur sometimes as emergents (0-0.2% cover, mean 0.1%) at 10-15m tall. Total vegetation cover is 50-58%, mean 53.3%.

In this association, dwarf to low shrubs mainly occupy the overstory with *Eriophyllum confertiflorum* sub-dominant to co-dominant with *Eriogonum wrightii*, and *Yucca whipplei* also can intermix as a co-dominant or sub-dominant. The most frequent herbs in the understory include native species *Monardella antonina* subsp. *benitensis*, *Poa secunda* and *Achillea millefolium.*

Monardella antonina subsp. *benitensis* and *Calystegia collina* subsp. *venusta* are CNPS list 4 species. *Monardella antonina* subsp. *benitensis* was found on 3 of 3 stands sampled. *Calystegia collina* subsp. *venusta* was found on 2 of 3 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 4458-4565ft, mean 4520ft
Aspect: SW
Slope: somewhat steep to steep, range 22-30 degrees, mean 25.7 degrees
Topography: convex or undulating; upper to top slopes
Small Rock Cover: range 10-15%, mean 11.7%
Large Rock Cover: range 1-20%, mean 8.7%
Litter Cover: range 55-65%, mean 60%
Bare Ground: range 10-24%, mean 14.7%
Parent Material: sedimentary or serpentine
Soil Texture: coarse loamy sand

This association was sampled in the East Fork San Carlos Creek watershed within the Serpentine and Western Non-Serpentine portions of the study area.

Samples used to describe association: (n=3)
CCBLM052, CCBLM064, CCBLM065

Rank: G2S2?

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Eriogonum wrightii-Eriophyllum confertiflorum/Monardella antonina* subsp. *benitensis* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	ERWR	*Eriogonum wrightii*	100	20.7	7	28
	ERCO25	*Eriophyllum confertiflorum*	100	10.0	7	15
	YUWH	*Yucca whipplei*	67	9.3	3	25
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	33	0.1	0.2	0.2
	LUAL4	*Lupinus albifrons*	33	0.1	0.2	0.2
Herb	MOANB	*Monardella antonina* subsp. *benitensis*	100	2.3	1	5
	POSE	*Poa secunda*	100	1.1	0.2	2
	ACMI2	*Achillea millefolium*	100	0.5	0.2	1
	AVENA	*Avena*	67	13.3	20	20
	CACOV	*Calystegia collina* subsp. *venusta*	67	1.0	1	2
	VUMY	*Vulpia myuros*	67	0.7	1	1
	GAAN	*Galium andrewsii*	67	0.4	0.2	1
	BRHO2	*Bromus hordeaceus*	33	0.3	1	1
	BRAR3	*Bromus arenarius*	33	0.1	0.2	0.2
	BRCA5	*Bromus carinatus*	33	0.1	0.2	0.2
	CAVE3	*Calochortus venustus*	33	0.1	0.2	0.2
	CIOCV	*Cirsium occidentale* var. *venustum*	33	0.1	0.2	0.2
	CLPUQ	*Clarkia purpurea* subsp. *quadrivulnera*	33	0.1	0.2	0.2
	DEPA2	*Delphinium parryi*	33	0.1	0.2	0.2
	GILIA	*Gilia*	33	0.1	0.2	0.2
	LIBI	*Linanthus bicolor*	33	0.1	0.2	0.2
	MEIM	*Melica imperfecta*	33	0.1	0.2	0.2
	PHHE2	*Phacelia heterophylla*	33	0.1	0.2	0.2

***Eriogonum wrightii-Juniperus californica*/Annual-Perennial Herb Association**

Wright's Buckwheat - California Juniper / Annual - Perennial Herb Association

LOCAL VEGETATION DESCRIPTION

Stands of *Eriogonum wrightii-Juniperus californica*/Annual-Perennial Herb Shrubland form an open to intermittent shrub layer (18-45%, mean 30.6%), where *Eriogonum wrightii* is usually dominant. Shrubs consistently occur in two different strata, with low shrubs at 0-1m tall and tall shrubs at 1-5m tall. The herbaceous layer is open to intermittent (15-65%, mean 44%) at 0-0.5m tall. Trees occur sometimes as emergents (0-4% cover, mean 0.8%) with hardwoods at 5-10m tall and conifers at 10-15m tall. Total vegetation cover is 60-80%, mean 70.2%.

In this association, *Eriogonum wrightii* is abundant in the shrub layer, and *Juniperus californica* is sub-dominant to co-dominant. Other soft-leaved and sclerophyllus species are infrequently to occasionally present in this layer at trace cover (see species table). *Pinus sabiniana* and *Quercus douglasii* may be present in the tree layer at trace cover. The herb understory is characterized by non-native annual grasses such as *Avena* sp., *Bromus hordeaceus,* and *Bromus madritensis*, though native herbs are often present such as *Micropus californicus*, *Plantago erecta, Poa secunda* and other grasses.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3527-4598ft, mean 4139ft
Aspect: NE, SE, SW
Slope: moderate to somewhat steep, range 10-15 degrees, mean 14 degrees
Topography: undulating, convex, concave, or flat; bottom to top slopes
Small Rock Cover: range 0.4-60%, mean 24.7%
Large Rock Cover: range 0-11%, mean 3.3%
Litter Cover: range 0.4-80%, mean 30.1%
Bare Ground: range 15-95%, mean 39.2%
Parent Material: sedimentary or serpentine
Soil Texture: moderately coarse sandy loam, moderately fine clay loam, moderately fine sandy clay loam, fine sandy clay

This association was sampled in the Domengine Creek and Ne Hi Canyon watersheds within the Eastern Non-Serpentine portion of the study area and Duckworth Canyon watershed within the Serpentine portion of the study area.

Samples used to describe association: (n=5)
CCBLM039, CCBLM043, CCBLM381, CCBLM415, CCBLM546

Rank: G3S3?

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Eriogonum wrightii-Juniperus californica*/Annual-Perennial Herb Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	40	0.6	0.2	3
	QUDO-t	*Quercus douglasii*	20	0.2	1	1
Tree Understory	PISA2-m	*Pinus sabiniana*	20	0.0	0.2	0.2
Shrub	ERWR	*Eriogonum wrightii*	100	24.4	15	45
	JUCA7	*Juniperus californica*	100	4.5	0.2	20
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	40	1.6	3	5
	ERCO25	*Eriophyllum confertiflorum*	40	0.6	0.2	3
	ADFA	*Adenostoma fasciculatum*	40	0.1	0.2	0.2
	QUAL2	*Quercus ×alvordiana*	20	0.2	1	1
	CECU	*Ceanothus cuneatus*	20	0.0	0.2	0.2
	CEBE3	*Cercocarpus betuloides*	20	0.0	0.2	0.2
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	20	0.0	0.2	0.2
	ERLI6	*Ericameria linearifolia*	20	0.0	0.2	0.2
	ERCA6	*Eriodictyon californicum*	20	0.0	0.2	0.2
	FRCA6	*Fremontodendron californicum*	20	0.0	0.2	0.2
	QUJO3	*Quercus john-tuckeri*	20	0.0	0.2	0.2
	RHIL	*Rhamnus ilicifolia*	20	0.0	0.2	0.2
	YUWH	*Yucca whipplei*	20	0.0	0.2	0.2
Herb	AVENA	*Avena*	80	16.4	2	40
	BRHO2	*Bromus hordeaceus*	80	10.4	2	20
	BRMA3	*Bromus madritensis*	80	3.3	0.2	15
	MICAC2	*Micropus californicus* var. *californicus*	60	0.8	1	2
	POSE	*Poa secunda*	40	2.4	2	10
	NAPU4	*Nassella pulchra*	40	0.6	1	2
	ELMU3	*Elymus multisetus*	40	0.2	0.2	1
	PLER3	*Plantago erecta*	40	0.2	0.2	1
	BRDI3	*Bromus diandrus*	40	0.1	0.2	0.2
	LIBI	*Linanthus bicolor*	40	0.1	0.2	0.2
	VUMY	*Vulpia myuros*	20	4.0	20	20
	ERCI6	*Erodium cicutarium*	20	3.0	15	15
	BRTE	*Bromus tectorum*	20	2.0	10	10
	VIPUQ	*Viola purpurea* subsp. *quercetorum*	20	0.4	2	2
	RILE2	*Rigiopappus leptocladus*	20	0.2	1	1
	VUMI	*Vulpia microstachys*	20	0.2	1	1
	ACMO2	*Achyrachaena mollis*	20	0.0	0.2	0.2
	AGGR	*Agoseris grandiflora*	20	0.0	0.2	0.2
	BRAR3	*Bromus arenarius*	20	0.0	0.2	0.2

***Eriogonum wrightii-Juniperus californica*/Annual-Perennial Herb Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Herb	CESO3	*Centaurea solstitialis*	20	0.0	0.2	0.2
	CLPUQ	*Clarkia purpurea* subsp. *quadrivulnera*	20	0.0	0.2	0.2
	CLUN	*Clarkia unguiculata*	20	0.0	0.2	0.2
	DUCY	*Dudleya cymosa*	20	0.0	0.2	0.2
	GAAN	*Galium andrewsii*	20	0.0	0.2	0.2
	LEFI11	*Lessingia filaginifolia*	20	0.0	0.2	0.2
	LUBI	*Lupinus bicolor*	20	0.0	0.2	0.2
	MECA2	*Melica californica*	20	0.0	0.2	0.2

***Gutierrezia californica*/Annual-Perennial Herb Association**

California Matchweed / Annual - Perennial Herb Association

LOCAL VEGETATION DESCRIPTION

Stands of *Gutierrezia californica/*Annual-Perennial Herb Shrubland form an open to intermittent shrub layer (5-35%, mean 16.6%), where *Gutierrezia californica* dominates. Shrubs infrequently occur in two different strata, with low shrubs at 0-0.5m tall and tall shrubs at 0-2m tall. The herbaceous layer is open to continuous (10-85%, mean 47%) at 0-0.5m tall. Total vegetation cover is 22-85%, mean 59%.

In this association, *Atriplex spinifera* and *Eriogonum fasciculatum* var. *polifolium* occasionally intermix in the shrub layer with other narrow-leaved species (see species table). Herbs that are characteristically present in the understory include non-natives *Bromus madritensis, Erodium cicutarium, Bromus hordeaceus,* and natives *Poa secunda* and *Amsinckia menziesii.*

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low, range 1466-2112ft, mean 1678ft
Aspect: NW
Slope: somewhat steep to steep, range 23-35 degrees, mean 30.4 degrees
Topography: undulating or flat; lower to upper slopes
Small Rock Cover: range 0-83%, mean 39.7%
Large Rock Cover: range 0-0.2%, mean 0.1%
Litter Cover: range 0.2-24%, mean 8.3%
Bare Ground: range 11-86%, mean 47.3%
Parent Material: slate, sedimentary
Soil Texture: coarse loamy sand, moderately fine sandy clay loam

This association was sampled in the Lower Tumey Gulch and Monocline Ridge watersheds within the Monocline Ridge portion of the study area.

Samples used to describe association: (n=5)
CCBLM479, CCBLM481, CCBLM488, CCBLM493, CCBLM495

Rank: G4S4?

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Gutierrezia californica*/Annual-Perennial Herb Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	GUCA	*Gutierrezia californica*	100	9.6	5	15
	ATSP	*Atriplex spinifera*	40	1.0	0.2	5
	ERFAP	*Eriogonum fasciculatum* var. *polifolium*	40	0.1	0.2	0.2
	ERLI6	*Ericameria linearifolia*	20	4.0	20	20
	EAEL	*Eastwoodia elegans*	20	0.4	2	2
	ISME5	*Isocoma menziesii*	20	0.0	0.2	0.2
Herb	BRMA3	*Bromus madritensis*	100	11.6	1	45
	POSE	*Poa secunda*	100	1.1	0.2	3
	ERCI6	*Erodium cicutarium*	80	5.0	0.2	20
	BRHO2	*Bromus hordeaceus*	80	1.1	0.2	5
	AMME	*Amsinckia menziesii*	80	0.2	0.2	0.2
	BRDI3	*Bromus diandrus*	60	32.0	0.2	80
	CHME2	*Chorizanthe membranacea*	60	1.1	0.2	5
	PHCIH2	*Phacelia cicutaria* var. *hispida*	60	0.5	0.2	2
	VUMY	*Vulpia myuros*	60	0.3	0.2	1
	AVENA	*Avena*	60	0.1	0.2	0.2
	CLUN	*Clarkia unguiculata*	40	0.1	0.2	0.2
	CLPE	*Claytonia perfoliata*	40	0.1	0.2	0.2
	STREP2	*Streptanthus*	40	0.1	0.2	0.2
	TRICH9	*Trichostema*	40	0.1	0.2	0.2
	VUMI	*Vulpia microstachys*	40	0.1	0.2	0.2
	ESCA2	*Eschscholzia californica*	20	0.6	3	3
	CABOD	*Camissonia boothii* subsp. *decorticans*	20	0.2	1	1
	APAN	*Apiastrum angustifolium*	20	0.0	0.2	0.2
	CESO3	*Centaurea solstitialis*	20	0.0	0.2	0.2
	DEHEP	*Delphinium hesperium* subsp. *pallescens*	20	0.0	0.2	0.2
	LEGLG	*Lessingia glandulifera* var. *glandulifera*	20	0.0	0.2	0.2
	LOWR2	*Lotus wrangelianus*	20	0.0	0.2	0.2
	MAVU	*Marrubium vulgare*	20	0.0	0.2	0.2
	OEDEC2	*Oenothera deltoides* subsp. *cognata*	20	0.0	0.2	0.2
Cryptogam	MOSS	Moss	20	0.2	1	1

***Juniperus californica-Ericameria linearifolia*/Annual-Perennial Herb Association**

California Juniper - Narrowleaf Goldenbush / Annual - Perennial Herb Association

LOCAL VEGETATION DESCRIPTION

Stands of *Juniperus californica-Ericameria linearifolia*/Annual-Perennial Herb Shrubland form an open to intermittent shrub layer (8-58%, mean 27.2%), where *Juniperus californica* is dominant. Shrubs frequently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 2-5m tall. The herbaceous layer is open to continuous (12-75%, mean 42.9%) at 0-1m tall. Trees occur sometimes as emergents (0-6% cover, mean 1%) with hardwoods at 5-10m tall and conifers at 5-20m tall. Total vegetation cover is 40-85%, mean 67.2%.

In this association, *Ericameria linearifolia* is characteristically present and sub-dominant while *Juniperus californica* is dominant in the shrub layer. *Eriogonum fasciculatum* also intermixes at low cover with a variety of other, less frequent, shrub species (see species table). *Quercus douglasii* and *Pinus sabiniana* occur infrequently in the tree layer at sparse cover. Grasses frequently occur in the herb understory, including non-native species *Bromus hordeaceus* and *Bromus madritensis* and native species *Poa secunda.*

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 2060-3668ft, mean 3069ft
Aspect: all aspects (except none/flat)
Slope: moderate to steep, range 6-36 degrees, mean 22.4 degrees
Topography: most often undulating, less often convex; most often on low to mid slopes, less often on upper to top slopes
Small Rock Cover: range 0.2-11%, mean 1.8%
Large Rock Cover: range 0-1%, mean 0.2%
Litter Cover: range 0.2-88%, mean 33.2%
Bare Ground: range 7-96%, mean 60.4%
Parent Material: sedimentary
Soil Texture: most often moderately fine silty clay loam, less often moderately fine clay loam, moderately fine sandy clay loam, fine silty clay

This association was sampled in the Byles Canyon and Hernandez Reservoir watersheds within the Western Non-Serpentine portion of the study area and the Ne Hi Canyon, Pine Canyon and Urruttia Canyon watersheds within the Eastern Non-Serpentine portion of the study area.

Samples used to describe association: (n=13)
CCBLM360, CCBLM371, CCBLM400, CCBLM422, CCBLM430, CCBLM434, CCBLM439, CCBLM449, CCBLM457, CCBLM458, CCBLM459, CCBLM508, CCBLM563

Rank: G4S4

GLOBAL DISTRIBUTION

inner South Coast, Central Coast

REFERENCES CITED

Holland 1986

***Juniperus californica-Ericameria linearifolia*/Annual-Perennial Herb Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUDO-t	*Quercus douglasii*	23	0.9	0.2	6
	PISA2-t	*Pinus sabiniana*	23	0.1	0.2	1
Tree Understory	PISA2-m	*Pinus sabiniana*	23	0.1	0.2	1
	QUDO-m	*Quercus douglasii*	15	0.2	0.2	2
Shrub	JUCA7	*Juniperus californica*	100	24.2	5	50
	ERLI6	*Ericameria linearifolia*	85	2.7	0.2	8
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	54	0.4	0.2	2
	ERCO25	*Eriophyllum confertiflorum*	38	1.8	1	12
	GUCA	*Gutierrezia californica*	31	0.1	0.2	1
	EPCA2	*Ephedra californica*	23	1.2	0.2	15
	YUWH	*Yucca whipplei*	23	0.2	0.2	2
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	23	0.2	0.2	2
	QUJO3	*Quercus john-tuckeri*	15	0.1	0.2	1
	RHIL	*Rhamnus ilicifolia*	15	0.0	0.2	0.2
	SYALL	*Symphoricarpos albus* var. *laevigatus*	15	0.0	0.2	0.2
Herb	BRHO2	*Bromus hordeaceus*	100	24.1	2	50
	BRMA3	*Bromus madritensis*	92	4.2	0.2	10
	POSE	*Poa secunda*	77	1.5	0.2	15
	AVENA	*Avena*	62	9.8	0.2	30
	VUMI	*Vulpia microstachys*	62	3.2	0.2	20
	ERCI6	*Erodium cicutarium*	54	3.5	0.2	20
	PLER3	*Plantago erecta*	46	1.0	0.2	7
	VUMY	*Vulpia myuros*	38	1.5	0.2	10
	MICAC2	*Micropus californicus* var. *californicus*	38	0.3	0.2	2
	BRAR3	*Bromus arenarius*	38	0.1	0.2	1
	AMME	*Amsinckia menziesii*	31	0.1	0.2	1
	MAFA3	*Marah fabaceus*	23	0.0	0.2	0.2
	NAPR2	*Navarretia prostrata*	23	0.0	0.2	0.2
	CORI2	*Cordylanthus rigidus*	15	0.2	1	2
	BLCR	*Bloomeria crocea*	15	0.0	0.2	0.2
	BRDI3	*Bromus diandrus*	15	0.0	0.2	0.2
Herb	CLARK	*Clarkia*	15	0.0	0.2	0.2
	CLPUQ	*Clarkia purpurea* subsp. *quadrivulnera*	15	0.0	0.2	0.2
	LINAN2	*Linanthus*	15	0.0	0.2	0.2
	MECA2	*Melica californica*	15	0.0	0.2	0.2
Cryptogam	MOSS	Moss	15	0.8	1	10
Epiphyte	PHJU	*Phoradendron juniperinum*	31	0.1	0.2	0.2

***Juniperus californica-Fraxinus dipetala-Ericameria linearifolia*/Annual-Perennial Herb Association**

California Juniper - Foothill Ash - Narrowleaf Goldenbush / Annual - Perennial Herb Association

LOCAL VEGETATION DESCRIPTION

Stands of *Juniperus californica-Fraxinus dipetala-Ericameria linearifolia*/Annual-Perennial Herb Shrubland form an intermittent to continuous shrub layer (35-75%, mean 49%), where *Juniperus californica* is dominant and *Fraxinus dipetala* and *Ericameria linearifolia* are sub-dominant to co-dominant. Shrubs consistently occur in two different strata, with low shrubs at 0-0.5m tall and tall shrubs at 2-5m tall. The herbaceous layer is open to intermittent (25-55%, mean 39%) at 0-0.5m tall. Trees occur frequently as emergents (0.2-8% cover, mean 3.3%) with hardwoods at 5-10m tall and conifers at 10-15m tall. Total vegetation cover is 65-80%, mean 76%.

In this association, *Fraxinus dipetala* and *Ericameria linearifolia* are sub-dominant to co-dominant with *Juniperus californica* in the shrub overstory. A variety of chaparral and drought deciduous species are also characteristically present as subdominants including *Eriophyllum confertiflorum*, *Rhamnus ilicifolia*, and *Eriogonum fasciculatum* var. *foliolosum*. *Quercus douglasii* and *Pinus sabiniana* can be found in the tree layer at trace cover. Non-native and native grass species such as *Bromus hordeaceus, Poa secunda, Vulpia microstachys,* and *Bromus madritensis* characteristically occur in the understory.

Monardella antonina subsp. *benitensis*, a CNPS list 4 species, was found on 1 of 5 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 2896-3092ft, mean 2973ft
Aspect: NE or NW
Slope: somewhat steep to steep, range 25-28 degrees, mean 25.8 degrees
Topography: flat; lower to upper slopes
Small Rock Cover: range 2-2%, mean 2%
Large Rock Cover: range 0.2-0.2%, mean 0.2%
Litter Cover: range 67.8-78%, mean 73.2%
Bare Ground: range 15-25%, mean 19.6%
Parent Material: sedimentary
Soil Texture: moderately fine sandy clay loam

This association was sampled in the Ne Hi Canyon watershed within the Eastern Non-Serpentine portion of the study area.

Samples used to describe association: (n=5)
CCBLM444, CCBLM445, CCBLM446, CCBLM448, CCBLM451

Rank: G3S3

GLOBAL DISTRIBUTION

inner South Coast, Central Coast

REFERENCES CITED

Holland 1986

***Juniperus californica-Fraxinus dipetala-Ericameria linearifolia*/Annual-Perennial Herb Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	80	3.1	0.2	8
	QUDO-t	*Quercus douglasii*	40	0.1	0.2	0.2
Shrub	JUCA7	*Juniperus californica*	100	22.6	3	60
	FRDI2	*Fraxinus dipetala*	100	12.6	8	20
	ERLI6	*Ericameria linearifolia*	100	9.0	5	12
	ERCO25	*Eriophyllum confertiflorum*	100	3.6	1	8
	RHIL	*Rhamnus ilicifolia*	80	1.6	1	5
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	80	1.4	0.2	3
	ARGL4	*Arctostaphylos glauca*	60	0.1	0.2	0.2
	CEBE3	*Cercocarpus betuloides*	40	0.2	0.2	1
	SAME5	*Sambucus mexicana*	40	0.1	0.2	0.2
	ARCA11	*Artemisia californica*	20	0.0	0.2	0.2
	ERTO	*Eriodictyon tomentosum*	20	0.0	0.2	0.2
	QUJO3	*Quercus john-tuckeri*	20	0.0	0.2	0.2
Herb	BRHO2	*Bromus hordeaceus*	100	24.4	12	35
	POSE	*Poa secunda*	100	3.2	2	5
	VUMI	*Vulpia microstachys*	100	2.8	1	5
	BRMA3	*Bromus madritensis*	80	5.0	4	10
	VUMY	*Vulpia myuros*	60	1.6	1	5
	AVENA	*Avena*	40	1.0	0.2	5
	BRAR3	*Bromus arenarius*	40	0.2	0.2	1
	LICI	*Linanthus ciliatus*	40	0.1	0.2	0.2
	MECA2	*Melica californica*	40	0.1	0.2	0.2
	MEIM	*Melica imperfecta*	40	0.1	0.2	0.2
	BRDI3	*Bromus diandrus*	20	0.2	1	1
	MOANB	*Monardella antonina* subsp. *benitensis*	20	0.2	1	1

***Lotus scoparius* Alliance** (no association defined)

Deer Weed Alliance

LOCAL VEGETATION DESCRIPTION
In one stand of *Lotus scoparius* Shrubland the shrub layer is open (20%), where *Lotus scoparius* dominates. Shrubs occur in two different strata, with low shrubs at 0.5-1m tall and tall shrubs at 1-2m tall. The herbaceous layer is intermittent (45%) at 0-0.5m tall. Total vegetation cover is 60%.

In one stand of this alliance, the most abundant shrub species is *Lotus scoparius,* occurring with *Eriodictyon californicum* and non-native grasses *Bromus* spp. Overall, there is more shrub diversity than herb diversity (see species table).

LOCAL ENVIRONMENTAL DESCRIPTION
Elevation: mid, 3292ft
Aspect: SW
Slope: somewhat steep, 18 degrees
Topography: concave; upper slope
Small Rock Cover: 5%
Large Rock Cover: 15%
Litter Cover: 38%
Bare Ground: 37%
Parent Material: sedimentary
Soil Texture: medium to very fine loamy sand

This alliance was sampled in the Arroyo Leona watershed within the Eastern Non-Serpentine portion of the study area.

Samples used to describe alliance: (n=1)
CCBLM180

Rank: G5S5 (Alliance)

GLOBAL DISTRIBUTION
South Coast and Peninsular Ranges, Anza-Borrego Desert, Sierra Nevada foothills (personal observation)

REFERENCES CITED
Klein and Evens 2005, CDFG 1998

***Lotus scoparius* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	LOSC2	*Lotus scoparius*	100	12.0	12	12
	ERCA6	*Eriodictyon californicum*	100	5.0	5	5
	RIQU	*Ribes quercetorum*	100	2.0	2	2
	ARCA11	*Artemisia californica*	100	0.2	0.2	0.2
	EPCA2	*Ephedra californica*	100	0.2	0.2	0.2
	ERLI6	*Ericameria linearifolia*	100	0.2	0.2	0.2
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	100	0.2	0.2	0.2
Herb	BRHO2	*Bromus hordeaceus*	100	15.0	15	15
	BRDI3	*Bromus diandrus*	100	8.0	8	8
	BRAR3	*Bromus arenarius*	100	5.0	5	5

***Lupinus albifrons* Alliance** (no association defined)

Silver Bush Lupine Alliance

LOCAL VEGETATION DESCRIPTION
In one stand of *Lupinus albifrons* Shrubland, the shrub layer is open (26%), where *Lupinus albifrons* dominates. Shrubs occur in one stratum, at 0.5-1m tall. The herbaceous layer is open (16%) at 0.5-1m tall. Total vegetation cover is 42%.

In one stand of this alliance, *Lupinus albifrons* is the sole dominant shrub in the overstory. The most abundant species in the herb understory are *Avena* spp., *Melica californic*a, and *Eriogonum nudum* var. *indictum.*

Eriogonum nudum var. *indictum*, a CNPS list 4 species, was found in the one stand sampled.

LOCAL ENVIRONMENTAL DESCRIPTION
Elevation: low, 2128ft
Aspect: NE
Slope: steep, 28 degrees
Topography: concave; middle slope
Small Rock Cover: 61%
Large Rock Cover: 29%
Litter Cover: 4%
Bare Ground: 5%
Parent Material: sedimentary
Soil Texture: unknown

This alliance was sampled in the Pine Canyon watershed within the Eastern Non-Serpentine portion of the study area.

Samples used to describe alliance: (n=1)
CCBLM550

Rank: G4S4 (Alliance)

GLOBAL DISTRIBUTION
North Coast, Central Coast, Sierra Nevada

REFERENCES CITED
NatureServe 2005

***Lupinus albifrons* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	LUAL4	*Lupinus albifrons*	100	19.0	19	19
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	100	1.0	1	1
	ARCA11	*Artemisia californica*	100	0.2	0.2	0.2
	ERLI6	*Ericameria linearifolia*	100	0.2	0.2	0.2
	YUWH	*Yucca whipplei*	100	0.2	0.2	0.2
Herb	AVENA	*Avena*	100	9.0	9	9
	ERNUI	*Eriogonum nudum* var. *indictum*	100	7.0	7	7
	MECA2	*Melica californica*	100	7.0	7	7
	BRHO2	*Bromus hordeaceus*	100	6.0	6	6
	CIOCV	*Cirsium occidentale* var. *venustum*	100	0.2	0.2	0.2
	PHACE	*Phacelia*	100	0.2	0.2	0.2

***Prunus ilicifolia* Alliance** (no association defined)

Hollyleaf Cherry Alliance

LOCAL VEGETATION DESCRIPTION

Stands of *Prunus ilicifolia* Shrubland form an intermittent to continuous shrub layer (50-90%, mean 70%), where *Prunus ilicifolia* dominates. Shrubs may occur in two different strata, with low shrubs at 0.5-1m tall and tall shrubs at 2-5m tall. The herbaceous layer is open (0.2-15%, mean 7.6%) at 0-0.5m tall. Trees may occur as emergents (0-0.2%, mean 0.1%) at 2-10m tall. Total vegetation cover is 77.5%.

In this alliance, *Ribes quercetorum* and *Eriogonum fasciculatum* var. *foliolosum* are examples of species that may intermix in the shrub layer while *Prunus ilicifolia* is usually dominant. *Pinus sabiniana* may be present in the tree layer at trace cover. Grasses are most frequent in the herb understory, including non-natives *Bromus hordeaceus* and *Bromus madritensis* and native *Poa secunda.*

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3746-3867ft, mean 3807ft
Aspect: SE, SW
Slope: somewhat steep, range 15-24 degrees, mean 19.5 degrees
Topography: concave; middle to upper slopes
Small Rock Cover: range 0.2-0.3%, mean 0.3%
Large Rock Cover: range 10.7-42%, mean 26.4%
Litter Cover: range 28-54%, mean 40.8%
Bare Ground: range 28-32%, mean 30%
Parent Material: sedimentary
Soil Texture: medium loam, moderately fine clay loam

This alliance was sampled in the Ne Hi Canyon watershed within the Eastern Non-Serpentine portion of the study area.

Samples used to describe alliance: (n=2)
CCBLM417, CCBLM419

Rank: G4S4 (Alliance)

GLOBAL DISTRIBUTION

North Coast, Central Coast, South Coast, inner montane Transverse Ranges, Peninsular Ranges, Channel Islands

REFERENCES CITED

Klein and Evens 2005, NatureServe 2005, Borchert 2004, Evens and San 2004, Sawyer and Keeler-Wolf 1995, Holland 1986

***Prunus ilicifolia* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Understory	PISA2-m	*Pinus sabiniana*	50	0.1	0.2	0.2
Shrub	PRIL	*Prunus ilicifolia*	100	47.5	45	50
	RIQU	*Ribes quercetorum*	50	22.5	45	45
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	50	1.0	2	2
	ARTR2	*Artemisia tridentata*	50	0.1	0.2	0.2
	GUCA	*Gutierrezia californica*	50	0.1	0.2	0.2
	JUCA7	*Juniperus californica*	50	0.1	0.2	0.2
	KEBRB	*Keckiella breviflora* subsp. *breviflora*	50	0.1	0.2	0.2
	SYALL	*Symphoricarpos albus* var. *laevigatus*	50	0.1	0.2	0.2
Herb	BRHO2	*Bromus hordeaceus*	100	0.2	0.2	0.2
	BRMA3	*Bromus madritensis*	100	0.2	0.2	0.2
	POSE	*Poa secunda*	100	0.2	0.2	0.2
	VUMY	*Vulpia myuros*	50	2.5	5	5
	AVENA	*Avena*	50	0.1	0.2	0.2
	NAPU4	*Nassella pulchra*	50	0.1	0.2	0.2
	PHACE	*Phacelia*	50	0.1	0.2	0.2
	SACO6	*Salvia columbariae*	50	0.1	0.2	0.2
	VUMI	*Vulpia microstachys*	50	0.1	0.2	0.2
Cryptogam	LICHEN	Lichen	50	7.5	15	15
	MOSS	Moss	50	2.5	5	5

***Quercus berberidifolia* Alliance** (no association defined)

Scrub Oak Alliance

LOCAL VEGETATION DESCRIPTION

In one stand of *Quercus berberidifolia* Shrubland, the shrub layer is intermittent (37%), where *Quercus berberidifolia* dominates. Shrubs occur in one stratum, at 2-5m tall. The herbaceous layer is open (7%) at 0-0.5m tall. Trees occur as emergents (0.2%) at 5-10m tall. Total vegetation cover is 39%.

In one stand of this alliance, chaparral species such as *Fraxinus dipetala* and *Arctostaphylos glauca* intermix in the shrub overstory at low cover while *Quercus berberidifolia* is dominant. Native and non-native forbs and grasses create a sparse herb understory (see species table).

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, 3025ft
Aspect: NW
Slope: somewhat steep, 26 degrees
Topography: undulating; mid to upper slope
Small Rock Cover: 0.2%
Large Rock Cover: 0.2%
Litter Cover: 79%
Bare Ground: 19%
Parent Material: sedimentary
Soil Texture: fine sandy clay

This alliance was sampled in the Picacho Creek watershed within the Western Non-Serpentine portion of the study area.

Samples used to describe alliance: (n=1)
CCBLM022

Rank: G5S5 (Alliance)

GLOBAL DISTRIBUTION

inner North Coast, Central Coast, Cascade Range foothills, Sierra Nevada foothills, Southern CA, Baja CA

REFERENCES CITED

Klein and Evens 2005, Borchert 2004, Sawyer and Keeler-Wolf 1995, Gordon & White 1994, Allen et al. 1989, Holland 1986

***Quercus berberidifolia* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	QUBE5	*Quercus berberidifolia*	100	32.0	32	32
	ERCO25	*Eriophyllum confertiflorum*	100	7.0	7	7
	FRDI2	*Fraxinus dipetala*	100	4.0	4	4
	ARGL4	*Arctostaphylos glauca*	100	3.0	3	3
	SYALL	*Symphoricarpos albus* var. *laevigatus*	100	0.2	0.2	0.2
Herb	BRMA3	*Bromus madritensis*	100	0.2	0.2	0.2
	GAAN	*Galium andrewsii*	100	0.2	0.2	0.2
	GAPO	*Galium porrigens*	100	0.2	0.2	0.2
	MEIM	*Melica imperfecta*	100	0.2	0.2	0.2
	VUMI	*Vulpia microstachys*	100	0.2	0.2	0.2

***Quercus durata/Pinus sabiniana* Association**

Leather Oak / Foothill Pine Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus durata/Pinus sabiniana* Shrubland form an intermittent to continuous shrub layer (50-85%, mean 70.6%), where *Quercus durata* is dominant. Shrubs frequently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (0.2-2%, mean 0.4%) at 0-0.5m tall. Trees occur consistently as emergents (0.2-20% cover, mean 4.7%) at 2-15m tall. Total vegetation cover is 60-88%, mean 73.5%.

In this association, *Quercus durata* is dominant while other chaparral species may occur at low cover, including characteristic presence of *Ceanothus cuneatus*. *Pinus sabiniana* is frequently present in the tree layer at low cover (15% or less), and *Calocedrus decurrens* and *Pinus coulteri* infrequently intermix at trace cover. *Galium andrewsii* are characteristically present in the herb layer, and a variety of other native forbs or grasses may occur.

Monardella antonina subsp. *benitensis* and *Calystegia collina* subsp. *venusta* are CNPS list 4 species. *Monardella antonina* subsp. *benitensis* was found on 2 of 8 stands. *Calystegia collina* subsp. *venusta* was found on 1 of 8 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 3222-5018ft, mean 4389ft
Aspect: all aspects (except none/flat)
Slope: somewhat steep, range 18-26 degrees, mean 21.6 degrees
Topography: most often undulating, less often convex or flat; lower to top slopes
Small Rock Cover: range 10.7-60%, mean 23.8%
Large Rock Cover: range 0-12%, mean 4%
Litter Cover: range 1.5-80%, mean 49.2%
Bare Ground: range 5.4-30%, mean 19.8%
Parent Material: serpentine
Soil Texture: medium to very fine sandy loam, medium loam, moderately fine sandy clay loam, moderately fine clay loam

This association was sampled in the Canada Azul, Clear Creek and Sawmill Creek watersheds within the Serpentine portion of the study area.

Samples used to describe association: (n=8)
CCBLM007, CCBLM067, CCBLM069, CCBLM076, CCBLM092, CCBLM106, CCBLM289, CCBLM292

Rank: G4S4

GLOBAL DISTRIBUTION

montane Central Coast Ranges, and possibly other serpentine zones in California including North Coast Ranges

REFERENCES CITED

Sawyer and Keeler-Wolf 1995, Holland 1986

***Quercus durata/Pinus sabiniana* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	88	4.0	0.2	15
	PICO3-t	*Pinus coulteri*	13	0.6	5	5
	CADE27-t	*Calocedrus decurrens*	13	0.0	0.2	0.2
Tree Understory	PISA2-m	*Pinus sabiniana*	63	0.2	0.2	1
	CADE27-m	*Calocedrus decurrens*	13	0.0	0.2	0.2
Shrub	QUDU4	*Quercus durata*	100	58.4	40	70
	CECU	*Ceanothus cuneatus*	100	5.6	1	15
	ARGL4	*Arctostaphylos glauca*	75	4.1	0.2	15
	RHTO6	*Rhamnus tomentella*	75	1.0	0.2	3
	ARPU5	*Arctostaphylos pungens*	63	0.9	0.2	5
	ERCA6	*Eriodictyon californicum*	63	0.5	0.2	3
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	63	0.3	0.2	1
	GARRY	*Garrya*	50	0.8	0.2	5
	TODI	*Toxicodendron diversilobum*	38	0.2	0.2	1
	SYALL	*Symphoricarpos albus* var. *laevigatus*	38	0.1	0.2	0.2
	ADFA	*Adenostoma fasciculatum*	25	0.6	1	4
	RHIL	*Rhamnus ilicifolia*	25	0.1	0.2	0.2
	CEBE3	*Cercocarpus betuloides*	13	0.0	0.2	0.2
	ERCO25	*Eriophyllum confertiflorum*	13	0.0	0.2	0.2
	HEAR5	*Heteromeles arbutifolia*	13	0.0	0.2	0.2
	RHCA	*Rhamnus californica*	13	0.0	0.2	0.2
Herb	GAAN	*Galium andrewsii*	75	0.4	0.2	2
	ELMU3	*Elymus multisetus*	38	0.1	0.2	0.2
	GAPO	*Galium porrigens*	38	0.1	0.2	0.2
	MOANB	*Monardella antonina* subsp. *benitensis*	25	0.1	0.2	0.2
	BRMA3	*Bromus madritensis*	13	0.0	0.2	0.2
	CACOV	*Calystegia collina* subsp. *venusta*	13	0.0	0.2	0.2
	CIOCV	*Cirsium occidentale* var. *venustum*	13	0.0	0.2	0.2
	MECA2	*Melica californica*	13	0.0	0.2	0.2
	METO	*Melica torreyana*	13	0.0	0.2	0.2
	SCUTE	*Scutellaria*	13	0.0	0.2	0.2
Cryptogam	LICHEN	Lichen	13	0.1	1	1

***Quercus durata-Adenostoma fasciculatum-Quercus wislizeni* Association**

Leather Oak - Chamise - Interior Live Oak Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus durata-Adenostoma fasciculatum-Quercus wislizeni* Shrubland form a continuous shrub layer (76-95%, mean 87.8%), where *Quercus durata* co-dominates with a variety of chaparral species off of serpentine. Shrubs infrequently occur in two different strata, with low shrubs at 1-2m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (0.2%, mean 0.2%) at 0-0.5m tall. Trees occur frequently as emergents (0.2-3% cover, mean 1.1%) with hardwoods at 5-10m tall and conifers at 5-15m tall. Total vegetation cover is 76-95%, mean 87.8%.

In this association, a variety of shrubs intermix. *Adenostoma fasciculatum* and *Ceanothus cuneatus* co-dominate with *Quercus durata* in the overstory, and *Quercus wislizeni* is characteristically sub-dominant to co-dominant. A mixture of other chaparral species frequently occurs including *Fremontodendron californicum* (see species table). *Pinus sabiniana* and *Quercus chrysolepis* may occur in the tree layer at trace cover. *Salvia columbariae* is often present in the herb understory with other native forb and grass species.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 4628-4794ft, mean 4732ft
Aspect: SE, SW or variable
Slope: moderate to somewhat steep, range 12-15 degrees, mean 14 degrees
Topography: undulating or convex; mid to top slopes
Small Rock Cover: range 4-26%, mean 11.8%
Large Rock Cover: range 0.2-8%, mean 2.4%
Litter Cover: range 61-88%, mean 73.5%
Bare Ground: range 3-21%, mean 8.6%
Parent Material: sedimentary
Soil Texture: moderately coarse sandy loam, moderately fine sandy clay loam, moderately fine silty clay loam

This association was sampled in the Duckworth Canyon and Sawmill Creek watersheds within the Eastern and Western Non-Serpentine portions of the study area.

Samples used to describe association: (n=4)
CCBLM044, CCBLM248, CCBLM275, CCBLM277

Rank: G4S4

GLOBAL DISTRIBUTION

montane Central Coast Ranges

REFERENCES CITED

Sawyer and Keeler-Wolf 1995, Holland 1986

***Quercus durata-Adenostoma fasciculatum-Quercus wislizeni* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	75	0.8	0.2	2
	QUCH2-t	*Quercus chrysolepis*	25	0.1	0.2	0.2
Tree Understory	QUWI2-m	*Quercus wislizeni*	100	13.3	1	30
	QUCH2-m	*Quercus chrysolepis*	25	2.5	10	10
Shrub	CECU	*Ceanothus cuneatus*	100	26.3	5	45
	ADFA	*Adenostoma fasciculatum*	100	26.0	20	34
	QUDU4	*Quercus durata*	100	24.5	6	35
	FRCA6	*Fremontodendron californicum*	75	0.8	0.2	2
	CEBE3	*Cercocarpus betuloides*	50	3.3	5	8
	ERCA6	*Eriodictyon californicum*	50	0.3	0.2	1
	ARGL4	*Arctostaphylos glauca*	25	0.8	3	3
	GARRY	*Garrya*	25	0.1	0.2	0.2
	JUCA7	*Juniperus californica*	25	0.1	0.2	0.2
Herb	SACO6	*Salvia columbariae*	50	0.1	0.2	0.2
	EPBR3	*Epilobium brachycarpum*	25	0.1	0.2	0.2
	MIFR2	*Mimulus fremontii*	25	0.1	0.2	0.2
	PEGR8	*Penstemon grinnellii*	25	0.1	0.2	0.2
	POSE	*Poa secunda*	25	0.1	0.2	0.2
Cryptogam	LICHEN	Lichen	50	7.5	15	15

***Quercus durata-Arctostaphylos glauca/Pinus sabiniana* Association**

Leather Oak - Bigberry Manzanita Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus durata-Arctostaphylos glauca* Shrubland form an open to continuous shrub layer (25-88%, mean 69.5%), where *Quercus durata* and *Arctostaphylos glauca* co-dominate. Shrubs frequently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (0-3%, mean 0.6%) at 0-0.5m tall. Trees occur consistently as emergents (0.2-15% cover, mean 5.5%) at 5-20m tall. Total vegetation cover is 25-90%, mean 71%.

In this association, *Quercus durata* and *Arctostaphylos glauca* co-dominate in the shrub overstory, though *Adenostoma fasciculatum* and/or *Ceanothus cuneatus* may also be co-dominant in this layer. *Rhamnus tomentella* and *Rhamnus ilicifolia* are characteristically present at sparse cover. *Pinus sabiniana* is characteristically present with cover up to 15% in the tree layer while *Pinus coulteri, Pinus jeffreyi,* and *Calocedrus decurrens* may be found at low cover. The simple herb layer is comprised of native forbs and grasses, including frequently present *Galium andrewsii.*

Monardella antonina subsp. *benitensis, Calystegia collina* subsp. *venusta*, and *Trichostema rubisepalum* are CNPS list 4 species. *Monardella antonina* subsp. *benitensis* was found on 11 of 29 stands sampled. *Calystegia collina* subsp. *venusta* was found on 2 of 29 stands sampled. *Trichostema rubisepalum* was found on 1 of 29 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3187-4807ft, mean 4072ft
Aspect: all aspects (except none/flat)
Slope: somewhat steep to steep, range 12-38 degrees, mean 21.4 degrees
Topography: most often undulating, less often convex; lower to top slopes
Small Rock Cover: range 0-65%, mean 27.3%
Large Rock Cover: range 0-20%, mean 3.8%
Litter Cover: range 10-86%, mean 42.5%
Bare Ground: range 3-45%, mean 21.8%
Parent Material: serpentine (rarely sedimentary-1 sample)
Soil Texture: most often moderately coarse sandy loam; less often coarse sand, coarse to very fine loamy sand, medium loam, medium to very fine sandy loam, moderately fine clay loam, moderately fine sandy clay loam

This association was sampled in the Arroyo Leona, Byles Canyon, Clear Creek, East Fork San Carlos Creek, Larious Canyon, Picacho Creek, Sawmill Creek and Upper White Creek watersheds within the Serpentine portion of the study area. One sample was collected in the Upper White Creek watershed within the Eastern Non-Serpentine portion of the study area.

Samples used to describe association: (n=29)
CCBLM002, CCBLM003, CCBLM019, CCBLM059, CCBLM062, CCBLM097, CCBLM109, CCBLM115, CCBLM118, CCBLM123, CCBLM140, CCBLM143, CCBLM145, CCBLM146, CCBLM148, CCBLM160, CCBLM165, CCBLM168, CCBLM171, CCBLM188, CCBLM189, CCBLM191, CCBLM199, CCBLM212, CCBLM250, CCBLM253, CCBLM271, CCBLM288, CCBLM290

Rank: G4S4

GLOBAL DISTRIBUTION

montane Central Coast Ranges

REFERENCES CITED

Sawyer and Keeler-Wolf 1995

***Quercus durata-Arctostaphylos glauca/Pinus sabiniana* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	83	4.6	0.2	15
	PICO3-t	*Pinus coulteri*	52	0.5	0.2	5
	CADE27-t	*Calocedrus decurrens*	28	0.1	0.2	1
	PIJE-t	*Pinus jeffreyi*	17	0.1	0.2	2
Tree Understory	PISA2-m	*Pinus sabiniana*	41	1.1	0.2	7
Shrub	QUDU4	*Quercus durata*	100	32.2	5	70
	ARGL4	*Arctostaphylos glauca*	100	28.8	3	48
	CECU	*Ceanothus cuneatus*	86	2.0	0.2	10
	ERCA6	*Eriodictyon californicum*	69	0.5	0.2	5
	ADFA	*Adenostoma fasciculatum*	62	5.9	0.2	28
	RHIL	*Rhamnus ilicifolia*	59	0.2	0.2	1
	ARPU5	*Arctostaphylos pungens*	45	0.5	0.2	7
	GARRY	*Garrya*	41	0.5	0.2	10
	RHTO6	*Rhamnus tomentella*	41	0.2	0.2	2
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	38	0.3	0.2	5
	HEAR5	*Heteromeles arbutifolia*	28	0.2	0.2	3
	ERCO25	*Eriophyllum confertiflorum*	17	0.1	0.2	3
	BEAQD	*Berberis aquifolium* var. *dictyota*	14	0.0	0.2	0.2
	YUWH	*Yucca whipplei*	10	0.0	0.2	0.2
Herb	GAAN	*Galium andrewsii*	55	0.1	0.2	0.2
	MOANB	*Monardella antonina* subsp. *benitensis*	38	0.3	0.2	3
	ELMU3	*Elymus multisetus*	17	0.1	0.2	1
	GAPO	*Galium porrigens*	14	0.0	0.2	0.2
	METO	*Melica torreyana*	14	0.0	0.2	0.2

***Quercus durata-Arctostaphylos glauca-Garrya congdonii/Melica torreyana* Association**
Leather Oak - Bigberry Manzanita - Congdon Silktassel / Torrey's Melicgrass Association

LOCAL VEGETATION DESCRIPTION
In one stand of *Quercus durata-Arctostaphylos glauca-Garrya congdonii/Melica torreyana* Shrubland the shrub layer is intermittent (65%). *Quercus durata* and *Arctostaphylos glauca* are co-dominant. Shrubs occur in two different strata, with low shrubs at 1-2m tall and tall shrubs at 2-5m tall. The herbaceous layer is intermittent (45%) at 0-0.5m tall. Trees occur as emergents (1%) at 5-10m tall. Total vegetation cover is 75%.

In one stand of this association, *Garrya congdonii* is characteristically present while *Quercus durata* and *Arctostaphylos glauca* are co-dominant in the shrub overstory. *Pinus sabiniana* is present at trace cover in the tree layer. Native forbs and grasses comprise the herb understory, including an abundance of *Melica torreyana.*

Monardella antonina subsp. *benitensis*, a CNPS list 4 species, was found in the one stand sampled.

LOCAL ENVIRONMENTAL DESCRIPTION
Elevation: mid, 3149ft
Aspect: NW
Slope: somewhat steep, 26 degrees
Topography: undulating; mid-slope
Small Rock Cover: 7%
Large Rock Cover: 0.3%
Litter Cover: 84%
Bare Ground: 7%
Parent Material: serpentine
Soil Texture: moderately coarse sandy loam

This association was sampled in the Larious Canyon watershed within the Serpentine portion of the study area.

Samples used to describe association: (n=1)
CCBLM207

Rank: G3S3

GLOBAL DISTRIBUTION
Central Coast

REFERENCES CITED
Evens and San 2004

***Quercus durata-Arctostaphylos glauca-Garrya congdonii/Melica torreyana* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	100	1.0	1	1
Shrub	QUDU4	*Quercus durata*	100	35.0	35	35
	ARGL4	*Arctostaphylos glauca*	100	30.0	30	30
	ADFA	*Adenostoma fasciculatum*	100	5.0	5	5
	HEAR5	*Heteromeles arbutifolia*	100	3.0	3	3
	ERCO25	*Eriophyllum confertiflorum*	100	1.0	1	1
	CLLA3	*Clematis lasiantha*	100	0.2	0.2	0.2
	GARRY	*Garrya*	100	0.2	0.2	0.2
	RHIL	*Rhamnus ilicifolia*	100	0.2	0.2	0.2
Herb	METO	*Melica torreyana*	100	30.0	30	30
	BRMA3	*Bromus madritensis*	100	5.0	5	5
	VUMY	*Vulpia myuros*	100	5.0	5	5
	VUMI	*Vulpia microstachys*	100	2.0	2	2
	MOANB	*Monardella antonina* subsp. *benitensis*	100	1.0	1	1
	AMME	*Amsinckia menziesii*	100	0.2	0.2	0.2
	ELMU3	*Elymus multisetus*	100	0.2	0.2	0.2
	GAAN	*Galium andrewsii*	100	0.2	0.2	0.2
	GAPO	*Galium porrigens*	100	0.2	0.2	0.2
	PHHE2	*Phacelia heterophylla*	100	0.2	0.2	0.2
	POSE	*Poa secunda*	100	0.2	0.2	0.2

***Quercus durata-Arctostaphylos pungens/Pinus sabiniana* Association**

Leather Oak - Pointleaf Manzanita / Foothill Pine Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus durata-Arctostaphylos pungens/Pinus sabiniana* Shrubland form an intermittent to continuous shrub layer (60-90%, mean 74.5%), where *Quercus durata* and *Arctostaphylos pungens* co-dominate. Shrubs often occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 0.5-5m tall. The herbaceous layer is open (0.2%, mean 0.2%) at 0-0.5m tall. Trees occur consistently as emergents (0.2-16% cover, mean 4.9%) at 5-20m tall. Total vegetation cover is 62-90%, mean 76.6%.

In this association, *Quercus durata* and *Arctostaphylos pungens* co-dominate in the shrub overstory, though *Arctostaphylos glauca* or *Ceanothus cuneatus* may also be co-dominant in this layer. *Eriodictyon californicum* is characteristically present at low cover. *Pinus sabiniana* is consistently present in the tree layer with cover at less than 20%, and *Pinus coulteri* and *Calocedrus decurrens* may also intermix at trace cover. Native forbs and grasses occupy the sparse herb understory.

Monardella antonina subsp. *benitensis*, a CNPS list 4 species, was found in 1 of the 11 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3330-4834ft, mean 4373ft
Aspect: most often SW, less often NE, SE or variable
Slope: gentle to somewhat steep, range 6-22 degrees, mean 13.7 degrees
Topography: most often undulating, less often convex; middle to top slopes
Small Rock Cover: range 2-50%, mean 26.1%
Large Rock Cover: range 0.2-4%, mean 1.6%
Litter Cover: range 20-89%, mean 50%
Bare Ground: range 3-40%, mean 17.8%
Parent Material: serpentine
Soil Texture: most often moderately fine sandy clay loam, less often coarse loamy sand, moderately coarse to very fine sandy loam, moderately fine silty clay loam

This association was sampled in the Arroyo Leona, Clear Creek, Picacho Creek, Sawmill Creek and Upper White Creek watersheds within the Serpentine portion of the study area.

Samples used to describe association: (n=11)
CCBLM093, CCBLM158, CCBLM167, CCBLM169, CCBLM170, CCBLM174, CCBLM195, CCBLM282, CCBLM294, CCBLM295, CCBLM316

Rank: G2S2

GLOBAL DISTRIBUTION

montane Central Coast Ranges

REFERENCES CITED

Sawyer and Keeler-Wolf 1995

***Quercus durata-Arctostaphylos pungens/Pinus sabiniana* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	100	4.1	0.2	16
	PICO3-t	*Pinus coulteri*	18	0.7	3	5
	CADE27-t	*Calocedrus decurrens*	18	0.0	0.2	0.2
Tree Understory	PISA2-m	*Pinus sabiniana*	45	0.8	0.2	6
Shrub	QUDU4	*Quercus durata*	100	29.3	0.2	40
	ARPU5	*Arctostaphylos pungens*	100	23.5	8	50
	CECU	*Ceanothus cuneatus*	100	3.6	0.2	14
	ARGL4	*Arctostaphylos glauca*	91	10.9	1	35
	ERCA6	*Eriodictyon californicum*	91	0.4	0.2	2
	ADFA	*Adenostoma fasciculatum*	64	6.4	0.2	23
	ERCO25	*Eriophyllum confertiflorum*	36	0.1	0.2	1
	GARRY	*Garrya*	27	0.1	0.2	1
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	27	0.1	0.2	0.2
	RHTO6	*Rhamnus tomentella*	27	0.1	0.2	0.2
Herb	ELMU3	*Elymus multisetus*	36	0.1	0.2	0.2
	GAAN	*Galium andrewsii*	36	0.1	0.2	0.2
	METO	*Melica torreyana*	27	0.1	0.2	0.2
	MODO	*Monardella douglasii*	18	0.0	0.2	0.2

***Quercus durata-Cercocarpus betuloides* Association**

Leather Oak - Birchleaf Mountain-mahogany Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus durata-Cercocarpus betuloides* Shrubland form a continuous shrub layer (70-90%, mean 80%), where *Quercus durata* and *Cercocarpus betuloides* co-dominate. Shrubs consistently occur in two different strata, with low shrubs at 1-2m tall and tall shrubs at 2-5m tall. The herbaceous layer is open (0.2-1%, mean 0.6%) at 0-0.5m tall. Trees occur frequently as emergents (0.2-3% cover, mean 1.1%) with hardwoods at 5-10m tall and conifers at 10-20m tall. Total vegetation cover is 70-90%, mean 80%.

In this association, *Quercus durata* and *Cercocarpus betuloides* co-dominate in the shrub overstory. Other chaparral shrubs also frequently occur in this layer as sub-dominants, including *Ceanothus cuneatus*, *Garrya* sp., and *Fremontodendron californicum. Pinus sabiniana, Quercus chrysolepis,* and *Pinus coulteri* may occur in the tree layer at trace cover. The herb understory is virtually devoid of species, but occasionally includes natives *Viola purpurea* spp. *quercetorum* and *Sanicula crassicaulis.*

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3884-4920ft, mean 4408ft
Aspect: NE, SE, variable
Slope: moderate to somewhat steep, range 10-20 degrees, mean 15.3 degrees
Topography: most often undulating, less often convex; low to top slopes
Small Rock Cover: range 5-12%, mean 6.8%
Large Rock Cover: range 0-1%, mean 0.6%
Litter Cover: range 65-85%, mean 77%
Bare Ground: range 5-25%, mean 10.8%
Parent Material: serpentine (especially at edge with sedimentary)
Soil Texture: coarse loamy sand, moderately coarse to very fine sandy loam, moderately fine sandy clay loam

This association was sampled in the Arroyo Leona and East Fork San Carlos Creek watersheds within the Serpentine portion of the study area.

Samples used to describe association: (n=4)
CCBLM051, CCBLM080, CCBLM081, CCBLM153

Rank: G4S4

GLOBAL DISTRIBUTION

montane Central Coast Ranges, scattered in Central and Northern California, where serpentine occurs

REFERENCES CITED

Sawyer and Keeler-Wolf 1995, Holland 1986

***Quercus durata-Cercocarpus betuloides* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	75	1.0	0.2	3
	PICO3-t	*Pinus coulteri*	25	0.1	0.2	0.2
	QUCH2-t	*Quercus chrysolepis*	25	0.1	0.2	0.2
Tree Understory	PISA2-l	*Pinus sabiniana*	25	0.1	0.2	0.2
	QUWI2-m	*Quercus wislizeni*	25	0.1	0.2	0.2
Shrub	CEBE3	*Cercocarpus betuloides*	100	30.8	20	40
	QUDU4	*Quercus durata*	100	26.3	10	40
	CECU	*Ceanothus cuneatus*	75	5.0	3	10
	GARRY	*Garrya*	75	4.8	2	15
	FRCA6	*Fremontodendron californicum*	75	0.2	0.2	0.2
	ARGL4	*Arctostaphylos glauca*	50	3.8	0.2	15
	ADFA	*Adenostoma fasciculatum*	50	3.8	5	10
	HEAR5	*Heteromeles arbutifolia*	50	0.3	0.2	1
	SAME5	*Sambucus mexicana*	50	0.3	0.2	1
	SYALL	*Symphoricarpos albus* var. *laevigatus*	50	0.1	0.2	0.2
	TODI	*Toxicodendron diversilobum*	50	0.1	0.2	0.2
	QUJO3	*Quercus john-tuckeri*	25	3.8	15	15
	FRDI2	*Fraxinus dipetala*	25	0.3	1	1
	CLLA3	*Clematis lasiantha*	25	0.1	0.2	0.2
	JUCA7	*Juniperus californica*	25	0.1	0.2	0.2
	RHIL	*Rhamnus ilicifolia*	25	0.1	0.2	0.2
Herb	MAFA3	*Marah fabaceus*	25	0.1	0.2	0.2
	SACR2	*Sanicula crassicaulis*	25	0.1	0.2	0.2
	VIPUQ	*Viola purpurea* subsp. *quercetorum*	25	0.1	0.2	0.2

***Quercus john-tuckeri-Adenostoma fasciculatum* Association**

Tucker Oak - Chamise Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus john-tuckeri-Adenostoma fasciculatum* Shrubland form an intermittent to continuous shrub layer (50-80%, mean 65.8%), where *Quercus john-tuckeri* is dominant and *Adenostoma fasciculatum* is sub-dominant to co-dominant. Shrubs frequently occur in two different strata, with low shrubs at 0-0.5m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (1-25%, mean 8.4%) at 0-0.5m tall. Trees occur consistently as emergents (0.2-11% cover, mean 4.9%) with hardwoods at 5-10m tall and conifers at 5-35m tall. Total vegetation cover is 57-85%, mean 73.2%.

In this association, *Adenostoma fasciculatum* is sub-dominant to co-dominant with *Quercus john-tuckeri* in the shrub overstory. *Ceanothus cuneatus* and *Juniperus californica* also characteristically occur in this layer but at low cover. *Pinus sabiniana* is consistently present in the tree layer at low cover (<10%), and *Quercus douglasii* may also be present as an emergent tree. Non-native and native grasses and native forbs occupy the open herb understory (see species table).

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 2852-3593ft, mean 3103ft
Aspect: variable, none/flat, or SE
Slope: flat or gentle to steep, range 1-30 degrees, mean 15.6 degrees
Topography: convex, flat or undulating; most often lower to middle slopes (sometimes to top slopes)
Small Rock Cover: range 1-17%, mean 6.5%
Large Rock Cover: range 0.2-1.1%, mean 0.7%
Litter Cover: range 22-88%, mean 65.6%
Bare Ground: range 5-55%, mean 22.6%
Parent Material: sedimentary or serpentine
Soil Texture: moderately fine sandy clay loam, moderately fine silty clay loam, fine silty clay

This association was sampled in the Byles Canyon watershed within the Western Non-Serpentine portion of the study area and the Clear Creek and Upper White Creek watersheds within the Serpentine portion of the study area. .

Samples used to describe association: (n=5)
CCBLM094, CCBLM267, CCBLM327, CCBLM328, CCBLM363

Rank: G3S3

GLOBAL DISTRIBUTION

Coast Ranges, western Transverse Ranges

REFERENCES CITED

Holland 1986

***Quercus john-tuckeri-Adenostoma fasciculatum* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	100	4.0	0.2	9
	QUDO-t	*Quercus douglasii*	60	0.8	0.2	3
Tree Understory	PISA2-m	*Pinus sabiniana*	60	0.8	0.2	3
	QUDO-m	*Quercus douglasii*	20	0.0	0.2	0.2
Shrub	QUJO3	*Quercus john-tuckeri*	100	24.2	20	31
	ADFA	*Adenostoma fasciculatum*	100	18.4	1	40
	CECU	*Ceanothus cuneatus*	100	2.8	0.2	8
	JUCA7	*Juniperus californica*	100	1.2	0.2	3
	ARGL4	*Arctostaphylos glauca*	60	13.2	0.2	36
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	60	2.6	0.2	12
	ERLI6	*Ericameria linearifolia*	60	0.8	0.2	3
	SYALL	*Symphoricarpos albus* var. *laevigatus*	60	0.4	0.2	1
	ERCO25	*Eriophyllum confertiflorum*	40	1.0	0.2	5
	HEAR5	*Heteromeles arbutifolia*	40	0.6	0.2	3
	CEBE3	*Cercocarpus betuloides*	40	0.6	1	2
	YUWH	*Yucca whipplei*	20	1.6	8	8
	ARPU5	*Arctostaphylos pungens*	20	0.2	1	1
	ERTO	*Eriodictyon tomentosum*	20	0.0	0.2	0.2
	FRDI2	*Fraxinus dipetala*	20	0.0	0.2	0.2
Herb	AVENA	*Avena*	60	3.6	0.2	15
	BRMA3	*Bromus madritensis*	60	3.0	4	6
	BRHO2	*Bromus hordeaceus*	20	0.2	1	1
	CAAPD	*Castilleja applegatei* subsp. *disticha*	20	0.0	0.2	0.2
	HEDI4	*Hesperolinon disjunctum*	20	0.0	0.2	0.2
	LODA	*Lomatium dasycarpum*	20	0.0	0.2	0.2
	MECA2	*Melica californica*	20	0.0	0.2	0.2
	POSE	*Poa secunda*	20	0.0	0.2	0.2
	VELA	*Verbena lasiostachys*	20	0.0	0.2	0.2
Epiphyte	PHVI9	*Phoradendron villosum*	40	0.1	0.2	0.2

***Quercus john-tuckeri-Juniperus californica-Ericameria linearifolia* Association**

Tucker Oak - California Juniper - Narrowleaf Goldenbush Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus john-tuckeri-Juniperus californica-Ericameria linearifolia* Shrubland form an intermittent to continuous shrub layer (12-75%, mean 52.2%), where *Quercus john-tuckeri* is dominant. Shrubs consistently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 1-10m tall. The herbaceous layer is open to intermittent (5-50%, mean 24.7%) at 0-0.5m tall. Trees occur frequently as emergents (0-9% cover, mean 2.7%) with hardwoods at 5-10m tall and conifers at 5-20m tall. Total vegetation cover is 40-85%, mean 68.8%.

In this association, a diversity of species intermix in the shrub overstory, including a variety of chaparral species (see species table). *Ericameria linearifolia* and *Juniperus californica* are characteristically present at low cover while *Quercus john-tuckeri* is dominant. *Pinus sabiniana, Quercus douglasii, Quercus wislizeni,* and *Quercus chrysolepis* may occur in the tree layer at sparse cover. Grasses are most frequent in the herb understory, including native species *Poa secunda* and *Vulpia microstachys,* and non-native species *Bromus hordeaceus* and *Bromus madritensis.*

Acanthomintha obovata subsp. *obovata* and *Eriogonum vestitum* are CNPS list 4 species. Each species was found in 1 of 22 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 1888-3672ft, mean 3097ft
Aspect: most often NW or NE, less often SW, SE or variable
Slope: moderate to steep, range 10-45 degrees, mean 22.9 degrees
Topography: most often undulating, less often convex or concave; bottom to top slopes
Small Rock Cover: range 0.2-24%, mean 4.2%
Large Rock Cover: range 0-5%, mean 0.8%
Litter Cover: range 15-88%, mean 57.5%
Bare Ground: range 7-66%, mean 32.6%
Parent Material: sedimentary
Soil Texture: most often moderately fine silty clay loam, moderately fine clay loam, or fine silty clay; less often medium loam, moderately fine sandy clay loam

This association was sampled in the Byles Canyon, Larious Canyon and Hernandez Reservoir watersheds within the Western Non-Serpentine portion of the study area; Canada Azul, Coyote Canyon, Domengine Creek, Ne Hi Canyon and Urruttia Canyon watersheds within the Eastern Non-Serpentine portion of the study area.

Samples used to describe association: (n=22)
CCBLM083, CCBLM085, CCBLM132, CCBLM323, CCBLM340, CCBLM348, CCBLM350, CCBLM351, CCBLM354, CCBLM356, CCBLM373, CCBLM376, CCBLM391, CCBLM393, CCBLM394, CCBLM408, CCBLM409, CCBLM429, CCBLM431, CCBLM440, CCBLM453, CCBLM460

Rank: G3S3

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Quercus john-tuckeri-Juniperus californica-Ericameria linearifolia* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	82	1.5	0.2	8
	QUDO-t	*Quercus douglasii*	59	1.1	0.2	7
Tree Understory	PISA2-m	*Pinus sabiniana*	27	0.1	0.2	1
	QUDO-m	*Quercus douglasii*	14	0.5	0.2	8
Shrub	QUJO3	*Quercus john-tuckeri*	100	45.4	12	70
	JUCA7	*Juniperus californica*	91	2.0	0.2	10
	ERLI6	*Ericameria linearifolia*	91	1.9	0.2	10
	ERCO25	*Eriophyllum confertiflorum*	73	1.9	0.2	10
	CEBE3	*Cercocarpus betuloides*	59	0.7	0.2	5
	ARGL4	*Arctostaphylos glauca*	36	0.6	0.2	12
	RHIL	*Rhamnus ilicifolia*	36	0.1	0.2	0.2
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	32	1.5	0.2	12
	SYALL	*Symphoricarpos albus* var. *laevigatus*	32	0.1	0.2	2
	LOSUD	*Lonicera subspicata* var. *denudata*	27	0.1	0.2	0.2
	CECU	*Ceanothus cuneatus*	18	0.0	0.2	0.2
Herb	POSE	*Poa secunda*	95	2.8	0.2	20
	BRHO2	*Bromus hordeaceus*	91	7.9	0.2	25
	BRMA3	*Bromus madritensis*	91	6.6	2	21
	VUMI	*Vulpia microstachys*	73	3.2	0.2	20
	VUMY	*Vulpia myuros*	45	2.2	0.2	20
	GAAN	*Galium andrewsii*	45	0.1	0.2	0.2
	GAPO	*Galium porrigens*	36	0.1	0.2	1
	AVENA	*Avena*	23	0.1	0.2	1
	PLER3	*Plantago erecta*	18	0.2	0.2	3
	BRAR3	*Bromus arenarius*	18	0.2	0.2	2
	CORI2	*Cordylanthus rigidus*	18	0.1	0.2	1
	MECA2	*Melica californica*	14	0.1	0.2	1
	MICAC2	*Micropus californicus* var. *californicus*	14	0.0	0.2	0.2
Cryptogam	MOSS	Moss	14	0.8	2	10
Epiphyte	PHVI9	*Phoradendron villosum*	27	0.1	0.2	1

***Quercus john-tuckeri-Juniperus californica-Fraxinus dipetala* Association**

Tucker Oak - California Juniper - Foothill Ash Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus john-tuckeri-Juniperus californica-Fraxinus dipetala* Shrubland form an intermittent to continuous shrub layer (38-75%, mean 57.8%), where *Quercus john-tuckeri* is dominant to co-dominant with other chaparral species. Shrubs frequently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 2-5m tall. The herbaceous layer is open to intermittent (10-40%, mean 26%) at 0-0.5m tall. Trees occur consistently as emergents (0.4-15% cover, mean 5.6%) with hardwoods at 5-10m tall and conifers at 5-15m tall. Total vegetation cover is 65-80%, mean 75.4%.

In this association, *Fraxinus dipetala, Juniperus californica,* and *Cercocarpus betuloides* are characteristically present as sub-dominants to co-dominants with *Quercus john-tuckeri* in the shrub overstory. *Pinus sabiniana* and *Quercus douglasii* often occur in the tree layer at sparse cover. *Bromus hordeaceus* and *Poa secunda* are characteristically present in the herb layer.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 2660-4156ft, mean 3332ft
Aspect: most often NE
Slope: moderate to steep, range 10-40 degrees, mean 24 degrees
Topography: undulating, flat or concave
Small Rock Cover: range 2-5%, mean 3.5%
Large Rock Cover: range 0-0.2%, mean 0.1%
Litter Cover: range 59.8-85%, mean 72.4%
Bare Ground: range 7-30%, mean 18.5%
Parent Material: sedimentary or serpentine
Soil Texture: loam, moderately fine clay loam

This association was sampled in the Arroyo Leona watershed within the Eastern Non-Serpentine portion of the study area and the Clear Creek and Upper White Creek watersheds within Serpentine portion of the study area.

Samples used to describe association: (n=5)
CCBLM183, CCBLM185, CCBLM197, CCBLM519, CCBLM547

Rank: G3S3

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Quercus john-tuckeri-Juniperus californica-Fraxinus dipetala* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	80	3.0	0.2	6
	QUDO-t	*Quercus douglasii*	60	2.4	0.2	10
Tree Understory	QUDO-m	*Quercus douglasii*	20	1.0	5	5
Shrub	QUJO3	*Quercus john-tuckeri*	100	36.2	20	60
	FRDI2	*Fraxinus dipetala*	100	9.0	1	20
	JUCA7	*Juniperus californica*	100	7.0	0.2	30
	CEBE3	*Cercocarpus betuloides*	80	5.4	1	10
	CLLA3	*Clematis lasiantha*	60	0.1	0.2	0.2
	GARRY	*Garrya*	40	1.8	3	6
	ARGL4	*Arctostaphylos glauca*	20	0.0	0.2	0.2
	CECU	*Ceanothus cuneatus*	20	0.0	0.2	0.2
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	20	0.0	0.2	0.2
	TODI	*Toxicodendron diversilobum*	20	0.0	0.2	0.2
Herb	BRHO2	*Bromus hordeaceus*	80	6.2	0.2	20
	POSE	*Poa secunda*	80	1.6	1	3
	BRMA3	*Bromus madritensis*	60	3.6	5	8
	VUMI	*Vulpia microstachys*	40	2.2	1	10
	GAPO	*Galium porrigens*	40	0.1	0.2	0.2
	MAFA3	*Marah fabaceus*	40	0.1	0.2	0.2
	SACR2	*Sanicula crassicaulis*	40	0.1	0.2	0.2
	AVENA	*Avena*	20	1.0	5	5
	DAPU3	*Daucus pusillus*	20	0.2	1	1
	MADIA	*Madia*	20	0.2	1	1
	OSBR	*Osmorhiza brachypoda*	20	0.2	1	1
	VUMY	*Vulpia myuros*	20	0.2	1	1
	BRDI3	*Bromus diandrus*	20	0.0	0.2	0.2
	CLUN	*Clarkia unguiculata*	20	0.0	0.2	0.2
	ELMU3	*Elymus multisetus*	20	0.0	0.2	0.2
	GALIU	*Galium*	20	0.0	0.2	0.2
	METO	*Melica torreyana*	20	0.0	0.2	0.2
	PLECT	*Plectritis*	20	0.0	0.2	0.2
	SABI2	*Sanicula bipinnata*	20	0.0	0.2	0.2
Cryptogam	MOSS	Moss	40	1.2	1	5
	LICHEN	Lichen	20	3.0	15	15
Epiphyte	PHVI9	*Phoradendron villosum*	20	0.0	0.2	0.2

***Quercus john-tuckeri-Quercus wislizeni-Garrya flavescens* Association**

Tucker Oak - Interior Live Oak - Ashy Silktassel Bush Association

LOCAL VEGETATION DESCRIPTION

Stands of *Quercus john-tuckeri-Quercus wislizeni-Garrya flavescens* Shrubland form an intermittent to continuous shrub layer (45-70%, mean 60.3%), where *Quercus john-tuckeri* is dominant and *Quercus wislizeni* and *Garrya flavescens* are subdominant. Shrubs consistently occur in two different strata, with low shrubs at 0.5-1m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (3-30%, mean 14%) at 0-1m tall. Trees occur sometimes as emergents (0-21% cover, mean 3.8%) with hardwoods at 5-10m tall and conifers at 5-10m tall. Total vegetation cover is 55-85%, mean 69.3%.

In this association, *Pinus sabiniana* occurs infrequently in the tree overstory at trace cover. A variety of chaparral species occur in the shrub overstory, including characteristic present *Ceanothus cuneatus* and *Ericameria linearifolia.* Non-native annual grass *Bromus madritensis* is consistent in the herb layer and co-occurs with a variety of other forb and grass species.

Monardella antonina subsp. *benitensis,* a CNPS list 4 species, was found in 1 of 6 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3795-4555ft, mean 4124ft
Aspect: All aspects (except none/flat)
Slope: gentle to steep, range 5-28 degrees, mean 19.5 degrees
Topography: most often convex, infrequently undulating; upper to top slopes
Small Rock Cover: range 1-42%, mean 25.7%
Large Rock Cover: range 0-12%, mean 4.5%
Litter Cover: range 23-74%, mean 44.8%
Bare Ground: range 14-38%, mean 22.3%
Parent Material: sedimentary, shale
Soil Texture: most often moderately coarse sandy loam; less often medium to very fine loamy sand, medium loam or medium to very fine sandy loam

This association was sampled in the Arroyo Leona, Domengine Creek and Pine Canyon watersheds within the Eastern Non-Serpentine portion of the study area and the East Fork San Carlos Creek watershed within the Western Non-Serpentine portion of the study area.

Samples used to describe association: (n=6)
CCBLM049, CCBLM463, CCBLM543, CCBLM544, CCBLM554, CCBLM555

Rank: G3S3

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Quercus john-tuckeri-Quercus wislizeni-Garrya flavescens* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	33	0.2	0.2	1
	QUWI2-t	*Quercus wislizeni*	17	2.5	15	15
	QUDO-t	*Quercus douglasii*	17	0.7	4	4
	QUCH2-t	*Quercus chrysolepis*	17	0.2	1	1
Tree Understory	QUWI2-m	*Quercus wislizeni*	83	4.5	0.2	11
	PISA2-m	*Pinus sabiniana*	33	0.2	0.2	1
	PISA2-l	*Pinus sabiniana*	17	0.0	0.2	0.2
	QUDO-m	*Quercus douglasii*	17	0.0	0.2	0.2
Shrub	QUJO3	*Quercus john-tuckeri*	100	26.7	8	85
	CECU	*Ceanothus cuneatus*	83	8.2	0.2	20
	GARRY	*Garrya*	83	6.2	1	20
	ERLI6	*Ericameria linearifolia*	83	2.8	2	5
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	50	12.3	4	35
	FRDI2	*Fraxinus dipetala*	50	2.2	0.2	7
	CEBE3	*Cercocarpus betuloides*	50	1.9	0.2	11
	RHIL	*Rhamnus ilicifolia*	50	0.2	0.2	1
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	33	1.4	0.2	8
	ERCO25	*Eriophyllum confertiflorum*	33	0.8	2	3
	CLLA3	*Clematis lasiantha*	33	0.2	0.2	1
	JUCA7	*Juniperus californica*	33	0.1	0.2	0.2
	BEAQD	*Berberis aquifolium* var. *dictyota*	17	0.2	1	1
	QUBE5	*Quercus berberidifolia*	17	0.2	1	1
	YUWH	*Yucca whipplei*	17	0.2	1	1
	ARPU5	*Arctostaphylos pungens*	17	0.0	0.2	0.2
	ERCA6	*Eriodictyon californicum*	17	0.0	0.2	0.2
	TODI	*Toxicodendron diversilobum*	17	0.0	0.2	0.2
Herb	BRMA3	*Bromus madritensis*	83	2.8	2	6
	VUMY	*Vulpia myuros*	50	5.0	6	15
	POSE	*Poa secunda*	50	1.8	1	7
	GAAN	*Galium andrewsii*	50	0.1	0.2	0.2
	VUMI	*Vulpia microstachys*	33	0.8	2	3
	AVENA	*Avena*	33	0.3	1	1

***Quercus john-tuckeri-Quercus wislizeni-Garrya flavescens* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Herb	BRAR3	*Bromus arenarius*	17	0.8	5	5
	BRDI3	*Bromus diandrus*	17	0.8	5	5
	BRTE	*Bromus tectorum*	17	0.8	5	5
	BRHO2	*Bromus hordeaceus*	17	0.5	3	3
	BRCA5	*Bromus carinatus*	17	0.0	0.2	0.2
	LICI	*Linanthus ciliatus*	17	0.0	0.2	0.2
	MIFR2	*Mimulus fremontii*	17	0.0	0.2	0.2
	MOANB	*Monardella antonina* subsp. *benitensis*	17	0.0	0.2	0.2
	PEGR8	*Penstemon grinnellii*	17	0.0	0.2	0.2

***Salix breweri/Muhlenbergia asperifolia* Association**

Brewer's Willow / Alkali Muhly Association

LOCAL VEGETATION DESCRIPTION

Stands of *Salix breweri/Muhlenbergia asperifolia* Shrubland form an open to intermittent shrub layer (3-50%, mean 21.5%), where *Salix breweri* is dominant. Shrubs frequently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 0-5m tall. The herbaceous layer is open to intermittent (0-40%, mean 11.5%) at 0-0.5m tall. Trees occur frequently as emergents (0-15% cover, mean 1.6%) at 5-20m tall. Total vegetation cover is 4-80%, mean 31.75%.

In this association, *Rhamnus tomentella* and *Arctostaphylos glauca* often intermix in the shrub layer while *Salix breweri* is usually dominant. *Calocedrus decurrens, Pinus coulteri, Pinus jeffreyi,* and *Pinus sabiniana* are occasionally present as emergent trees at low cover. Native herbs *Muhlenbergia asperifolia*, *Solidago guiradonis*, and *Sisyrinchium bellum* frequently occupy the understory.

Trichostema rubisepalum and *Solidago guiradonis* are CNPS list 4 species. *Trichostema rubisepalum* was found on 4 of 12 stands sampled. *Solidago guiradonis* was found on 9 of 12 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 2384-4597ft, mean 3603ft
Aspect: most often none/flat, less often SW or NW
Slope: flat to somewhat steep, range 0-15 degrees, mean 2.8 degrees
Topography: most often concave; less often flat or undulating, bottom to upper slopes
Small Rock Cover: range 1-60%, mean 31.9%
Large Rock Cover: range 5-50%, mean 21.9%
Litter Cover: range 0.2-81%, mean 10.4%
Bare Ground: range 8-58%, mean 32.7%
Parent Material: most often serpentine, infrequently sedimentary
Soil Texture: most often coarse loamy sand, less often medium to very fine loamy sand or moderately coarse sandy loam

This association was sampled in the Clear Creek, Larious Canyon and Sawmill Creek watersheds within the Serpentine portion of the study area and the Upper White Creek watershed within both the Eastern Non-Serpentine and Serpentine portions of the study area.

Samples used to describe association: (n=12)
CCBLM061, CCBLM128, CCBLM147, CCBLM157, CCBLM186, CCBLM187, CCBLM190, CCBLM198, CCBLM211, CCBLM223, CCBLM278, CCBLM377

Rank: G2S2

GLOBAL DISTRIBUTION

Central Coast in riparian serpentine

REFERENCES CITED

Holland 1986

***Salix breweri/Muhlenbergia asperifolia* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max	
Tree Overstory	PICO3-t	*Pinus coulteri*	33	0.2	0.2	2	
	CADE27-t	*Calocedrus decurrens*	25	0.1	0.2	1	
	PISA2-t	*Pinus sabiniana*	25	0.1	0.2	0.2	
	PIJE-t	*Pinus jeffreyi*	17	1.3	0.2	15	
Tree Understory	PISA2-m	*Pinus sabiniana*	25	0.1	0.2	0.2	
Shrub	SABR2	*Salix breweri*	100	17.7	3	40	
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	83	2.4	0.2	15	
	RHTO6	*Rhamnus tomentella*	50	1.8	0.2	10	
	ARGL4	*Arctostaphylos glauca*	50	0.6	0.2	5	
Herb	MUAS	*Muhlenbergia asperifolia*	75	4.2	0.2	20	
	SOGU	*Solidago guiradonis*	75	2.8	0.2	18	
	SIBE	*Sisyrinchium bellum*	75	0.3	0.2	1	
	AQEX	*Aquilegia eximia*	67	0.3	0.2	2	
	CAMIM5	*Castilleja miniata* subsp. *miniata*	58	0.1	0.2	0.2	
	ACMI2	*Achillea millefolium*	50	0.8	0.2	7	
	DISP	*Distichlis spicata*	50	0.4	0.2	3	
	ELTRT2	*Elymus trachycaulus* subsp. *teslinensis*	33	1.5	0.2	12	
	TRRU	*Trichostema rubisepalum*	33	0.1	0.2	0.2	
	MELA2	*Mentzelia laevicaulis*	25	0.1	0.2	0.2	
	ZIVEV	*Zigadenus venenosus* var. *venenosus*	25	0.1	0.2	0.2	
	ERIOG	*Eriogonum*	17	0.0	0.2	0.2	
	HEPU2	*Helenium puberulum*	17	0.0	0.2	0.2	
Cryptogam	ALGAE	*Unknown Algae*	17	0.3	1	3	

***Salvia mellifera-Eriogonum fasciculatum* var. *foliolosum-Eriodictyon tomentosum* Association**

Black Sage - California Buckwheat - Wooly Yerba Santa Association

LOCAL VEGETATION DESCRIPTION

Stands of *Salvia mellifera-Eriogonum fasciculatum* var. *foliolosum-Eriodictyon tomentosum* Shrubland form an intermittent to continuous shrub layer (33-75%, mean 58.6%), where *Salvia mellifera* is dominant and *Eriogonum fasciculatum* var. *foliolosum* and *Eriodictyon tomentosum* are sub-dominant. Shrubs frequently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 1-5m tall. The herbaceous layer is open to intermittent (0.2-40%, mean 12.2%) at 0-0.5m tall. Trees occur infrequently as emergents (0-0.2% cover, mean 0%) at 15-20m tall. Total vegetation cover is 60-75%, mean 67.4%.

In this association, *Salvia mellifera* is usually dominant in the shrub overstory while *Artemisia californica, Eriogonum fasciculatum* var. *foliolosum* and *Eriodictyon tomentosum* are characteristically present and usually sub-dominant (though sometimes co-dominant). *Yucca whipplei* is also characteristically present at low cover. *Pinus sabiniana* is infrequent in the tree overstory at trace cover. Grasses are most frequent in the herb layer, including non-natives *Bromus madritensis* and *Bromus hordeaceus,* and native *Poa secunda.*

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 1695-3310ft, mean 2658ft
Aspect: SW
Slope: somewhat steep to steep, range 18-30 degrees, mean 24.6 degrees
Topography: most often undulating, less often convex; low to upper slopes
Small Rock Cover: range 2-10%, mean 4.8%
Large Rock Cover: range 0.2-25%, mean 11.3%
Litter Cover: range 35-50%, mean 41.5%
Bare Ground: range 25-50%, mean 37.5%
Parent Material: sedimentary
Soil Texture: coarse loamy sand, moderately coarse to very fine sandy loam, moderately fine sandy clay loam

This association was sampled in the Coyote Canyon, Ne Hi Canyon and Upper White Creek watersheds within the Eastern Non-Serpentine portion of the study area.

Samples used to describe association: (n=5)
CCBLM217, CCBLM218, CCBLM405, CCBLM407, CCBLM503

Rank: G3S3?

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

Salvia mellifera-Eriogonum fasciculatum* var. *foliolosum -Eriodictyon tomentosum

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	20	0.0	0.2	0.2
Shrub	SAME3	*Salvia mellifera*	100	38.8	22	60
	ARCA11	*Artemisia californica*	100	5.9	0.2	23
	ERTO	*Eriodictyon tomentosum*	100	5.4	0.2	10
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	80	6.4	2	15
	YUWH	*Yucca whipplei*	80	0.5	0.2	1
	JUCA7	*Juniperus californica*	60	0.1	0.2	0.2
	GUCA	*Gutierrezia californica*	40	0.6	1	2
	CELE2	*Ceanothus leucodermis*	40	0.2	0.2	1
	ADFA	*Adenostoma fasciculatum*	20	1.6	8	8
	ERLI6	*Ericameria linearifolia*	20	0.2	1	1
	ERFAP	*Eriogonum fasciculatum* var. *polifolium*	20	0.2	1	1
	CECU	*Ceanothus cuneatus*	20	0.0	0.2	0.2
	EPCA2	*Ephedra californica*	20	0.0	0.2	0.2
	ERCA6	*Eriodictyon californicum*	20	0.0	0.2	0.2
	ERCO25	*Eriophyllum confertiflorum*	20	0.0	0.2	0.2
Herb	BRMA3	*Bromus madritensis*	60	8.8	1	40
	BRHO2	*Bromus hordeaceus*	40	1.0	0.2	5
	POSE	*Poa secunda*	40	0.1	0.2	0.2
	VUMY	*Vulpia myuros*	20	2.0	10	10
	AMME	*Amsinckia menziesii*	20	0.0	0.2	0.2
	CAMIS	*Camissonia*	20	0.0	0.2	0.2
	CEME2	*Centaurea melitensis*	20	0.0	0.2	0.2
	CLARK	*Clarkia*	20	0.0	0.2	0.2
	CRDE	*Cryptantha decipiens*	20	0.0	0.2	0.2
	ERCI6	*Erodium cicutarium*	20	0.0	0.2	0.2
	GAAN2	*Galium angustifolium*	20	0.0	0.2	0.2
	PHACE	*Phacelia*	20	0.0	0.2	0.2
Cryptogam	CRYPTO	*Cryptogamic crust*	20	3.0	15	15

***Tamarix* Alliance**

Tamarisk Alliance

LOCAL VEGETATION DESCRIPTION
In one stand of *Tamarix* Shrubland the shrub layer is open (18%) and *Tamarix* dominates. Shrubs occur in two different strata, with low shrubs at 0-1m tall and tall shrubs at 2-5m tall. The herbaceous layer is open (11%) at 0-1m tall. Total vegetation cover is 28%.

In one stand of this alliance, *Tamarix* is the dominant species as a tall shrub. The most abundant low shrubs include *Artemisia californica, Hazardia squarrosa,* and *Eriodictyon californicum*, and the most abundant herbs include non-native grasses *Bromus madritensis* and *Bromus hordeaceus. Populus fremontii* is present in the tree overstory at trace cover.

LOCAL ENVIRONMENTAL DESCRIPTION
Elevation: low, 1658ft
Aspect: SE
Slope: gentle, 5 degrees
Topography: concave; bottom
Small Rock Cover: 33%
Large Rock Cover: 37%
Litter Cover: 7%
Bare Ground: 20%
Parent Material: silty alluvium
Soil Texture: medium loam

This association was sampled in the Ne Hi Canyon watershed within the Eastern Non-Serpentine portion of the study area.

Samples used to describe alliance: (n=1)
CCBLM522

Rank: G5S5 (Alliance – non-native)

GLOBAL DISTRIBUTION
North Coast, inner Central Coast, South Coast, Peninsular Ranges, Central Valley, southern Sierra Nevada foothills, southern montane Sierra Nevada, Mojave Desert, Colorado Desert

REFERENCES CITED
Klein and Evens 2005, Thomas et al. 2004, Sawyer and Keeler-Wolf 1995, Holland 1986

***Tamarix* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Understory	TAMAR2	*Tamarix*	100	5.0	5	5
	POFR2-m	*Populus fremontii*	100	0.2	0.2	0.2
Shrub	ARCA11	*Artemisia californica*	100	3.0	3	3
	ERCA6	*Eriodictyon californicum*	100	3.0	3	3
	HASQ2	*Hazardia squarrosa*	100	3.0	3	3
	BAPI	*Baccharis pilularis*	100	1.0	1	1
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	100	0.2	0.2	0.2
	EPCA2	*Ephedra californica*	100	0.2	0.2	0.2
	ERFAP	*Eriogonum fasciculatum* var. *polifolium*	100	0.2	0.2	0.2
	GUCA	*Gutierrezia californica*	100	0.2	0.2	0.2
	JUCA7	*Juniperus californica*	100	0.2	0.2	0.2
Herb	BRMA3	*Bromus madritensis*	100	10.0	10	10
	BRHO2	*Bromus hordeaceus*	100	2.0	2	2
	HECU3	*Heliotropium curassavicum*	100	0.2	0.2	0.2

***Achnatherum hymenoides* Alliance** (no association defined)
Indian Ricegrass Alliance

LOCAL VEGETATION DESCRIPTION
In one stand of *Achnatherum hymenoides* the herbaceous layer is continuous (68%) at 0-0.5m tall, where *Achnatherum hymenoides* is the dominant native herb species. The shrub layer is open (0.2%) at 0.5-1m tall. Total vegetation cover is 68%.

In one stand of this association, *Achnatherum hymenoides* is the most abundant native herb species as a perennial bunchgrass; however, *Erodium cicutarium* has greater abundance as a non-native annual forb. Other native and non-native herbs occur at low cover (<10%) such as *Lessingia glandulifera* and *Bromus diandrus* while a variety of mainly native species occur at trace cover. *Atriplex spinifera* occurs in the shrub overstory at trace cover.

LOCAL ENVIRONMENTAL DESCRIPTION
Elevation: low, 1495ft
Aspect: SE
Slope: somewhat steep, 23 degrees
Topography: convex; top slope
Small Rock Cover: 0%
Large Rock Cover: 0%
Litter Cover: 0.3%
Bare Ground: 98%
Parent Material: Sand dunes
Soil Texture: sand

This alliance was sampled in the Monocline Ridge watershed within the Monocline Ridge portion of the study area.

Samples used to describe alliance: (n=1)
CCBLM475

Rank: G4S4 (Alliance)

GLOBAL DISTRIBUTION
Transmontane CA, Inter-West

REFERENCES CITED
Sawyer and Keeler-Wolf 1995

***Achnatherum hymenoides* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	ATSP	*Atriplex spinifera*	100	0.2	0.2	0.2
Herb	ERCI6	*Erodium cicutarium*	100	40.0	40	40
	ACHY	*Achnatherum hymenoides*	100	12.0	12	12
	BRDI3	*Bromus diandrus*	100	5.0	5	5
	LEGLG	*Lessingia glandulifera* var. *glandulifera*	100	2.0	2	2
	BRMA3	*Bromus madritensis*	100	1	1	1
	AMME	*Amsinckia menziesii*	100	0.2	0.2	0.2
	ERAN3	*Eriogonum angulosum*	100	0.2	0.2	0.2
	LOWR2	*Lotus wrangelianus*	100	0.2	0.2	0.2
	MADIA	*Madia*	100	0.2	0.2	0.2
	OEDEC2	*Oenothera deltoides* subsp. *cognata*	100	0.2	0.2	0.2
	RUHY	*Rumex hymenosepalus*	100	0.2	0.2	0.2
	URLI5	*Uropappus lindleyi*	100	0.2	0.2	0.2
	VUMY	*Vulpia myuros*	100	0.2	0.2	0.2

***Carex* spp.-*Juncus mexicanus-Leymus triticoides* Association**

Sedge spp. - Mexican Rush - Creeping Ryegrass Association

LOCAL VEGETATION DESCRIPTION

Stands of *Carex* spp.-*Juncus mexicanus-Leymus triticoides* form an intermittent to continuous herbaceous layer (60-75%, mean 65%) at 0-1m tall, where *Carex sp.* is dominant and *Juncus mexicanus* and *Leymus triticoides* are sub-dominant. The shrub layer is open (0-0.2%, mean 0.1%) at 0.5-1m tall. Total vegetation cover is 60-75%, mean 65%.

In this association, *Juncus mexicanus* and *Leymus triticoides* characteristically occur as subdominants while one of two *Carex* occurs as the dominant herb species, including *Carex praegracilis* (or morphologically similar species) or *C. serratodens.* Native herbs *Achillea millefolium*, *Zigadenus venenosus* var*. venenosus*, *Asclepias fascicularis*, *Verbena lasiostachys*, and *Hypericum formosum* var. *scouleri* may occur in the herb layer at low cover. *Chrysothamnus nauseosus* subsp. *mohavensis* and *Baccharis pilularis* occur occasionally in the shrub layer at trace cover.

Solidago guiradonis, a CNPS list 4 species, was found on 1 of 3 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3578-4393ft, mean 4103ft
Aspect: none/flat or NW
Slope: flat to gentle, range 0-3 degrees, mean 1.3 degrees
Topography: flat to concave; bottom to upper slopes
Small Rock Cover: range 0-5%, mean 2%
Large Rock Cover: range 0-0%, mean 0.1%
Litter Cover: range 73.8-90%, mean 81.3%
Bare Ground: range 5-20%, mean 11.7%
Parent Material: serpentine or sedimentary
Soil Texture: moderately fine sandy clay loam, moderately fine silty clay loam

This association was sampled in the Clear Creek watershed within the Serpentine and Western Non-Serpentine portions of the study area.

Samples used to describe association: (n=3)
CCBLM010, CCBLM015, CCBLM205

Rank: G3S3?

GLOBAL DISTRIBUTION

Probably scattered throughout most regions of CA

REFERENCES CITED

Holland 1986

***Carex* spp.*-Juncus mexicanus-Leymus triticoides* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	BAPI	*Baccharis pilularis*	33	0.1	0.2	0.2
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	33	0.1	0.2	0.2
Herb	CAREX	*Carex (praegracilis)*	100	40.3	1	60
	JUME4	*Juncus mexicanus*	100	10.0	5	15
	LETR5	*Leymus triticoides*	100	5.7	2	10
	ACMI2	*Achillea millefolium*	67	3.7	3	8
	ZIVEV	*Zigadenus venenosus* var. *venenosus*	67	1.1	0.2	3
	ASFA	*Asclepias fascicularis*	67	0.7	1	1
	VELA	*Verbena lasiostachys*	67	0.7	1	1
	HYFOS	*Hypericum formosum* var. *scouleri*	67	0.4	0.2	1
	CASE2	*Carex serratodens*	33	5.0	15	15
	ARDO3	*Artemisia douglasiana*	33	0.3	1	1
	BRHO2	*Bromus hordeaceus*	33	0.3	1	1
	MIGU	*Mimulus guttatus*	33	0.3	1	1
	SOOL	*Sonchus oleraceus*	33	0.3	1	1
	CIVU	*Cirsium vulgare*	33	0.1	0.2	0.2
	CRASS	*Crassula*	33	0.1	0.2	0.2
	ELGL	*Elymus glaucus*	33	0.1	0.2	0.2
	ELMU3	*Elymus multisetus*	33	0.1	0.2	0.2
	GAAN	*Galium andrewsii*	33	0.1	0.2	0.2
	POGLG4	*Potentilla glandulosa* subsp. *glandulosa*	33	0.1	0.2	0.2
	SOGU	*Solidago guiradonis*	33	0.1	0.2	0.2
	VUMY	*Vulpia myuros*	33	0.1	0.2	0.2
Cryptogam	MOSS	*Moss*	33	3.3	10	10

***Eleocharis macrostachya* Alliance** (no association defined)

Pale Spikerush Alliance

LOCAL VEGETATION DESCRIPTION

Stands of *Eleocharis macrostachya* form an open to continuous herbaceous layer (20-70%, mean 45%) at 0-0.5m tall, where *Eleocharis macrostachya* dominates. The shrub layer is open (0-0.2%, mean 0.1%) at 1-2m tall. Total vegetation cover is 20-70%, mean 45%.

In this alliance, *Eleocharis macrostachya* is the sole dominant herb species, though other wetland species intermix at low cover such as *Juncus mexicanus*, *Eleocharis acicularis* var. *bella*, and *Solidago guiradonis*. *Chrysothamnus nauseosus* subsp. *mohavensis* may be present at trace cover in the shrub overstory. Stands occur in seeps and periodically flooded pools (e.g., Spanish Lakes).

Solidago guiradonis, a CNPS list 4 species, was found on 1 of 2 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3600-4637ft, mean 4119ft
Aspect: none/flat
Slope: flat to gentle, range 0-1 degrees, mean 0.5 degrees
Topography: flat or concave; bottom to mid slopes
Small Rock Cover: range 1-5%, mean 3%
Large Rock Cover: range 0.2-0%, mean 0.2%
Litter Cover: range 0.2-73%, mean 36.6%
Bare Ground: range 21-90%, mean 55.5%
Parent Material: serpentine
Soil Texture: unknown

This alliance was sampled in the Arroyo Leona and Clear Creek watersheds within the Serpentine portion of the study area.

Samples used to describe alliance: (n=2)
CCBLM162, CCBLM228

Rank: G4S4 (Alliance)

GLOBAL DISTRIBUTION

Cismontane CA, Transmontane CA

REFERENCES CITED

Klein and Evens 2005, Potter 2003, Sawyer and Keeler-Wolf 1995

***Eleocharis macrostachya* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	100	0.2	0.2	0.2
	ERCO25	*Eriophyllum confertiflorum*	50	0.1	0.2	0.2
Herb	ELMA5	*Eleocharis macrostachya*	100	44.0	15	73
	JUME4	*Juncus mexicanus*	50	3.0	6	6
	ELACB	*Eleocharis acicularis* var. *bella*	50	1	2	2
	SOGU	*Solidago guiradonis*	50	0.5	1	1
	EPMI	*Epilobium minutum*	50	0.1	0.2	0.2
	ERIOG	*Eriogonum*	50	0.1	0.2	0.2
	LOTUS	*Lotus (argophyllus)*	50	0.1	0.2	0.2
	MAFL	*Malacothrix floccifera*	50	0.1	0.2	0.2
	MIGU	*Mimulus guttatus*	50	0.1	0.2	0.2
	PHAU7	*Phragmites australis*	50	0.1	0.2	0.2

***Elymus multisetus* Alliance** (no association defined)

Big Squirreltail Alliance

LOCAL VEGETATION DESCRIPTION

In one stand of *Elymus multisetus,* the herbaceous layer is intermittent (45%) at 0-0.5m tall, where *Elymus multisetus* dominates. The shrub layer is open (1%) with low shrubs at 0-0.5m and tall shrubs at 1-2m tall. Trees occur as emergents (1%) at 10-15m tall. Total vegetation cover is 47%.

In one stand of this alliance, *Elymus multisetus* is the dominant herb. Other grass species occur as subdominants such as native *Melica torreyana* and non-native *Bromus madritensis.* Tree *Pinus sabiniana* occurs as an emergent at trace cover, and shrubs *Chrysothamnus nauseosus* var. *mohavensis* and *Cercocarpus betuloides* are present also at trace cover

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, 3448ft
Aspect: NW
Slope: somewhat steep, 22 degrees
Topography: convex; upper slope
Small Rock Cover: 20%
Large Rock Cover: 2%
Litter Cover: 33%
Bare Ground: 40%
Parent Material: serpentine
Soil Texture: fine sandy clay

This alliance was sampled in the Byles Canyon watershed within the Serpentine portion of the study area.

Samples used to describe alliance: (n=1)
CCBLM144

Rank: G4S4 (Alliance)

GLOBAL DISTRIBUTION

Central Coast

REFERENCES CITED

Evens and San 2004

***Elymus multisetus* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	100	1	1	1
Shrub	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	100	1	1	1
	CEBE3	*Cercocarpus betuloides*	100	0.2	0.2	0.2
Herb	ELMU3	*Elymus multisetus*	100	32.0	32	32
	METO	*Melica torreyana*	100	10.0	10	10
	BRMA3	*Bromus madritensis*	100	3.0	3	3
	BRDI3	*Bromus diandrus*	100	1	1	1
	BRHO2	*Bromus hordeaceus*	100	1	1	1
	ESCA2	*Eschscholzia californica*	100	1	1	1
	AVENA	*Avena*	100	0.2	0.2	0.2
	BRAR3	*Bromus arenarius*	100	0.2	0.2	0.2
	EREL6	*Eriogonum elongatum*	100	0.2	0.2	0.2
	ERCA14	*Erysimum capitatum*	100	0.2	0.2	0.2
	FRITI	*Fritillaria*	100	0.2	0.2	0.2
	HOMUL	*Hordeum murinum* subsp. *leporinum*	100	0.2	0.2	0.2
	LASE	*Lactuca serriola*	100	0.2	0.2	0.2
	MECA2	*Melica californica*	100	0.2	0.2	0.2
	VUMI	*Vulpia microstachys*	100	0.2	0.2	0.2

Eriogonum nudum var. *indictum-Eriogonum vestitum* Association

Nude Buckwheat - Idria Buckwheat Association

LOCAL VEGETATION DESCRIPTION

Stands of *Eriogonum nudum* var. *indictum-Eriogonum vestitum* form an open herbaceous layer (7-30%, mean 17.6%) at 0-0.5m tall, where *Eriogonum nudum* var. *indictum* dominates. The shrub layer is open (0-4%, mean 1.4%) at 0-2m tall. Total vegetation cover is 7-30%, mean 18.4%.

In this association, various forbs and grasses intermix in the herb overstory, especially native species. *Eriogonum nudum* var. *indictum* is the dominant species at high cover and *Eriogonum vestitum* is a characteristic species at trace cover. Non-natives species such as *Bromus madritensis* and *Erodium cicutarium* occur at low to high cover. Shrubs such as *Gutierrezia californica*, *Eriogonum fasciculatum* var. *polifolium*, and *Atriplex spinifera* may occur at trace cover.

Eriogonum nudum var. *indictum* and *Eriogonum vestitum* are CNPS list 4 species. Both species were found on all 5 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low, range 1249-1960ft, mean 1731ft
Aspect: SW, SE, variable
Slope: somewhat steep to steep, range 25-45 degrees, mean 34 degrees
Topography: undulating or convex; lower to upper slopes
Small Rock Cover: range 10-75%, mean 27%
Large Rock Cover: range 0-5%, mean 1.4%
Litter Cover: range 0.2-1%, mean 0.4%
Bare Ground: range 20-89%, mean 69%
Parent Material: most often sedimentary, infrequently slate
Soil Texture: most often moderately fine sandy clay loam, less often moderately fine clay loam

This association was sampled in the Canada Azul, Foot Hill and Monocline Ridge watersheds within the Eastern Non-Serpentine and Monocline Ridge portions of the study area.

Samples used to describe association: (n=5)
CCBLM084, CCBLM474, CCBLM496, CCBLM499, CCBLM502

Rank: G2S2

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Eriogonum nudum* var*. indictum-Eriogonum vestitum* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	GUCA	*Gutierrezia californica*	60	1.4	1	4
	ERFAP	*Eriogonum fasciculatum* var. *polifolium*	60	0.1	0.2	0.2
	ATSP	*Atriplex spinifera*	20	0.0	0.2	0.2
Herb	ERNUI	*Eriogonum nudum* var. *indictum*	100	13.6	5	20
	BRMA3	*Bromus madritensis*	100	4.6	0.2	15
	ERVE4	*Eriogonum vestitum*	100	0.4	0.2	1
	ERCI6	*Erodium cicutarium*	60	0.1	0.2	0.2
	VUMY	*Vulpia myuros*	40	0.4	1	1
	AVENA	*Avena*	40	0.2	0.2	1
	ESCA	*Eschscholzia caespitosa*	40	0.1	0.2	0.2
	ACSP12	*Achnatherum speciosum*	20	0.0	0.2	0.2
	AMME	*Amsinckia menziesii*	20	0.0	0.2	0.2
	LENI	*Lepidium nitidum*	20	0.0	0.2	0.2
	SACO6	*Salvia columbariae*	20	0.0	0.2	0.2
	STEPH	*Stephanomeria*	20	0.0	0.2	0.2
	VUMI	*Vulpia microstachys*	20	0.0	0.2	0.2

***Juncus mexicanus* Association**

Mexican Rush Association

LOCAL VEGETATION DESCRIPTION
Stands of *Juncus mexicanus* form an intermittent to continuous herbaceous layer (65-83%, mean 74%) at 0-0.5m tall, where *Juncus mexicanus* dominates. The shrub layer is open (0-2%, mean 1%) at low: 0-0.5, tall: 2-5m tall. Trees may occur as emergents (0-2% cover, mean 1%) at 5-10m tall. Total vegetation cover is 65-83%, mean 74%.

In this association, *Juncus mexicanus* is the sole dominant species, though a diverse variety of other wetland native and non-native species occupy the herb overstory at low cover. Tree *Pinus sabiniana* and shrubs *Juniperus californica* and *Rhamnus tomentella* may occur in the overstory at trace cover.

LOCAL ENVIRONMENTAL DESCRIPTION
Elevation: mid, range 4006-4393ft, mean 4200ft
Aspect: none/flat and SW
Slope: flat, gentle to somewhat steep, range 1-15 degrees, mean 8 degrees
Topography: flat, concave; mid to upper slopes
Small Rock Cover: range 5-7%, mean 5.8%
Large Rock Cover: range 0-0%, mean 0.2%
Litter Cover: range 45-78%, mean 61.5%
Bare Ground: range 10.4-45%, mean 27.7%
Parent Material: serpentine, sedimentary
Soil Texture: moderately fine sandy clay loam, fine silty clay

This association was sampled in the Clear Creek and Duckworth Canyon watersheds within the Eastern Non-Serpentine and Serpentine portions of the study area.

Samples used to describe association: (n=2)
CCBLM009, CCBLM256

Rank: G5S5

GLOBAL DISTRIBUTION
California, including the Great Central Valley, Mojave Desert, Central Coast Ranges, and Peninsular Ranges

REFERENCES CITED
Evens and San In publication, Thomas et al. 2004, CDFG 2000, Manning and Padgett 1995

***Juncus mexicanus* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	50	1	2	2
Shrub	JUCA7	*Juniperus californica*	50	0.5	1	1
	RHTO6	*Rhamnus tomentella*	50	0.1	0.2	0.2
Herb	JUME4	*Juncus mexicanus*	100	62.5	45	80
	EPILO	*Epilobium*	50	4.0	8	8
	ACMI2	*Achillea millefolium*	50	1.5	3	3
	CAREX2	*Carex*	50	1	2	2
	ELMA5	*Eleocharis macrostachya*	50	1	2	2
	HEPU2	*Helenium puberulum*	50	1	2	2
	JUXI	*Juncus xiphioides*	50	1	2	2
	LETR5	*Leymus triticoides*	50	1	2	2
	LOPU3	*Lotus purshianus*	50	1	2	2
	GNPA	*Gnaphalium palustre*	50	0.5	1	1
	POMO5	*Polypogon monspeliensis*	50	0.5	1	1
	AGOSE	*Agoseris*	50	0.1	0.2	0.2
	ASFA	*Asclepias fascicularis*	50	0.1	0.2	0.2
	AVENA	*Avena*	50	0.1	0.2	0.2
	HOBR2	*Hordeum brachyantherum*	50	0.1	0.2	0.2
	HYFOS	*Hypericum formosum* var. *scouleri*	50	0.1	0.2	0.2
	LASE	*Lactuca serriola*	50	0.1	0.2	0.2
	MIGU	*Mimulus guttatus*	50	0.1	0.2	0.2
	PHAQ	*Phalaris aquatica*	50	0.1	0.2	0.2
	PHYLA	*Phyla*	50	0.1	0.2	0.2
	TYDO	*Typha domingensis*	50	0.1	0.2	0.2
	VELA	*Verbena lasiostachys*	50	0.1	0.2	0.2
	ZIVEV	*Zigadenus venenosus* var. *venenosus*	50	0.1	0.2	0.2

***Phragmites australis* Alliance** (no association defined)

Common Reed Alliance

LOCAL VEGETATION DESCRIPTION

In one stand of *Phragmites australis* alliance, the herbaceous layer is continuous (70%) at 2-5m tall, where *Phragmites australis* dominates. The shrub layer is open (5%) at 1-2m tall. Trees may occur as emergents (0.4%) with hardwoods at 10-15m tall and conifers at 5-10m tall. Total vegetation cover is 72%.

In one stand of this alliance, the dominant species in the herb layer is *Phragmites australis* while sub-dominant herbs include wetland species *Eleocharis macrostachya, Solidago guiradonis,* and *Juncus mexicanus.* Trees *Salix laevigata* and *Pinus sabiniana* and shrub *Chrysothamnus nauseosus* subsp. *mohavensis* also occur at trace cover.

Solidago guiradonis, a CNPS list 4 species, was found in the one stand sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, 3573ft
Aspect: none/flat
Slope: flat, 0 degrees
Topography: flat; mid slope
Small Rock Cover: 1%
Large Rock Cover: 0%
Litter Cover: 74%
Bare Ground: 20%
Parent Material: serpentine
Soil Texture: unknown

This alliance was sampled in the Clear Creek watershed in the Serpentine portion of the study area.

Samples used to describe alliance: (n=1)
CCBLM227

Rank: G5S5 (Alliance)

GLOBAL DISTRIBUTION

Cismontane California, Transmontane CA, North America

REFERENCES CITED

NatureServe 2005, Sawyer and Keeler-Wolf 1995

***Phragmites australis* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	100	0.2	0.2	0.2
	SALA3-t	*Salix laevigata*	100	0.2	0.2	0.2
Shrub	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	100	5.0	5	5
Herb	PHAU7	*Phragmites australis*	100	52.0	52	52
	ELMA5	*Eleocharis macrostachya*	100	25.0	25	25
	SOGU	*Solidago guiradonis*	100	8.0	8	8
	JUME4	*Juncus mexicanus*	100	2.0	2	2

***Rumex hymenosepalus* Alliance** (no association defined)

Wild Rhubarb Alliance

LOCAL VEGETATION DESCRIPTION

In one stand of *Rumex hymenosepalus* Alliance the herbaceous layer is open (15%) at 0-0.5m tall, where *Rumex hymenosepalus* is abundant. The shrub layer is open (0.2%) at 0.5-1m tall. Total vegetation cover is 15%.

In one stand of this alliance, *Ambrosia acanthicarpa* co-dominates with *Rumex hymenosepalus.* Other native and non-native herbs intermix at trace cover (see species table). It occurs along undulating sand dunes.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low, 1577ft
Aspect: SE
Slope: moderate, 6 degrees
Topography: undulating; top slope
Small Rock Cover: 0%
Large Rock Cover: 0%
Litter Cover: 0.2%
Bare Ground: 94%
Parent Material: dune
Soil Texture: sand

This alliance was sampled in the Monocline Ridge watershed within the Monocline Ridge portion of the study area.

Samples used to describe alliance: (n=1)
CCBLM476

Rank: G2S2 (Alliance)

GLOBAL DISTRIBUTION

Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED

No reference citations

***Rumex hymenosepalus* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Herb	RUHY	*Rumex hymenosepalus*	100	8.0	8	8
	AMAC2	*Ambrosia acanthicarpa*	100	5.0	5	5
	AMME	*Amsinckia menziesii*	100	0.2	0.2	0.2
	BRDI3	*Bromus diandrus*	100	0.2	0.2	0.2
	BRMA3	*Bromus madritensis*	100	0.2	0.2	0.2
	ERPL2	*Eriastrum pluriflorum*	100	0.2	0.2	0.2
	SATR12	*Salsola tragus*	100	0.2	0.2	0.2

***Typha latifolia* Association**

Broad-leafed Cattail Association

LOCAL VEGETATION DESCRIPTION

Stands of *Typha latifolia* form an open to continuous herbaceous layer (23-80%, mean 51.5%) at 1-2m tall, where *Typha latifolia* dominates. The shrub layer is open (1-4%, mean 2.5%) at low: 1-2, tall: 1-5m tall. Trees may occur as emergents (0-0% cover, mean 0.1%) at 10-15m tall. Total vegetation cover is 25-80%, mean 52.5%.

In this association, *Typha latifolia* is dominant in the herbaceous overstory while a variety of other wetland species occur as sub-dominants, including *Juncus mexicanus, Stachys pycnantha,* and *Carex serratodens. Populus fremontii*, *Sequoia sempervirens*, *Pinus sabiniana*, and *Tamarix* sp. occur in the tree layer at sparse cover. *Chrysothamnus nauseosus* spp. *mohavensis, Rhamnus tomentella,* and *Sambucus mexicana* are examples of shrubs that may intermix at sparse cover.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 2974-4767ft, mean 3871ft
Aspect: none/flat
Slope: flat, 0 degrees
Topography: flat; mid to upper slopes
Small Rock Cover: range 0-5%, mean 2.5%
Large Rock Cover: range 0-0%, mean 0%
Litter Cover: range 5-70%, mean 37.5%
Bare Ground: range 20-90%, mean 55%
Parent Material: sedimentary, serpentine
Soil Texture: medium silt, fine silty clay

This alliance was sampled in the Arroyo Leona and Byles Canyon watersheds within the Serpentine and Western Non-Serpentine portions of the study area.

Samples used to describe association: (n=2)
CCBLM150, CCBLM346

Rank: G5S5

GLOBAL DISTRIBUTION

Cismontane CA, Transmontane CA, North America

REFERENCES CITED

NatureServe 2005, Sawyer and Keeler-Wolf 1995, Holland 1986

***Typha latifolia* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	50	0.1	0.2	0.2
	POFR2-t	*Populus fremontii*	50	0.1	0.2	0.2
	SESE3	*Sequoia sempervirens*	50	0.1	0.2	0.2
Tree Understory	TAMAR2	*Tamarix*	50	2.0	4	4
Shrub	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	50	0.5	1	1
	BASA4	*Baccharis salicifolia*	50	0.1	0.2	0.2
	RHTO6	*Rhamnus tomentella*	50	0.1	0.2	0.2
	SALA6-m	*Salix lasiolepis*	50	0.1	0.2	0.2
	SAME5	*Sambucus mexicana*	50	0.1	0.2	0.2
Herb	TYLA	*Typha latifolia*	100	51.5	23	80
	JUME4	*Juncus mexicanus*	50	1	2	2
	STPY	*Stachys pycnantha*	50	0.5	1	1
	ACMI2	*Achillea millefolium*	50	0.1	0.2	0.2
	CASE2	*Carex serratodens*	50	0.1	0.2	0.2
	CHENO	*Chenopodium*	50	0.1	0.2	0.2
	JUXI	*Juncus xiphioides*	50	0.1	0.2	0.2
	LETR5	*Leymus triticoides*	50	0.1	0.2	0.2
	POMO5	*Polypogon monspeliensis*	50	0.1	0.2	0.2
	SIBE	*Sisyrinchium bellum*	50	0.1	0.2	0.2

Upland Annual-Perennial Herbaceous Habitat (no association defined)

LOCAL VEGETATION DESCRIPTION
Stands of Upland Annual-Perennial Herb Habitat form an open to continuous herbaceous layer (1-95%, mean 51.1%) at 0-0.5m tall, where annual species are usually most abundant and include *Avena* and *Bromus* species. The shrub layer is open (0-7%, mean 2.1%) with low shrubs at 0-2m and tall shrubs at 0-10m tall. Trees occur infrequently as emergents (0-6% cover, mean 0.6%) with hardwoods at 5-10m tall and with conifers at 5-20m tall. Total vegetation cover is 3-95%, mean 52.6%.

In this habitat, grasses may be most abundant and most frequent in the herb layer. Non-native species *Bromus hordeaceus, Bromus madritensis*, and *Avena* spp. and native species *Poa secunda* are often present. Other native grasses may occur including *Vulpia microstachys, Elymus multisetus.* Trees and shrubs occur in sparse cover and include *Quercus douglasii*, *Pinus sabiniana*, *Juniperus californica,* and *Gutierrezia californica.*

In the year in which the stands were sampled, low rainfall and unseasonably early warm weather reduced the occurrence and development of herbs in the study area. Further data in more phenologically active time periods (early spring and summer) are needed to classify this habitat into more specific alliances and associations.

Calystegia collina subsp. *venusta*, a CNPS list 4 species, was found on 1 of 18 stands. *Camissonia benitensis,* a CNPS list 1B species, was found on 1 of 18 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION
Elevation: low to mid, range 1326-4858ft, mean 3314ft
Aspect: all aspects including none/flat
Slope: flat to steep, range 0-30 degrees, mean 12.8 degrees
Topography: most often undulating, less often flat or convex; lower to top slopes
Small Rock Cover: range 0.2-60%, mean 17.9%
Large Rock Cover: range 0-60%, mean 5.4%
Litter Cover: range 0.2-89%, mean 37.4%
Bare Ground: range 3-90%, mean 35.1%
Parent Material: most often sedimentary, less often serpentine or slate
Soil Texture: varies from coarse loamy sand to fine silty clay

This habitat was sampled in the Arroyo Leona, Byles Canyon, Clear Creek, Duckworth Canyon, Foot Hill, Hernandez Reservoir, Larious Canyon, Monocline Ridge, Ne Hi Canyon and Upper White Creek watersheds within all portions (Serpentine, Non-Serpentine, and Monocline Ridge) of the study area.

Samples used to describe association: (n=18)
CCBLM008, CCBLM014, CCBLM078, CCBLM079, CCBLM125, CCBLM152, CCBLM182, CCBLM206, CCBLM229, CCBLM272, CCBLM347, CCBLM352, CCBLM441, CCBLM455, CCBLM490, CCBLM491, CCBLM494, CCBLM498

Rank: G2S2 to G4S4 (Habitat)

GLOBAL DISTRIBUTION
Scattered throughout most regions of CA

REFERENCES CITED
Klein and Evens 2005, Holland 1986

Upland Annual-Perennial Herbaceous Habitat (no association defined)

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	QUDO-t	*Quercus douglasii*	17	0.5	1	6
	PISA2-t	*Pinus sabiniana*	11	0.1	0.2	1
Shrub	JUCA7	*Juniperus californica*	39	0.5	0.2	5
	GUCA	*Gutierrezia californica*	33	0.3	0.2	2
	QUJO3	*Quercus john-tuckeri*	17	0.2	0.2	2
	ERCO25	*Eriophyllum confertiflorum*	17	0.1	0.2	2
	ERLI6	*Ericameria linearifolia*	17	0.1	0.2	1
	ADFA	*Adenostoma fasciculatum*	11	0.1	0.2	1
	CECU	*Ceanothus cuneatus*	11	0.1	0.2	1
	ISME5	*Isocoma menziesii*	11	0.1	0.2	1
	ATSP	*Atriplex spinifera*	11	0.0	0.2	0.2
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	11	0.0	0.2	0.2
	YUWH	*Yucca whipplei*	11	0.0	0.2	0.2
Herb	BRHO2	*Bromus hordeaceus*	89	10.9	0.2	40
	BRMA3	*Bromus madritensis*	83	10.9	0.2	95
	POSE	*Poa secunda*	61	1.4	0.2	13
	AVENA	*Avena*	50	12.4	0.2	70
	VUMY	*Vulpia myuros*	50	3.0	0.2	35
	ERCI6	*Erodium cicutarium*	44	2.7	1	20
	VUMI	*Vulpia microstachys*	39	0.3	0.2	2
	BRAR3	*Bromus arenarius*	33	1.7	0.2	11
	BRDI3	*Bromus diandrus*	28	1.2	0.2	20
	ELMU3	*Elymus multisetus*	28	0.9	0.2	8
	ACMI2	*Achillea millefolium*	28	0.4	0.2	3
	AMME	*Amsinckia menziesii*	28	0.1	0.2	0.2
	MICAC2	*Micropus californicus* var. *californicus*	28	0.1	0.2	0.2
	HERBAC	Herbaceous unknown	22	2.5	0.2	25
	CORI2	*Cordylanthus rigidus*	22	0.2	0.2	3
	CEME2	*Centaurea melitensis*	22	0.1	0.2	1
	LASE	*Lactuca serriola*	22	0.1	0.2	1
	LIBI	*Linanthus bicolor*	22	0.0	0.2	0.2
	NAPU4	*Nassella pulchra*	22	0.0	0.2	0.2
	LENI	*Lepidium nitidum*	17	1.3	1	20
	JUME4	*Juncus mexicanus*	17	0.6	0.2	7
	TRWI3	*Trifolium willdenowii*	17	0.3	0.2	5
	HEKE	*Hemizonia kelloggii*	17	0.1	0.2	1
	ERIOG	*Eriogonum*	17	0.0	0.2	0.2
	GAAN	*Galium andrewsii*	17	0.0	0.2	0.2

Upland Annual-Perennial Herbaceous Habitat (no association defined)

Stratum	Code	Species Name	Con	Avg	Min	Max
Herb	MECA2	*Melica californica*	17	0.0	0.2	0.2
	ERBO	*Erodium botrys*	11	1.7	0.2	30
	ZIVEV	*Zigadenus venenosus* var. *venenosus*	11	0.6	3	8
	PLER3	*Plantago erecta*	11	0.3	0.2	6
	MICRO6	*Microseris*	11	0.1	0.2	2
	NALE2	*Nassella lepida*	11	0.1	1	1
	ERSE3	*Eremocarpus setigerus*	11	0.1	0.2	1
	HOBR2	*Hordeum brachyantherum*	11	0.1	0.2	1
	VIPUQ	*Viola purpurea* subsp. *quercetorum*	11	0.1	0.2	1
	ACSP12	*Achnatherum speciosum*	11	0.0	0.2	0.2
	ESCA	*Eschscholzia caespitosa*	11	0.0	0.2	0.2
	TRLA4	*Trichostema lanceolatum*	11	0.0	0.2	0.2
	VELA	*Verbena lasiostachys*	11	0.0	0.2	0.2

Serpentine Vernal Pool Habitat (placeholder)

LOCAL VEGETATION DESCRIPTION
Stands of Vernal Pools form an open to continuous herbaceous layer at 0-0.5m tall, where annual and perennial species occur. The shrub layer and tree layer are absent. Total vegetation is variable in cover, depending on time of year and amount of winter rainfall.

In this habitat, graminoids and forbs are most common, including native species of *Eleocharis acicularis* var. *bella, Eleocharis macrostachya, Eryngium vaseyi, Psilocarphus brevissimus* var. *brevissimus,* and *Psilocarphus tenellus*. Non-native species are usually absent.

In the year in which the stands were sampled, low rainfall and unseasonably early warm weather reduced the occurrence and development of herbs in the study area. Further data in more phenologically active time periods (early spring and summer) are needed to classify this habitat into a more specific floristic classification.

LOCAL ENVIRONMENTAL DESCRIPTION
Elevation: mid, 4630 - 4740ft
Aspect: none/flat, S, or SE
Slope: flat, concave
Topography: gentle; ridge tops
Small Rock Cover: no data
Large Rock Cover: no data
Litter Cover: no data
Bare Ground: data
Parent Material: no data
Soil Texture: rocky, silty/clayey

This habitat is found on serpentine substrate in at least four different areas of the Spanish Lakes.

Samples used to describe association: (n=0)

Rank: G2S2 (Habitat)

GLOBAL DISTRIBUTION
Unique upper elevation vernal pools in the montane Central Coast Ranges region

REFERENCES CITED
Hopkins and Silverman 2004

***Vulpia microstachys-Plantago erecta* Herbaceous Association**

Small Fescue - California Plantain Herbaceous Association

LOCAL VEGETATION DESCRIPTION

In one stand of *Vulpia microstachys-Plantago erecta* Association, the herbaceous layer is continuous (70%) at 0-0.5m tall, where *Vulpia microstachys* and *Plantago erecta* co-dominate. The shrub layer is open (2%) at low: 0-0.5, tall: 2-5m tall. Total vegetation cover is 72%.

In the one stand sampled, native herbs *Vulpia microstachys* and *Plantago erecta* co-dominate with non-native grasses *Bromus hordeaceus* and *Bromus madritensis* in the herbaceous layer. Shrubs (e.g., *Gutierrezia californica* and *Chrysothamnus nauseosus* subsp. *mohavensis*) occur in the overstory at trace cover.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, 3109ft
Aspect: SE
Slope: moderate, 14 degrees
Topography: convex; mid-slope
Small Rock Cover: 0%
Large Rock Cover: 0%
Litter Cover: 28%
Bare Ground: 70%
Parent Material: sedimentary
Soil Texture: fine silty clay

This association was sampled in the Ne Hi Canyon watershed within the Eastern Non-Serpentine portion of the study area.

Samples used to describe association: (n=1)
CCBLM437

Rank: G4S4

GLOBAL DISTRIBUTION

Central Coast

REFERENCES CITED

Evens and San 2004

***Vulpia microstachys-Plantago erecta* Herbaceous Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	100	1	1	1
	GUCA	*Gutierrezia californica*	100	1	1	1
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	100	0.2	0.2	0.2
	JUCA7	*Juniperus californica*	100	0.2	0.2	0.2
	QUJO3	*Quercus john-tuckeri*	100	0.2	0.2	0.2
Herb	PLER3	*Plantago erecta*	100	25.0	25	25
	VUMI	*Vulpia microstachys*	100	25.0	25	25
	BRHO2	*Bromus hordeaceus*	100	20.0	20	20
	BRMA3	*Bromus madritensis*	100	20.0	20	20
	AVENA	*Avena*	100	5.0	5	5
	AMME	*Amsinckia menziesii*	100	0.2	0.2	0.2
Epiphyte	PHJU	*Phoradendron juniperinum*	100	0.2	0.2	0.2

Lichen-Moss Habitat (no association defined)

LOCAL VEGETATION DESCRIPTION
Stands of *Lichen-Moss* form an open herbaceous layer (0-3%, mean 1.5%) at 0-0.5m tall, and *Lichen* and *Moss* co-dominate in a non-vascular layer covering rocks (60-86%, mean 73%). The shrub layer is open (1-1%, mean 1%) at 0-1m tall. Total vegetation cover is 60-86, mean 73%.

Various species of lichens and mosses are the predominant form of vegetation, which are covering small outcrops of rocks. Shrub species occur in the stands at sparse cover, such as *Ericameria cuneata* var. *spathulata, Eriodictyon californicum,* and *Yucca whipplei.* Herb species also occur at sparse cover, such as *Elymus multisetus, Pellaea mucronata,* and *Salvia columbariae.*

Monardella antonina subsp. *benitensis*, a CNPS list 4 species, was found on 1 of 2 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION
Elevation: mid, range 3260-3937ft, mean 3599ft
Aspect: variable, NE
Slope: steep, range 40-40 degrees, mean 40 degrees
Topography: convex or undulating; mid to upper slopes
Small Rock Cover: range 0-35%, mean 17.5%
Large Rock Cover: range 40-60%, mean 50%
Litter Cover: range 0-0%, mean 0.1%
Bare Ground: range 0-1%, mean 0.5%
Parent Material: serpentine, sedimentary
Soil Texture: unknown

This habitat was sampled in the Domengine Creek and Larious Canyon watersheds within the Eastern Non-Serpentine and Serpentine portions of the study area.

Samples used to describe association: (n=2)
CCBLM208, CCBLM411

Rank: Unknown

GLOBAL DISTRIBUTION
Inner Central Coast - only known from this study area but potentially found in other areas

REFERENCES CITED
No reference citations

Lichen-Moss Habitat (no association defined)

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	ERCUS	*Ericameria cuneata* var. *spathulata*	50	0.5	1	1
	ERCA6	*Eriodictyon californicum*	50	0.5	1	1
	YUWH	*Yucca whipplei*	50	0.5	1	1
	BEAQD	*Berberis aquifolium* var. *dictyota*	50	0.1	0.2	0.2
	ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	50	0.1	0.2	0.2
	ERCO25	*Eriophyllum confertiflorum*	50	0.1	0.2	0.2
	QUDU4	*Quercus durata*	50	0.1	0.2	0.2
	SAME5	*Sambucus mexicana*	50	0.1	0.2	0.2
Herb	BRMA3	*Bromus madritensis*	50	0.5	1	1
	CIOCV	*Cirsium occidentale* var. *venustum*	50	0.1	0.2	0.2
	ELMU3	*Elymus multisetus*	50	0.1	0.2	0.2
	ERIOG	*Eriogonum*	50	0.1	0.2	0.2
	MOANB	*Monardella antonina* subsp. *benitensis*	50	0.1	0.2	0.2
	PEMU	*Pellaea mucronata*	50	0.1	0.2	0.2
	PHHE2	*Phacelia heterophylla*	50	0.1	0.2	0.2
	SACO6	*Salvia columbariae*	50	0.1	0.2	0.2
Cryptogam	LICHEN	*Lichen*	100	51	36	66
	MOSS	*Moss*	100	16.0	12	20

***Pinus coulteri* Barren Association**

Coulter Pine Barren Association

LOCAL VEGETATION DESCRIPTION

Stands of *Pinus coulteri* barren Woodland form an open tree layer (0.2-6%, mean 3.1%) at 5-15m tall. *Pinus coulteri* dominates in the tree overstory at low cover. The shrub layer is open (0.2-0.2%, mean 0.2%) at 0.5-2m tall, and the herbaceous layer is open (0.2%, mean 0.2%) at 0-0.5m tall. Total vegetation cover is 0.2-6%, mean 3.1%.

In this association, *Pinus coulteri* is present at low cover in the tree layer and is regenerating in the understory. *Pinus jeffreyi* may be present at trace cover. The understory is sparse and may include shrub *Rhamnus tomentella* and native grass and forb species *Allium burlewii, Elymus multisetus, Lupinus concinnus,* and *Viola purpurea* subsp. *quercetorum.*

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 4540-4672ft, mean 4606ft
Aspect: NW, variable
Slope: somewhat steep to steep, range 25-28 degrees, mean 26.5 degrees
Topography: convex or concave; mid to top slopes
Small Rock Cover: range 66-77%, mean 71.5%
Large Rock Cover: range 0-0.2%, mean 0.1%
Litter Cover: range 0.2-2%, mean 1.2%
Bare Ground: range 20-28%, mean 23.8%
Parent Material: serpentine
Soil Texture: coarse loamy sand

This association was sampled in the Canada Azul and East Fork San Carlos Creek watersheds within the Serpentine portion of the study area.

Samples used to describe association: (n=2)
CCBLM055, CCBLM298

Rank: G2S2

GLOBAL DISTRIBUTION

montane Central Coast Ranges

REFERENCES CITED

Sawyer and Keeler-Wolf 1995

***Pinus coulteri* barren Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PICO3-t	*Pinus coulteri*	100	2.6	0.2	5
	PIJE-t	*Pinus jeffreyi*	50	0.5	1	1
Tree Understory	PICO3-m	*Pinus coulteri*	100	0.2	0.2	0.2
	PICO3-l	*Pinus coulteri*	50	0.1	0.2	0.2
Shrub	RHTO6	*Rhamnus tomentella*	50	0.1	0.2	0.2
Herb	ALBU	*Allium burlewii*	50	0.1	0.2	0.2
	ELMU3	*Elymus multisetus*	50	0.1	0.2	0.2
	ERIOG	*Eriogonum*	50	0.1	0.2	0.2
	LUCO	*Lupinus concinnus*	50	0.1	0.2	0.2
	VIPUQ	*Viola purpurea* subsp. *quercetorum*	50	0.1	0.2	0.2

***Pinus jeffreyi-Pinus sabiniana* Barren Association**

Jeffrey Pine - Foothill Pine Barren Association

LOCAL VEGETATION DESCRIPTION

Stands of *Pinus jeffreyi-Pinus sabiniana* barren Woodland form an open tree layer (0.2-5%, mean 3.5%), with conifers at 5-20m tall including *Pinus jeffreyi and Pinus sabiniana*. The shrub layer is open (0.2-10%, mean 3.8%) at low: 1-2, tall: 0-5m tall, and the herbaceous layer is open (0-0.2%, mean 0.0%) at 0-0.5m tall. Total vegetation cover is 1-12%, mean 6.6%.

In this association, *Pinus jeffreyi* and *Pinus sabiniana* occur in the tree overstory at low cover, and they are often regenerating in the understory. *Pinus coulteri* is often present at sparse cover in the tree overstory and is occasionally regenerating in the understory. *Arctostaphylos glauca* and *Arctostaphylos pungens* are often present in the shrub layer at sparse cover. The herb understory is virtually devoid of species, especially by late spring/summer.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: low to mid, range 2579-4990ft, mean 4279ft
Aspect: all aspects (except none/flat)
Slope: somewhat steep, range 15-26 degrees, mean 22 degrees
Topography: most often undulating, less often convex; lower to top slopes
Small Rock Cover: range 30-80%, mean 54.4%
Large Rock Cover: range 2-9%, mean 4.9%
Litter Cover: range 0.2-5%, mean 2.1%
Bare Ground: range 10-65%, mean 36.7%
Parent Material: serpentine
Soil Texture: coarse loamy sand, moderately coarse sandy loam

This association was sampled in the Clear Creek and Sawmill Creek watersheds within the Serpentine portion of the study area.

Samples used to describe association: (n=7)
CCBLM072, CCBLM074, CCBLM193, CCBLM224, CCBLM262, CCBLM276, CCBLM293

Rank: G2S2

GLOBAL DISTRIBUTION

montane Central Coast Ranges

REFERENCES CITED

Sawyer and Keeler-Wolf 1995

***Pinus jeffreyi-Pinus sabiniana* Barren Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PIJE-t	*Pinus jeffreyi*	100	1.6	0.2	3
	PISA2-t	*Pinus sabiniana*	100	1.5	0.2	3
	PICO3-t	*Pinus coulteri*	57	0.5	0.2	1
Tree Understory	PISA2-m	*Pinus sabiniana*	71	0.1	0.2	0.2
	PIJE-m	*Pinus jeffreyi*	57	0.4	0.2	2
	PICO3-m	*Pinus coulteri*	43	0.1	0.2	0.2
	PIJE-l	*Pinus jeffreyi*	43	0.1	0.2	0.2
	PISA2-l	*Pinus sabiniana*	29	0.1	0.2	0.2
Tree Understory	CADE27-l	*Calocedrus decurrens*	14	0.0	0.2	0.2
Shrub	ARGL4	*Arctostaphylos glauca*	57	1.7	0.2	5
	ARPU5	*Arctostaphylos pungens*	57	0.5	0.2	3
	RHTO6	*Rhamnus tomentella*	43	0.1	0.2	0.2
	SABR2	*Salix breweri*	43	0.1	0.2	0.2
	QUDU4	*Quercus durata*	29	0.7	0.2	5
	ADFA	*Adenostoma fasciculatum*	14	0.0	0.2	0.2
	CHNAM	*Chrysothamnus nauseosus* subsp. *mohavensis*	14	0.0	0.2	0.2
	JUCA7	*Juniperus californica*	14	0.0	0.2	0.2
	RHIL	*Rhamnus ilicifolia*	14	0.0	0.2	0.2

***Pinus sabiniana-Pinus coulteri* Barren Association**

Foothill Pine - Coulter Pine Barren Association

LOCAL VEGETATION DESCRIPTION

Stands of *Pinus sabiniana-Pinus coulteri* barren Woodland form an open tree layer (1-3%, mean 2%), with conifers at 5-15m tall including and *Pinus sabiniana* and *Pinus coulteri*. The shrub layer is open (1-6%, mean 2.5%) at low: 0-0.5, tall: 0.5-2m tall, and the herbaceous layer is sparse (0-0.2%, mean 0.0%) at 0-0.5m tall. Total vegetation cover is 3-7%, mean 4%.

In this association, *Pinus sabiniana* and *Pinus coulteri* occur in the tree overstory at low cover, and they are often regenerating in the understory. *Arctostaphylos glauca* and *Quercus durata* are characteristically present in the shrub understory at sparse cover. The herb layer is sparse and consists of native forbs and grasses, including *Calystegia collina* subsp. *venusta*.

Calystegia collina subsp. *venusta,* CNPS List 4 species, was found in 2 of the 4 stands sampled. *Monardella antonina* subsp. *benitensis*, a CNPS List 4 species, was found in 1 of the 4 stands sampled.

LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: mid, range 3652-4414ft, mean 3933ft
Aspect: SW, SE, variable
Slope: somewhat steep, range 16-25 degrees, mean 20.3 degrees
Topography: undulating; lower to top slopes
Small Rock Cover: range 40-71%, mean 49.2%
Large Rock Cover: range 0.2-8%, mean 2.2%
Litter Cover: range 0.2-5%, mean 1.8%
Bare Ground: range 21.9-52%, mean 43.1%
Parent Material: serpentine
Soil Texture: coarse loamy sand

This association was sampled in the Clear Creek and Sawmill Creek watersheds within the Serpentine portion of the study area.

Samples used to describe association: (n=4)
CCBLM119, CCBLM120, CCBLM287, CCBLM312

Rank: G2S2

GLOBAL DISTRIBUTION

montane Central Coast Ranges

REFERENCES CITED

Sawyer and Keeler-Wolf 1995

***Pinus sabiniana-Pinus coulteri* Barren Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Overstory	PISA2-t	*Pinus sabiniana*	100	1.3	1	2
	PICO3-t	*Pinus coulteri*	100	0.8	0.2	1
Tree Understory	PISA2-l	*Pinus sabiniana*	75	0.2	0.2	0.2
	PISA2-m	*Pinus sabiniana*	50	0.1	0.2	0.2
	PICO3-m	*Pinus coulteri*	25	0.1	0.2	0.2
Shrub	ARGL4	*Arctostaphylos glauca*	100	2.0	0.2	5
	QUDU4	*Quercus durata*	100	0.4	0.2	1
	ARPU5	*Arctostaphylos pungens*	25	0.1	0.2	0.2
	CECU	*Ceanothus cuneatus*	25	0.1	0.2	0.2
	ERCA6	*Eriodictyon californicum*	25	0.1	0.2	0.2
Herb	CACOV	*Calystegia collina* subsp. *venusta*	50	0.1	0.2	0.2
	ELMU3	*Elymus multisetus*	25	0.1	0.2	0.2
	ERIOG	*Eriogonum*	25	0.1	0.2	0.2
	MOANB	*Monardella antonina* subsp. *benitensis*	25	0.1	0.2	0.2
	STREP2	*Streptanthus*	25	0.1	0.2	0.2
	STBR2	*Streptanthus breweri*	25	0.1	0.2	0.2
	LUPIN	*Lupinus*	25	0.1	0.2	0.2

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APPENDIX 1. List of scientific and common names for species occurring in the vegetation rapid assessments. Codes and common names follow the Plants Database (USDA 2003).

Code	Taxon	Common Name	Family	Native
ACHNA	*Achnatherum*	needlegrass	Poaceae	yes
ACHY	*Achnatherum hymenoides*	Indian ricegrass	Poaceae	yes
ACLA2	*Acanthomintha lanceolata*	Santa Clara thorn-mint	Lamiaceae	yes
ACMI2	*Achillea millefolium*	common yarrow	Asteraceae	yes
ACMO2	*Achyrachaena mollis*	soft blow wives	Asteraceae	yes
ACOB	*Acanthomintha obovata*	San Benito thorn-mint	Lamiaceae	yes
ACSP12	*Achnatherum speciosum*	desert needlegrass	Poaceae	yes
ADFA	*Adenostoma fasciculatum*	chamise	Rosaceae	yes
AECA-t	*Aesculus californica*	California buckeye	Hippocastanaceae	yes
AGGR	*Agoseris grandiflora*	bigflower agoseris	Asteraceae	yes
AGOSE	*Agoseris*	agoseris	Asteraceae	yes
AICA	*Aira caryophyllea*	silver hairgrass	Poaceae	no
ALBU	*Allium burlewii*	Burlew's onion	Liliaceae	yes
ALGAE	*Unknown Algae*	algae	Unknown	unknown
ALHO2	*Allium howellii*	Howell's onion	Liliaceae	yes
ALPE	*Allium peninsulare*	Mexicali onion	Liliaceae	yes
AMAC2	*Ambrosia acanthicarpa*	annual bursage	Asteraceae	yes
AMME	*Amsinckia menziesii*	Menzies' fiddleneck	Boraginaceae	yes
AMUT	*Amelanchier utahensis*	western serviceberry	Rosaceae	yes
APAN	*Apiastrum angustifolium*	wild parsley	Apiaceae	yes
AQEX	*Aquilegia eximia*	Van Houtte's columbine	Ranunculaceae	yes
ARCA11	*Artemisia californica*	California sagebrush	Asteraceae	yes
ARDO3	*Artemisia douglasiana*	Douglas' sagewort	Asteraceae	yes
ARGL4	*Arctostaphylos glauca*	bigberry manzanita	Ericaceae	yes
ARPU5	*Arctostaphylos pungens*	pointleaf manzanita	Ericaceae	yes
ARTR2	*Artemisia tridentata*	big sagebrush	Asteraceae	yes
ASAC	*Astragalus accidens*	Rogue River milkvetch	Fabaceae	yes
ASFA	*Asclepias fascicularis*	Mexican whorled milkweed	Asclepiadaceae	yes
ASGA	*Astragalus gambelianus*	Gambel's dwarf milkvetch	Fabaceae	yes
ASPUP7	*Astragalus purshii var. purshii*	woollypod milkvetch	Fabaceae	yes
ATRIP	*Atriplex*	saltbush	Chenopodiaceae	yes
ATSP	*Atriplex spinifera*	spinescale saltbush	Chenopodiaceae	yes
AVENA	*Avena*	oat	Poaceae	no
AVFA	*Avena fatua*	wild oat	Poaceae	no
BAPI	*Baccharis pilularis*	dwarf chaparral broom	Asteraceae	yes
BASA4	*Baccharis salicifolia*	mule's fat	Asteraceae	yes
BEAQD	*Berberis aquifolium* var. *dictyota*	shining netvein barberry	Berberidaceae	yes
BLCR	*Bloomeria crocea*	common goldenstar	Liliaceae	yes
BRAR3	*Bromus arenarius*	Australian brome	Poaceae	no
BRCA5	*Bromus carinatus*	California brome	Poaceae	yes

Code	Taxon	Common Name	Family	Native
BRDI2	*Brachypodium distachyon*	purple false brome	Poaceae	yes
BRDI3	*Bromus diandrus*	ripgut grass	Poaceae	no
BRHO2	*Bromus hordeaceus*	soft brome	Poaceae	no
BRLA3	*Bromus laevipes*	Chinook brome	Poaceae	yes
BRMA3	*Bromus madritensis*	Spanish brome	Poaceae	no
BRTE	*Bromus tectorum*	cheatgrass	Poaceae	no
CAAPD	*Castilleja applegatei* subsp. *disticha*	wavyleaf Indian paintbrush	Scrophulariaceae	yes
CABE7	*Camissonia benitensis*	San Benito evening primrose	Onagraceae	yes
CABOD	*Camissonia boothii subsp. decorticans*	shredding evening primrose	Onagraceae	yes
CACOV	*Calystegia collina subsp. venusta*	south coast range morning-glory	Convolvulaceae	yes
CADE14	*Cardamine debilis*	roadside bittercress	Brassicaceae	yes
CADE27-l	*Calocedrus decurrens*	incense cedar	Cupressaceae	yes
CADE27-m	*Calocedrus decurrens*	incense cedar	Cupressaceae	yes
CADE27-t	*Calocedrus decurrens*	incense cedar	Cupressaceae	yes
CAEXE	*Castilleja exserta subsp. exserta*	exserted Indian paintbrush	Scrophulariaceae	yes
CAFO2	*Castilleja foliolosa*	woolly Indian paintbrush	Scrophulariaceae	yes
CAGR14	*Camissonia graciliflora*	hill suncup	Onagraceae	yes
CAMIM5	*Castilleja miniata subsp. miniata*	giant red Indian paintbrush	Scrophulariaceae	yes
CAMIS	*Camissonia*	suncup	Onagraceae	yes
CAMIS3	*Castilleja minor subsp. spiralis*	lesser Indian paintbrush	Scrophulariaceae	yes
CAMU3	*Calycadenia multiglandulosa*	sticky western rosinweed	Asteraceae	yes
CAREX	*Carex (praegracilis)*	carex	Cyperaceae	yes
CAREX2	*Carex*	carex	Cyperaceae	yes
CASE2	*Carex serratodens*	twotooth sedge	Cyperaceae	yes
CASP	*Calochortus splendens*	splendid mariposa lily	Liliaceae	yes
CASTI2	*Castilleja*	Indian paintbrush	Scrophulariaceae	yes
CASUS2	*Calystegia subacaulis subsp. subacaulis*	hillside false bindweed	Convolvulaceae	yes
CAVE3	*Calochortus venustus*	butterfly mariposa lily	Liliaceae	yes
CEBE3	*Cercocarpus betuloides*	birchleaf mountain mahogany	Rosaceae	yes
CECU	*Ceanothus cuneatus*	buckbrush	Rhamnaceae	yes
CEIN3	*Ceanothus integerrimus*	deerbrush	Rhamnaceae	yes
CELE2	*Ceanothus leucodermis*	chaparral whitethorn	Rhamnaceae	yes
CEME2	*Centaurea melitensis*	Maltese star-thistle	Asteraceae	no
CESO3	*Centaurea solstitialis*	yellow star-thistle	Asteraceae	no
CHENO	*Chenopodium*	goosefoot	Chenopodiaceae	yes
CHME2	*Chorizanthe membranacea*	pink spineflower	Polygonaceae	yes
CHNAM	*Chrysothamnus nauseosus subsp. mohavensis*	rubber rabbitbrush	Asteraceae	yes

Code	Taxon	Common Name	Family	Native
CHORI2	*Chorizanthe*	spineflower	Polygonaceae	yes
CHPE4	*Chorizanthe perfoliata*	perfoliate spineflower	Polygonaceae	yes
CHPO3	*Chlorogalum pomeridianum*	wavyleaf soap plant	Liliaceae	yes
CIOCV	*Cirsium occidentale* var. *venustum*	cobwebby thistle	Asteraceae	yes
CIVU	*Cirsium vulgare*	bull thistle	Asteraceae	no
CLARK	*Clarkia*	clarkia	Onagraceae	yes
CLBR	*Clarkia breweri*	fairy fans	Onagraceae	yes
CLLA3	*Clematis lasiantha*	pipestem clematis	Ranunculaceae	yes
CLPE	*Claytonia perfoliata*	miner's lettuce	Portulacaceae	yes
CLPUQ	*Clarkia purpurea subsp. quadrivulnera*	winecup clarkia	Onagraceae	yes
CLRH	*Clarkia rhomboidea*	diamond clarkia	Onagraceae	yes
CLUN	*Clarkia unguiculata*	elegant clarkia	Onagraceae	yes
COHE	*Collinsia heterophylla*	purple Chinese houses	Scrophulariaceae	yes
COLLI	*Collinsia*	blue eyed Mary	Scrophulariaceae	yes
COREO2	*Coreopsis*	tickseed	Asteraceae	yes
CORI2	*Cordylanthus rigidus*	stiffbranch bird's beak	Scrophulariaceae	yes
COSP	*Collinsia sparsiflora*	spinster's blue eyed Mary	Scrophulariaceae	yes
CRASS	*Crassula*	pygmyweed	Crassulaceae	yes
CRDE	*Cryptantha decipiens*	gravelbar cryptantha	Boraginaceae	yes
CRIN8	*Cryptantha intermedia*	Clearwater cryptantha	Boraginaceae	yes
CRYPT	*Cryptantha*	cryptantha	Boraginaceae	yes
CRYPTO	*Cryptogamic crust*	cryptogamic crust	Unknown	yes
CUCA	*Cuscuta californica*	chaparral dodder	Cuscutaceae	yes
CYDA	*Cynodon dactylon*	Bermudagrass	Poaceae	yes
DAPU3	*Daucus pusillus*	American wild carrot	Apiaceae	yes
DECA2	*Delphinium cardinale*	scarlet larkspur	Ranunculaceae	yes
DEHEP	*Delphinium hesperium subsp. pallescens*	foothill larkspur	Ranunculaceae	yes
DELPH	*Delphinium*	larkspur	Ranunculaceae	yes
DEPA2	*Delphinium parryi*	San Bernardino larkspur	Ranunculaceae	yes
DISP	*Distichlis spicata*	inland saltgrass	Poaceae	yes
DUCY	*Dudleya cymosa*	canyon liveforever	Crassulaceae	yes
EAEL	*Eastwoodia elegans*	yellow aster	Asteraceae	yes
ELACB	*Eleocharis acicularis* var. *bella*	beautiful spikerush	Cyperaceae	yes
ELEL5	*Elymus elymoides*	squirreltail	Poaceae	yes
ELGL	*Elymus glaucus*	blue wildrye	Poaceae	yes
ELMA5	*Eleocharis macrostachya*	common spikerush	Cyperaceae	yes
ELMU3	*Elymus multisetus*	big squirreltail	Poaceae	yes
ELTRT2	*Elymus trachycaulus subsp. teslinensis*	slender wheatgrass	Poaceae	yes
EMPE	*Emmenanthe penduliflora*	whisperingbells	Hydrophyllaceae	yes
EPBR3	*Epilobium brachycarpum*	tall annual willowherb	Onagraceae	yes
EPCA2	*Ephedra californica*	California jointfir	Ephedraceae	yes
EPILO	*Epilobium*	willowherb	Onagraceae	yes
EPMI	*Epilobium minutum*	chaparral willowherb	Onagraceae	yes

Code	Taxon	Common Name	Family	Native
ERAN3	*Eriogonum angulosum*	anglestem buckwheat	Polygonaceae	yes
ERBO	*Erodium botrys*	longbeak stork's bill	Geraniaceae	no
ERCA14	*Erysimum capitatum*	sanddune wallflower	Brassicaceae	yes
ERCA6	*Eriodictyon californicum*	California yerba santa	Hydrophyllaceae	yes
ERCI6	*Erodium cicutarium*	redstem stork's bill	Geraniaceae	no
ERCO17	*Eriogonum covilleanum*	Coville's buckwheat	Polygonaceae	yes
ERCO25	*Eriophyllum confertiflorum*	golden-yarrow	Asteraceae	yes
ERCUS	*Ericameria cuneata* var. *spathulata*	cliff goldenbush	Asteraceae	yes
EREL6	*Eriogonum elongatum*	longstem buckwheat	Polygonaceae	yes
EREL8	*Eriogonum elegans*	elegant buckwheat	Polygonaceae	yes
ERFA2	*Eriogonum fasciculatum*	Eastern Mojave buckwheat	Polygonaceae	yes
ERFAF2	*Eriogonum fasciculatum* var. *foliolosum*	Eastern Mojave buckwheat	Polygonaceae	yes
ERFAP	*Eriogonum fasciculatum* var. *polifolium*	Eastern Mojave buckwheat	Polygonaceae	yes
ERFO2	*Erigeron foliosus*	leafy fleabane	Asteraceae	yes
ERHE	*Eriogonum heermannii*	Heermann's buckwheat	Polygonaceae	yes
ERIGE2	*Erigeron*	fleabane	Asteraceae	yes
ERIOG	*Eriogonum*	buckwheat	Polygonaceae	yes
ERIOP2	*Eriophyllum*	woolly sunflower	Asteraceae	yes
ERLI	*Erigeron linearis*	desert yellow fleabane	Asteraceae	yes
ERLI6	*Ericameria linearifolia*	narrowleaf goldenbush	Asteraceae	yes
ERNU3	*Eriogonum nudum*	naked buckwheat	Polygonaceae	yes
ERNUI	*Eriogonum nudum* var. *indictum*	protruding buckwheat	Polygonaceae	yes
ERPL2	*Eriastrum pluriflorum*	Tehachapi woollystar	Polemoniaceae	yes
ERSE3	*Eremocarpus setigerus*	dove weed	Euphorbiaceae	yes
ERSP3	*Eriastrum sparsiflorum*	Great Basin woollystar	Polemoniaceae	yes
ERTO	*Eriodictyon tomentosum*	woolly yerba santa	Hydrophyllaceae	yes
ERUM	*Eriogonum umbellatum*	sulphur-flower buckwheat	Polygonaceae	yes
ERVE4	*Eriogonum vestitum*	Idria buckwheat	Polygonaceae	yes
ERWR	*Eriogonum wrightii*	bastardsage	Polygonaceae	yes
ESCA	*Eschscholzia caespitosa*	tufted poppy	Papaveraceae	yes
ESCA2	*Eschscholzia californica*	California poppy	Papaveraceae	yes
FICA2	*Filago californica*	California cottonrose	Asteraceae	yes
FIGA	*Filago gallica*	narrowleaf cottonrose	Asteraceae	no
FILAG	*Filago*	cottonrose	Asteraceae	yes
FRCA6	*Fremontodendron californicum*	California flannelbush	Sterculiaceae	yes
FRDI2	*Fraxinus dipetala*	California ash	Oleaceae	yes
FRITI	*Fritillaria*	fritillary	Liliaceae	yes
GAAN	*Galium andrewsii*	phloxleaf bedstraw	Rubiaceae	yes
GAAN2	*Galium angustifolium*	narrowleaf bedstraw	Rubiaceae	yes
GALIU	*Galium*	bedstraw	Rubiaceae	yes
GANU	*Galium nuttallii*	climbing bedstraw	Rubiaceae	yes
GAPA5	*Galium parisiense*	wall bedstraw	Rubiaceae	no
GAPO	*Galium porrigens*	graceful bedstraw	Rubiaceae	yes

Code	Taxon	Common Name	Family	Native
GARRY	*Garrya*	silktassel	Garryaceae	yes
GAVE3	*Gastridium ventricosum*	nit grass	Poaceae	no
GILIA	*Gilia*	gilia	Polemoniaceae	yes
GNLU	*Gnaphalium luteoalbum*	Jersey cudweed	Asteraceae	no
GNPA	*Gnaphalium palustre*	western marsh cudweed	Asteraceae	no
GUCA	*Gutierrezia californica*	San Joaquin snakeweed	Asteraceae	yes
HASQ2	*Hazardia squarrosa*	sawtooth goldenbush	Asteraceae	yes
HEAR5	*Heteromeles arbutifolia*	toyon	Rosaceae	yes
HECU3	*Heliotropium curassavicum*	salt heliotrope	Boraginaceae	yes
HEDI4	*Hesperolinon disjunctum*	Coast Range dwarf-flax	Linaceae	yes
HEFI	*Hemizonia fitchii*	Fitch's tarweed	Asteraceae	yes
HEKE	*Hemizonia kelloggii*	Kellogg's tarweed	Asteraceae	yes
HEPU2	*Helenium puberulum*	rosilla	Asteraceae	yes
HERBAC	*Herbaceous unknown*	unknown	Unknown	unknown
HESPE10	*Hesperevax*	dwarf-cudweed	Asteraceae	yes
HIIN3	*Hirschfeldia incana*	shortpod mustard	Brassicaceae	no
HOBR2	*Hordeum brachyantherum*	meadow barley	Poaceae	yes
HOLOC	*Holocarpha*	tarweed	Asteraceae	yes
HOMUL	*Hordeum murinum subsp. leporinum*	leporinum barley	Poaceae	no
HYFOS	*Hypericum formosum* var. *scouleri*	Scouler's St. Johnswort	Clusiaceae	yes
ISACB	*Isocoma acradenia* var. *bracteosa*	alkali goldenbush	Asteraceae	yes
ISME5	*Isocoma menziesii*	Menzies' goldenbush	Asteraceae	yes
JUCA7	*Juniperus californica*	California juniper	Cupressaceae	yes
JUME4	*Juncus mexicanus*	Mexican rush	Juncaceae	yes
JUXI	*Juncus xiphioides*	irisleaf rush	Juncaceae	yes
KEBRB	*Keckiella breviflora subsp. breviflora*	bush beardtongue	Scrophulariaceae	yes
KOMA	*Koeleria macrantha*	prairie Junegrass	Poaceae	yes
LAAU	*Lamarckia aurea*	goldentop grass	Poaceae	no
LACA7	*Lasthenia californica*	California goldfields	Asteraceae	yes
LARAR	*Lagophylla ramosissima subsp. ramosissima*	branched lagophylla	Asteraceae	yes
LASE	*Lactuca serriola*	prickly lettuce	Asteraceae	no
LATHY	*Lathyrus*	pea	Fabaceae	yes
LEFI11	*Lessingia filaginifolia*	common sandaster	Asteraceae	yes
LEGLG	*Lessingia glandulifera* var. *glandulifera*	valley lessingia	Asteraceae	yes
LENI	*Lepidium nitidum*	shining pepperweed	Brassicaceae	yes
LEOC8	*Lessingia occidentalis*	benitoa	Asteraceae	yes
LESQ	*Lepidospartum squamatum*	California broomsage	Asteraceae	yes
LETR5	*Leymus triticoides*	beardless wildrye	Poaceae	yes
LIBI	*Linanthus bicolor*	true babystars	Polemoniaceae	yes
LICHEN	*Lichen*	lichen	Unknown	unknown
LICI	*Linanthus ciliatus*	whiskerbrush	Polemoniaceae	yes
LILE3	*Linum lewisii*	prairie flax	Linaceae	yes

Code	Taxon	Common Name	Family	Native
LINAN2	*Linanthus*	linanthus	Polemoniaceae	yes
LIUS	*Linum usitatissimum*	common flax	Linaceae	no
LODA	*Lomatium dasycarpum*	woollyfruit desertparsley	Apiaceae	yes
LOHU2	*Lotus humistratus*	foothill deervetch	Fabaceae	yes
LOMA3	*Lomatium macrocarpum*	bigseed biscuitroot	Apiaceae	yes
LOMAT	*Lomatium*	desertparsley	Apiaceae	yes
LOMI	*Lotus micranthus*	desert deervetch	Fabaceae	yes
LOPE	*Lolium perenne*	perennial ryegrass	Poaceae	no
LOPU3	*Lotus purshianus*	American bird's-foot trefoil	Fabaceae	yes
LOSAS	*Lotus salsuginosus* var. *salsuginosus*	coastal bird's-foot trefoil	Fabaceae	yes
LOSC2	*Lotus scoparius*	common deerweed	Fabaceae	yes
LOSC6	*Loeseliastrum schottii*	Schott's calico	Polemoniaceae	yes
LOSUD	*Lonicera subspicata* var. *denudata*	Santa Barbara honeysuckle	Caprifoliaceae	yes
LOTUS	*Lotus (argophyllus)*	trefoil	Fabaceae	yes
LOUT	*Lomatium utriculatum*	common lomatium	Apiaceae	yes
LOWR2	*Lotus wrangelianus*	Chilean bird's-foot trefoil	Fabaceae	yes
LUAL4	*Lupinus albifrons*	silver lupine	Fabaceae	yes
LUBI	*Lupinus bicolor*	miniature lupine	Fabaceae	yes
LUCO	*Lupinus concinnus*	scarlet lupine	Fabaceae	yes
LUMI9	*Lupinus microcarpus*	valley lupine	Fabaceae	yes
LUPIN	*Lupinus*	lupine	Fabaceae	yes
MAAB2	*Malacothamnus aboriginum*	Gray bushmallow	Malvaceae	yes
MADIA	*Madia*	tarweed	Asteraceae	yes
MAFA3	*Marah fabaceus*	California manroot	Cucurbitaceae	yes
MAFL	*Malacothrix floccifera*	woolly desertdandelion	Asteraceae	yes
MAVU	*Marrubium vulgare*	horehound	Lamiaceae	no
MECA2	*Melica californica*	California melicgrass	Poaceae	yes
MEIM	*Melica imperfecta*	smallflower melicgrass	Poaceae	yes
MELA2	*Mentzelia laevicaulis*	smoothstem blazingstar	Loasaceae	yes
MELIC	*Melica*	melicgrass	Poaceae	yes
MENTZ	*Mentzelia*	blazingstar	Loasaceae	yes
MEPO3	*Medicago polymorpha*	burclover	Fabaceae	yes
METO	*Melica torreyana*	Torrey's melicgrass	Poaceae	yes
MICA3	*Mimulus cardinalis*	scarlet monkeyflower	Scrophulariaceae	yes
MICAC2	*Micropus californicus* var. *californicus*	q tips	Asteraceae	yes
MICRO6	*Microseris*	silverpuffs	Asteraceae	yes
MIDOD	*Microseris douglasii subsp. douglasii*	Douglas' silverpuffs	Asteraceae	yes
MIFR2	*Mimulus fremontii*	Fremont's monkeyflower	Scrophulariaceae	yes
MIGU	*Mimulus guttatus*	seep monkeyflower	Scrophulariaceae	yes
MOANB	*Monardella antonina subsp. benitensis*	San Benito monardella	Lamiaceae	yes
MODO	*Monardella douglasii*	Douglas' monardella	Lamiaceae	yes
MOSS	*Moss*	moss	Unknown	yes

Code	Taxon	Common Name	Family	Native
MOVI2	*Monardella villosa*	coyote mint	Lamiaceae	yes
MUAS	*Muhlenbergia asperifolia*	scratchgrass	Poaceae	yes
MUMA2	*Muilla maritima*	sea muilla	Liliaceae	yes
NALE2	*Nassella lepida*	smallflower tussockgrass	Poaceae	yes
NAPR2	*Navarretia prostrata*	prostrate pincushionplant	Polemoniaceae	yes
NAPU2	*Navarretia pubescens*	downy pincushionplant	Polemoniaceae	yes
NAPU4	*Nassella pulchra*	purple tussockgrass	Poaceae	yes
NASSE	*Nassella*	tussockgrass	Poaceae	yes
NAVAR	*Navarretia*	pincushionplant	Polemoniaceae	yes
NIGL	*Nicotiana glauca*	tree tobacco	Solanaceae	no
OEDEC2	*Oenothera deltoides subsp. cognata*	birdcage evening-primrose	Onagraceae	yes
OSBR	*Osmorhiza brachypoda*	California sweetcicely	Apiaceae	yes
PACA18	*Parnassia californica*	California grass of Parnassus	Saxifragaceae	yes
PAPAC	*Parnassia palustris* var. *californica*	California grass of Parnassus	Saxifragaceae	yes
PEAN2	*Pellaea andromedifolia*	coffee cliffbrake	Pteridaceae	yes
PECE2	*Penstemon centranthifolius*	scarlet bugler	Scrophulariaceae	yes
PEGR8	*Penstemon grinnellii*	Grinnell's beardtongue	Scrophulariaceae	yes
PEHE3	*Penstemon heterophyllus*	bunchleaf penstemon	Scrophulariaceae	yes
PEMU	*Pellaea mucronata*	birdfoot cliffbrake	Pteridaceae	yes
PETR7	*Pentagramma triangularis*	goldback fern	Pteridaceae	yes
PHACE	*Phacelia*	phacelia	Hydrophyllaceae	yes
PHAQ	*Phalaris aquatica*	bulbous canarygrass	Poaceae	no
PHAU7	*Phragmites australis*	common reed	Poaceae	yes
PHCIH2	*Phacelia cicutaria* var. *hispida*	caterpillar phacelia	Hydrophyllaceae	yes
PHHE2	*Phacelia heterophylla*	varileaf phacelia	Hydrophyllaceae	yes
PHJU	*Phoradendron juniperinum*	juniper mistletoe	Viscaceae	yes
PHLOX	*Phlox*	phlox	Polemoniaceae	yes
PHVI9	*Phoradendron villosum*	Pacific mistletoe	Viscaceae	yes
PHYLA	*Phyla*	fogfruit	Verbenaceae	yes
PICO3-l	*Pinus coulteri*	Coulter pine	Pinaceae	yes
PICO3-m	*Pinus coulteri*	Coulter pine	Pinaceae	yes
PICO3-t	*Pinus coulteri*	Coulter pine	Pinaceae	yes
PIJE-l	*Pinus jeffreyi*	Jeffrey pine	Pinaceae	yes
PIJE-m	*Pinus jeffreyi*	Jeffrey pine	Pinaceae	yes
PIJE-t	*Pinus jeffreyi*	Jeffrey pine	Pinaceae	yes
PISA2-l	*Pinus sabiniana*	California foothill pine	Pinaceae	yes
PISA2-m	*Pinus sabiniana*	California foothill pine	Pinaceae	yes
PISA2-t	*Pinus sabiniana*	California foothill pine	Pinaceae	yes
PLECT	*Plectritis*	seablush	Valerianaceae	yes
PLER3	*Plantago erecta*	dotseed plantain	Plantaginaceae	yes
PLNO	*Plagiobothrys nothofulvus*	rusty popcornflower	Boraginaceae	yes
POAN	*Poa annua*	annual bluegrass	Poaceae	no
POFR2-m	*Populus fremontii*	Fremont cottonwood	Salicaceae	yes

Code	Taxon	Common Name	Family	Native
POFR2-t	*Populus fremontii*	Fremont cottonwood	Salicaceae	yes
POGLG4	*Potentilla glandulosa subsp. glandulosa*	sticky cinquefoil	Rosaceae	yes
POMO5	*Polypogon monspeliensis*	rabbitfootgrass	Poaceae	no
POSE	*Poa secunda*	Sandberg bluegrass	Poaceae	yes
PRIL	*Prunus ilicifolia*	hollyleaf cherry	Rosaceae	yes
PRVID2	*Prunus virginiana subsp. demissa*	western chokecherry	Rosaceae	yes
QUAL2	*Quercus ×alvordiana*	Alvord oak	Fagaceae	yes
QUBE5	*Quercus berberidifolia*	scrub oak	Fagaceae	yes
QUCH2-m	*Quercus chrysolepis*	canyon live oak	Fagaceae	yes
QUCH2-t	*Quercus chrysolepis*	canyon live oak	Fagaceae	yes
QUDO-l	*Quercus douglasii*	blue oak	Fagaceae	yes
QUDO-m	*Quercus douglasii*	blue oak	Fagaceae	yes
QUDO-t	*Quercus douglasii*	blue oak	Fagaceae	yes
QUDU4	*Quercus durata*	leather oak	Fagaceae	yes
QUJO3	*Quercus john-tuckeri*	Tucker oak	Fagaceae	yes
QULO-t	*Quercus lobata*	California white oak	Fagaceae	yes
QUWI2-m	*Quercus wislizeni*	interior live oak	Fagaceae	yes
QUWI2-t	*Quercus wislizeni*	interior live oak	Fagaceae	yes
RHCA	*Rhamnus californica*	California buckthorn	Rhamnaceae	yes
RHIL	*Rhamnus ilicifolia*	hollyleaf redberry	Rhamnaceae	yes
RHTO6	*Rhamnus tomentella*	California buckthorn	Rhamnaceae	yes
RICAC	*Ribes californicum* var. *californicum*	hillside gooseberry	Grossulariaceae	yes
RILE2	*Rigiopappus leptocladus*	wireweed	Asteraceae	yes
RIQU	*Ribes quercetorum*	rock gooseberry	Grossulariaceae	yes
RUHY	*Rumex hymenosepalus*	canaigre dock	Polygonaceae	yes
RUMEX	*Rumex*	dock	Polygonaceae	yes
SABI2	*Sanicula bipinnata*	poison sanicle	Apiaceae	yes
SABI3	*Sanicula bipinnatifida*	purple sanicle	Apiaceae	yes
SABR2	*Salix breweri*	Brewer's willow	Salicaceae	yes
SACO6	*Salvia columbariae*	chia	Lamiaceae	yes
SACR2	*Sanicula crassicaulis*	Pacific blacksnakeroot	Apiaceae	yes
SALA3-t	*Salix laevigata*	red willow	Salicaceae	yes
SALA6-m	*Salix lasiolepis*	arroyo willow	Salicaceae	yes
SAME3	*Salvia mellifera*	black sage	Lamiaceae	yes
SAME5	*Sambucus mexicana*	common elderberry	Caprifoliaceae	yes
SANIC	*Sanicula*	sanicle	Apiaceae	yes
SATR12	*Salsola tragus*	prickly Russian thistle	Chenopodiaceae	no
SCUTE	*Scutellaria*	skullcap	Lamiaceae	yes
SESE3	*Sequoia sempervirens*	redwood	Taxodiaceae	no
SIBE	*Sisyrinchium bellum*	western blue-eyed grass	Iridaceae	yes
SILE2	*Silene lemmonii*	Lemmon's catchfly	Caryophyllaceae	yes
SNAG	Standing snag	Unknown	Unknown	unknown
SOGU	*Solidago guiradonis*	Guirado goldenrod	Asteraceae	yes
SOLAN	*Solanum*	nightshade	Solanaceae	yes

Code	Taxon	Common Name	Family	Native
SOOL	*Sonchus oleraceus*	common sowthistle	Asteraceae	no
STBR2	*Streptanthus breweri*	Brewer's jewelflower	Brassicaceae	yes
STEPH	*Stephanomeria*	wirelettuce	Asteraceae	yes
STEXE	*Stephanomeria exigua subsp. exigua*	small wirelettuce	Asteraceae	yes
STPY	*Stachys pycnantha*	shortspike hedgenettle	Lamiaceae	yes
STREP2	*Streptanthus*	twistflower	Brassicaceae	yes
SYALL	*Symphoricarpos albus* var. *laevigatus*	common snowberry	Caprifoliaceae	yes
SYMO	*Symphoricarpos mollis*	creeping snowberry	Caprifoliaceae	yes
TACA8	*Taeniatherum caput-medusae*	medusahead	Poaceae	no
TAMAR2	*Tamarix*	tamarisk	Tamaricaceae	no
TODI	*Toxicodendron diversilobum*	Pacific poison oak	Anacardiaceae	yes
TORIL	*Torilis*	hedgeparsley	Apiaceae	yes
TRICH9	*Trichostema*	bluecurls	Lamiaceae	yes
TRIFO	*Trifolium*	clover	Fabaceae	yes
TRLA4	*Trichostema lanceolatum*	vinegarweed	Lamiaceae	yes
TRRU	*Trichostema rubisepalum*	Hernandez's bluecurls	Lamiaceae	yes
TRWI	*Trifolium willdenowii*	tomcat clover	Fabaceae	yes
TYDO	*Typha domingensis*	southern cattail	Typhaceae	yes
TYLA	*Typha latifolia*	broadleaf cattail	Typhaceae	yes
URLI5	*Uropappus lindleyi*	Lindley's silverpuffs	Asteraceae	yes
VELA	*Verbena lasiostachys*	western vervain	Verbenaceae	yes
VIPUQ	*Viola purpurea subsp. quercetorum*	goosefoot violet	Violaceae	yes
VUMI	*Vulpia microstachys*	small fescue	Poaceae	yes
VUMY	*Vulpia myuros*	rat-tail fescue	Poaceae	no
YUWH	*Yucca whipplei*	chaparral yucca	Agavaceae	yes
ZIVEV	*Zigadenus venenosus* var. *venenosus*	meadow deathcamas	Liliaceae	yes

APPENDIX 2. Special status plant species that occurred in vegetation surveys in the inner Central Coast, California.

Acanthomintha lanceolata

CNPS list 4 species
CNPS R-E-D Code is 1-2-3
Global rank is G3and state rank is S3.2

This species is found in chaparral (often on serpentinite soils), cismontane woodland and coastal scrub. Habitats are between 80 – 1,200 meters in elevation. This species is known from Alameda, Fresno, Merced, Monterey, San Benito, Santa Clara, San Joaquin and Stanislaus counties and is endemic to California. This species is possibly threatened by grazing (CNPS 2005).

Acanthomintha obovata* subsp. *obovata

CNPS list 4 species
CNPS R-E-D Code is 1-2-3
Global rank is G3T3 and state rank is S3.2

This species is found in chaparral, cismontane woodland and valley and foothill grasslands on clay, alkaline or serpentinite soils. Habitats are between 395 – 1500 meters in elevation. This species is known from Alameda, Fresno, Merced, Monterey, San Benito, Santa Clara and Stanislaus counties and is endemic to California. This species is threatened by grazing (CNPS 2005).

Calystegia collina* subsp. *venusta

CNPS list 4 species
CNPS R-E-D Code is 1-1-3
Global rank is G4T3 and state rank is S3.2

This species is found in chaparral, cismontane woodland and valley and foothill grasslands on serpentinite or sedimentary soils. Habitats are between 425 – 1,130 meters in elevation. This species is known from Fresno, Monterey, Santa Barbara and San Benito counties and is endemic to California. This species can be relatively abundant and tolerant of disturbance. See *Kew Bulletin* 35(2):328 (1980) for original description (CNPS 2005).

Camissonia benitensis

CNPS list 1B species
CNPS R-E-D Code is 3-3-3
Global rank is G1 and state rank is S1.1

This species is found in chaparral and cismontane woodland on serpentinite alluvium, clay, or gravelly soils. Habitats are between 600-1280 meters in elevation. This species is known from Fresno and San Benito counties and is endemic to California. This species is known only from the New Idria area and is seriously threatened by vehicles. See *Contributions from the U.S. National Herbarium* 37(5):332 (1969) for original description.

Clarkia breweri

CNPS list 4 species
CNPS R-E-D Code is 1-2-3
Global rank is G3 and state rank is S3.2

This species is found in chaparral, cismontane woodland and coastal scrub often on serpentinite soils. Habitats are between 215 - 1000 meters in elevation. This species is known from Fresno, Monterey, San Benito and San Luis Obispo counties and is endemic to California. Threatened by cattle grazing and potentially by reservoir construction (CNPS 2005).

Eriogonum nudum var. *indictum*

CNPS list 4 species
CNPS R-E-D Code is 1-2-3
Global rank is G5T3 and state rank is S3.2

This species is found in chaparral, chenopod scrub and cismontane woodland on clay or serpentinite soils. Habitats are between 150 – 800 meters in elevation. This species is known from Fresno, Kern, Merced, Monterey, San Benito, and San Luis Obispo counties and is endemic to California. Not always distinct from var. *auriculatum* in Fresno and San Benito counties. See *Flora of California* 1(4):421 (1914) by W.L. Jepson for original description, and *Phytologia* 66(4):329-332 (1989) for taxonomic treatment (CNPS 2005).

Eriogonum umbellatum var. *bahiiforme*

CNPS list 4 species
CNPS R-E-D Code is 1-2-3
Global rank is G5T3 and state rank is S3.2

This species is found in cismontane woodland and lower montane coniferous forest on rocky, often serpentinite soils. Habitats are between 700 – 2,200 meters in elevation. This species is known from Alameda, Contra Costa, Colusa, Glenn, Humboldt, Lake, Mendocino, Monterey, Napa, San Benito, Santa Clara, Siskiyou, San Joaquin and Stanislaus counties and is endemic to California. See *Phytologia* 66(4): 341-346 (1989) for taxonomic treatment (CNPS 2005).

Eriogonum vestitum

CNPS list 4 species
CNPS R-E-D Code is 1-1-3
Global rank is G3Q and state rank is S3.3

This species is found in valley and foothill grasslands. Habitats are between 235 - 900 meters in elevation. This species is known from Fresno, Merced and San Benito counties and is endemic to California. See *Phytologia* 66(4):375 (1989) for taxonomic treatment (CNPS 2005).

Lessingia occidentalis

CNPS list 4 species
CNPS R-E-D Code is 1-1-3
Global rank is G3 and state rank is S3.3

This species is found in chaparral, cismontane woodland, coastal scrub and valley and foothill grasslands on clay or serpentine soils. Habitats are between 450-850 meters in elevation. This species is known from Fresno, Monterey and San Benito counties and is endemic to California. See *Novon* 2(3):213-214 (1992) for revised nomenclature.

Malacothamnus aboriginum

CNPS list 1B species
CNPS R-E-D Code is 2-2-3
Global rank is G3 and state rank is S3.2

This species is found in chaparral and cismontane woodland often on rocky soils. Habitats are between 150 - 1700 meters in elevation. This species is known from Fresno, Monterey and San Benito counties and is endemic to California. This species appears in abundance after fires. *M. densiflorus* specimens from San Diego County have been confused with this species. See *Synoptical Flora of North America* 1(1):311 (1897) for original description (CNPS 2005).

Monardella antonina **subsp.** *benitensis*

CNPS list 4 species
CNPS R-E-D Code is 1-1-3
Global rank is G4T3 and state rank is S3.3

This species is found in chaparral on serpentinite soils. Habitats are between 500 – 915 meters in elevation. This species is known from Monterey, San Benito and San Luis Obispo counties and is endemic to California. See *Leaflets of Western Botany* 8(3):55 (1956) for original description, and *Phytologia* 72(1):9-16 (1992) for revised nomenclature (CNPS 2005).

Solidago guiradonis

CNPS list 4 species
CNPS R-E-D Code is 1-2-3
Global rank is G3 and state rank is S3.2

This species is found in cismontane woodland and valley and foothill grasslands often in serpentinite seeps and drainages. Habitats are between 600 - 900 meters in elevation. This species and is known only from the San Benito Mountains in Fresno and San Benito counties. This species is threatened by off road vehicle use. See *Proceedings of the American Academy of Arts and Sciences* 6:543 (1865) for original description (CNPS 2005).

Trichostema rubisepalum

CNPS list 4 species
CNPS R-E-D Code is 1-1-3
Global rank is G3 and state rank is S3.3

This species is found in broadleaf upland forest, chaparral, cismontane woodland, lower montane coniferous forest and vernal pools on gravelly, often volcanic or serpentinite soils. Habitats are between 300 – 1,000 meters in elevation. This species is known from Mariposa, Napa, San Benito, and Tuolumne counties and is endemic to California.

APPENDIX 3. Crosswalk of vegetation classification systems from Alliances and Associations in the Floristic National Vegetation Classification (NVC) to the California Department of Fish and Game's WHR types (Mayer and Laudenslayer 1988) and US Forest Service's CalVeg types (USFS 2004).

Alliance	Association	Code	WHR	Code	CalVeg
Tree-Overstory					
Pinus coulteri	*Pinus coulteri/Arctostaphylos glauca*	CPC	Closed-cone Pine - Cypress	PC	Coulter Pine (Pinus coulteri)
	Pinus coulteri/Quercus durata	CPC	Closed-cone Pine - Cypress	PC	Coulter Pine (Pinus coulteri)
	Pinus coulteri-Calocedrus decurrens/Quercus durata-Arctostaphylos glauca	CPC	Closed-cone Pine - Cypress	PC	Coulter Pine (Pinus coulteri)
	Pinus coulteri-Calocedrus decurrens/Rhamnus tomentella/Aquilegia eximia	CPC	Closed-cone Pine - Cypress	PC	Coulter Pine (Pinus coulteri)
	Pinus coulteri-Calocedrus decurrens-Pinus jeffreyi/Quercus durata	CPC	Closed-cone Pine - Cypress	PC, MU	Coulter Pine (Pinus coulteri), Ultramafic Mixed Conifer
	Pinus coulteri-Pinus sabiniana/Quercus durata-Arctostaphylos pungens	CPC	Closed-cone Pine - Cypress	PC	Coulter Pine (Pinus coulteri)
Pinus coulteri-Quercus chrysolepis	Alliance only	MHC	Montane Hardwood - Conifer	PC, QC	Coulter Pine, Canyon Live Oak
Pinus jeffreyi	Alliance only	JPN	Jeffrey Pine	JP	Jeffrey Pine
Pinus sabiniana	*Pinus sabiniana/Juniperus californica*/Annual-Perennial Herb	BOP	Blue Oak - Foothill Pine	PD	Foothill Grey Pine (Pinus sabiniana)
Populus fremontii	Alliance only	VRI	Valley Foothill Riparian	QF	Fremont Cottonwood (Populus fremontii)
Quercus chrysolepis	*Quercus chrysolepis*	MHW, MCH	Montane Hardwood, Mixed Chaparral	QC, CQ	Canyon Live Oak (Quercus chrysolepis), Lower Montane Mixed Chaparral
Quercus douglasii	*Quercus douglasii*/Annual-Perennial Herb	BOW	Blue Oak Woodland	QD	Blue Oak (Quercus douglasii)
	Quercus douglasii/Ceanothus cuneatus	BOW, BOP	Blue Oak Woodland, Blue Oak - Foothill Pine	QD, PD	Blue Oak (Quercus douglasii), Foothill Grey Pine (Pinus sabiniana)
	Quercus douglasii/Ericameria linearifolia-Juniperus californica	BOW, BOP	Blue Oak Woodland, Blue Oak - Foothill Pine	QD, PD	Blue Oak (Quercus douglasii), Foothill Grey Pine (Pinus sabiniana)
	Quercus douglasii/Eriogonum fasciculatum/Annual-Perennial Herb	BOW, BOP	Blue Oak Woodland, Blue Oak - Foothill Pine	QD, PD	Blue Oak (Quercus douglasii), Foothill Grey Pine (Pinus sabiniana)
	Quercus douglasii/Juniperus californica-Cercocarpus betuloides	BOW, BOP	Blue Oak Woodland, Blue Oak - Foothill Pine	QD, PD	Blue Oak (Quercus douglasii), Foothill Grey Pine (Pinus sabiniana)
	Quercus douglasii/Juniperus californica-Quercus john-tuckeri	BOW, BOP	Blue Oak Woodland, Blue Oak - Foothill Pine	QD, PD	Blue Oak (Quercus douglasii), Foothill Grey Pine (Pinus sabiniana)

Alliance	Association	Code	WHR	Code	CalVeg
Quercus douglasii	*Quercus douglasii-Pinus sabiniana/Cercocarpus betuloides*	BOW, BOP	Blue Oak Woodland, Blue Oak - Foothill Pine	QD, PD	Blue Oak (Quercus douglasii), Foothill Grey Pine (Pinus sabiniana)
	Quercus douglasii-Quercus wislizeni-Pinus sabiniana	BOW, BOP	Blue Oak Woodland, Blue Oak - Foothill Pine	NX, PD	Interior Mixed Hardwoods, Foothill Grey Pine (Pinus sabiniana)
Quercus lobata	Alliance only	VOW	Valley Oak Woodland	QL	Valley Oak (Quercus lobata)
Quercus wislizeni	Alliance only	MHW	Montane Hardwood	QW	Interior Live Oak (Quercus wislizenii)
Quercus wislizeni-Quercus chrysolepis	*Quercus wislizeni-Quercus chrysolepis*	MHW	Montane Hardwood	NX	Interior Mixed Hardwoods
Shrub-Overstory					
Adenostoma fasciculatum	*Adenostoma fasciculatum*	CRC	Chamise-Red Shank Chaparral	CA	Chamise (Adenostoma fasciculatum)
	Adenostoma fasciculatum Serpentine	CRC	Chamise-Red Shank Chaparral	CA	Chamise (Adenostoma fasciculatum)
Adenostoma fasciculatum-Arctostaphylos glauca	*Adenostoma fasciculatum-Arctostaphylos glauca* Serpentine	MCH	Mixed Chaparral	C1	Ultramafic Mixed Chaparral
	Adenostoma fasciculatum-Arctostaphylos glauca-Salvia mellifera	MCH	Mixed Chaparral	CQ	Lower Montane Mixed Chaparral
Arctostaphylos glauca	*Arctostaphylos glauca-Quercus durata/Pinus sabiniana*	MCH	Mixed Chaparral	SD	Manzanita
Artemisia californica	*Artemisia californica*/Annual Herb	CSC	Coastal Scrub	SS	California Sagebrush (Artemisia californica)
	Artemisia californica-Lepidium squamatum/Annual Herb	CSC	Coastal Scrub	SS, RS	California Sagebrush (Artemisia californica), Alluvial Fan Sage Scrub
	Artemisia californica-Malacothamnus aboriginum	CSC	Coastal Scrub	SS	California Sagebrush (Artemisia californica)
Artemisia californica-Eriogonum fasciculatum	*Artemisia californica-Eriogonum fasciculatum-Ephedra californica*	CSC	Coastal Scrub	SS	California Sagebrush (Artemisia californica)
Artemisia californica-Salvia mellifera	Alliance only	CSC	Coastal Scrub	SS	California Sagebrush (Artemisia californica)
Atriplex spinifera	*Atriplex spinifera*/Annual Herb	ASC	Alkali Desert Scrub	BC	Saltbrush (Atriplex spp.)
Baccharis salicifolia	*Baccharis salicifolia-Lepidium squamatum-Hazardia squarrosa*	FEW	Freshwater Emergent Wetland	ML	Riparian Baccharis (Baccharis spp.)
Ceanothus cuneatus	Alliance only	MCH	Mixed Chaparral	CL	Wedgeleaf Ceanothus (Ceanothus cuneatus)
Ceanothus leucodermis	Alliance only	MCH	Mixed Chaparral	CC	Ceanothus Chaparral (Ceanothus spp.)
Cercocarpus betuloides	*Cercocarpus betuloides-Ceanothus cuneatus-Quercus john-tuckeri*	MCH	Mixed Chaparral	WM	Birchleaf Mtn. Mahogany
	Cercocarpus betuloides-Juniperus californica/Annual-Perennial Herb	MCH	Mixed Chaparral	WM	Birchleaf Mtn. Mahogany

Alliance	Association	Code	WHR	Code	CalVeg
Cercocarpus betuloides-Eriogonum fasciculatum	Alliance only	CSC	Coastal Scrub	WM, SB	Birchleaf Mtn. Mahogany, Buckwheat (Eriogonum fasciculatum)
Chrysothamnus nauseosus	*Chrysothamnus nauseosus-Juniperus californica*/Annual-Perennial Herb	DSC	Desert Scrub	BR	Rabbitbrush (Chrysothamnus spp.)
Ephedra californica	*Ephedra californica*/Annual-Perennial Herb	DSC	Desert Scrub	FD	Ephedra
	Ephedra californica-Gutierrezia californica/Eriastrum pluriflorum	DSC	Desert Scrub	FD	Ephedra
Eriogonum fasciculatum	*Eriogonum fasciculatum* var. *foliolosum*/Annual Herb	CSC	Coastal Scrub	SB	Buckwheat (Eriogonum fasciculatum)
	Eriogonum fasciculatum var. *foliolosum-Juniperus californica*/Annual-Perennial Herb	CSC, JUN	Coastal Scrub, Juniper	SB, JC	Buckwheat (Eriogonum fasciculatum), California Juniper (shrub or tree)
	Eriogonum fasciculatum var. *foliolosum-Yucca whipplei*/Annual-Perennial Herb	CSC	Coastal Scrub	SB	Buckwheat (Eriogonum fasciculatum)
	Eriogonum fasciculatum var. *polifolium/Eriastrum pluriflorum*	CSC	Coastal Scrub	SB	Buckwheat (Eriogonum fasciculatum)
Eriogonum heermannii	Alliance only	DSC	Desert Scrub	BA	General Barren
Eriogonum wrightii	*Eriogonum wrightii-Eriophyllum confertiflorum/Monardella antonina* subsp.. *benitensis*	DSC	Desert Scrub	DB?	Desert Buckwheat (Eriogonum spp.)?
	Eriogonum wrightii-Juniperus californica/Annual-Perennial Herb	DSC	Desert Scrub	DB?	Desert Buckwheat (Eriogonum spp.)?
Gutierrezia californica	*Gutierrezia californica*/Annual-Perennial Herb	CSC	Coastal Scrub	SS?	California Sagebrush (Artemisia californica)?
Juniperus californica	*Juniperus californica-Ericameria linearifolia*/Annual-Perennial Herb	JUN	Juniper	JC	California Juniper (shrub or tree)
	Juniperus californica-Fraxinus dipetala-Ericameria linearifolia/Annual-Perennial Herb	JUN	Juniper	JC	California Juniper (shrub or tree)
Lotus scoparius	Alliance only	CSC	Coastal Scrub	SQ?	Soft Scrub-Chaparral Mix?
Lupinus albifrons	Alliance only	CSC	Coastal Scrub	SQ?	Soft Scrub-Chaparral Mix?
Prunus ilicifolia	Alliance only	MCH	Mixed Chaparral	CQ	Lower Montane Mixed Chaparral
Prunus virginiana	Alliance only	MCH	Mixed Chaparral	CQ	Lower Montane Mixed Chaparral
Quercus berberidifolia	Alliance only	MCH	Mixed Chaparral	CS	Scrub Oak (Quercus spp.)
Quercus durata	*Quercus durata/Pinus sabiniana*	MCH	Mixed Chaparral	C1	Ultramafic Mixed Shrub
	Quercus durata-Adenostoma fasciculatum-Quercus wislizeni	MCH	Mixed Chaparral	C1	Ultramafic Mixed Shrub
	Quercus durata-Arctostaphylos glauca/Pinus sabiniana	MCH	Mixed Chaparral	C1	Ultramafic Mixed Shrub
	Quercus durata-Arctostaphylos glauca-Garrya congdonii/Melica torreyana	MCH	Mixed Chaparral	C1	Ultramafic Mixed Shrub

Alliance	Association	Code	WHR	Code	CalVeg
	Quercus durata-Arctostaphylos pungens/Pinus sabiniana	MCH	Mixed Chaparral	C1	Ultramafic Mixed Shrub
	Quercus durata-Cercocarpus betuloides	MCH	Mixed Chaparral	C1	Ultramafic Mixed Shrub
Quercus john-tuckeri	*Quercus john-tuckeri-Adenostoma fasciculatum*	MCH	Mixed Chaparral	CT	Tucker Oak
	Quercus john-tuckeri-Juniperus californica-Ericameria linearifolia	MCH	Mixed Chaparral	CT	Tucker Oak
	Quercus john-tuckeri-Juniperus californica-Fraxinus dipetala	MCH	Mixed Chaparral	CT	Tucker Oak
Quercus john-tuckeri	*Quercus john-tuckeri-Quercus wislizeni-Garrya flavescens*	MCH	Mixed Chaparral	CT	Tucker Oak
Salix breweri	*Salix breweri/Muhlenbergia asperifolia*	MCH	Mixed Chaparral	WL	Shrub Willow
Salvia mellifera	*Salvia mellifera-Eriogonum fasciculatum* var. *foliolosum-Eriodictyon tomentosum*	CSC	Coastal Scrub	SP	Sage (Salvia spp.)
Tamarisk	*Tamarisk*	VRI	Valley Foothill Riparian	UT	Tamarisk (Tamarix spp.)
Herbaceous					
Achnatherum hymenoides	Alliance only	PGS	Perennial Grass	HM	Perennial Herbs
Carex spp.	*Carex* spp.*-Juncus mexicanus-Leymus triticoides*	WTM	Wet Meadow	HJ	Wet Grass/Herbs
Eleocharis macrostachya	Alliance only	WTM	Wet Meadow	HJ	Wet Grass/Herbs
Elymus multisetus	Alliance only	PGS	Perennial Grass	HM	Perennial Herbs
Eriogonum nudum	*Eriogonum nudum* var. *indictum-Eriogonum vestitum*	CSC	Coastal Scrub	DB?	Desert Buckwheat (Eriogonum spp.)?
Juncus mexicanus	*Juncus mexicanus*	WTM	Wet Meadow	HJ	Wet Grass/Herbs
Phragmites australis	Alliance only	WTM	Wet Meadow	HT	Tule-Cattail
Rumex hymenosepalus	Alliance only	PGS	Perennial Grass	HM	Perennial Herbs
Typha latifolia	Alliance only	FEW	Fresh Emergent Wetland	HT	Tule-Cattail
Upland Annual-Perennial Herbaceous	Habitat only	AGS, PGS	Annual Grassland, Perennial Grass	HG, HM	Dry Grass/Herbs, Perennial Herbs
Vernal Pool	Habitat only	WTM	Wet Meadow	HJ	Wet Grass/Herbs
Vulpia microstachys	*Vulpia microstachys-Plantago erecta*	AGS	Annual Grassland	HG	Dry Grass/Herbs
Rock-Barren					
Lichen-Moss	Habitat only	BAR	Barren	BA	General Barren
Sparsely vegetated	*Pinus coulteri* Barren	BAR	Barren	BA	General Barren
	Pinus jeffreyi-Pinus sabiniana Barren	BAR	Barren	BA	General Barren
	Pinus sabiniana-Pinus coulteri Barren	BAR	Barren	BA	General Barren