PENINSULA OPEN SPACE TRUST
PHOTO INTERPRETATION AND MAPPING
CLASSIFICATION REPORT

Prepared for Peninsula Open Space Trust
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TABLE OF CONTENTS

PENINSULA OPEN SPACE TRUST
VEGETATION MAP

I. INTRODUCTION

Aerial Information Systems (AIS) was contracted by the Peninsula Open Space Trust (POST) to create a vegetation inventory of the area located between San Gregorio and Pescadero Creeks in San Mateo County. The vegetation inventory is compatible with the Midpeninsula Regional Open Space District's (MROSD) Purisima Creek Redwoods vegetation inventory that was performed by AIS in 2005.

The mapping area includes approximately 20,800 acres of coastal plain, foothills and mountains south of San Francisco in the Santa Cruz Mountains. Its western boundary roughly follows the mean high water line of the shore, and on the east by property boundaries near Skyline Boulevard along the summit of the Santa Cruz Mountains. The Northern boundary forms an edge to the previously mapped Purisima study area just south of highway 84. The southern boundary is located just north of the Cloverdale Coastal Ranches.

Included in the study area are several ranches, including Pomponio and Michelson Ranch, both in the eastern portion of the mapping area. Several state parks are adjacent or nearby the mapping area and include Big Basin Redwoods & Butano State Park, Pescadero and Bean Hollow State Beaches, and Memorial & Pescadero Creek County Parks.

The major drainages in the study area are listed below:

Honsinger Creek
Pomponio Creek
Pescadero Creek
Butano Creek

II. REGIONAL DESCRIPTIONS

Pomponio Creek drains the northern portions of the mapping area from the Pomponio Reservoir in the eastern portion west to the coast where it terminates in a small estuary just south of Pomponio State Beach.

The central portions of the mapping area is drained by the Pescadero Creek where it terminates in the eastern edge of the Pescadero Marsh National Preserve, a large salt marsh located just outside the western most portions of the study area. Honsinger Creek is a major tributary to the Pescadero Creek running south where they join just east of the town of Pescadero.

Butano Creek is located in the southern section of the study area, running northwest through an extensive willow forest and eventually draining into the southern portions of the Pescadero Marsh National Preserve.

Elevations range from sea level, where steep bluffs ascend to the coastal plains approximately 100 to 200 feet. From there the coastal plain eventually gives way to the foothills of the Santa Cruz Mountains where the highest elevations (just under 1600') are located in the eastern edges of the mapping area on the Butano Ridge.

Vegetation Trends in the POST Study Area

The following section describes the trends that were observed during the mapping process.

Riparian Stands

Riparian communities vary considerably both floristically and structurally within the mapping area based on a number of environmental and geophysical factors including the size of the watershed, its directional configuration, steepness and associated disturbance related activities.

Generally, the smaller drainages, springs and seeps have less diversity of woody vegetation and are often comprised of pure stands of shrubby low growing arroyo willow. Larger watersheds that are still somewhat confined to steeper canyon side slopes contain stands of red alder, big leaf maple and California bay and are often just down slope from extensive stands of coast redwood. Good examples of these communities occur along the eastern portions of the study along Butano Creek where it drains out of Butano State Park. As the larger rivers and creeks enter the coastal plain, the riparian community becomes more varied and often contains a complex mosaic of box elder and red alder, in addition to several species of willow. Further complicating the riparian communities in this area are patches of California bay, and buckeye, which often form narrow bands close to the active floodplain edge. Only the big leaf maple looses significance downstream in these areas. Further downstream, just before the two major streams in the south drain into the Pescadero salt marsh, Fremont cottonwood and mixed willow communities dominate the tree canopy and red alder becomes only a minor component to the stand. Here, the riparian stands form broad extensive forests containing a complex mosaic of tree willows and cottonwoods dominating or co-dominating the stand, generally with smaller amounts of red alder.

Small meadows and freshwater marshes are numerous throughout the study, occurring along the fringes of farm ponds and reservoirs and in small depressions and swales on the coastal plain.

Central and Western Sections

For purposes of this study, the western sections include the coastal plain and lower foothills below the extensive conifer forests located in the higher elevations of the Santa Cruz Mountains. Much of the area is farmed or urbanized, especially south of Pescadero Creek. Some of the farmed areas ascend the lower slopes and contain planted feed crops of single species grass such as *lolium* or *avena.* Much of the non-urbanized portions of this zone contain extensive stands of annual grasses often with a sparse component of coyote brush. Other north coastal scrub species such as red elderberry, blackberry, poison oak or wax myrtle are locally common on mesic trending slopes.

Included in this region are the coastal bluffs and the coastal plain where small patches of the rare coastal prairie habitat still exist. On these prairies, sparse stands of dwarf coyote brush form a layer over an array of annuals, many of which are native species.

Much of the lower foothill slopes are dominated by annual grasses including species from the following genera: *bromus, hordeum, lolium, avena and/or vulpia.* On lower exposed slopes, small stands of coast live oak are common along with buckeye on adjacent steeper slopes. Blue blossom chaparral also forms small patches often adjacent to the hardwood stands. Introduced invasive grasses (including Harding and pampas grass) are common, especially in the southwestern portions of the mapping area but are generally less than 1 acre in size.

Coyote brush is by far the most common shrub species in this zone and occurs in a number of habitats from mesic to xeric on a variety of slopes. Stands vary considerably in both structure and cover density and also share dominance with a number of other coastal scrub species such as lizard tail, monkey flower, California sagebrush and poison oak.

Eastern Section

The eastern section of the study includes the mid and upper slopes of the Santa Cruz Mountains generally above 500' in elevation as well as the eastern portions of the major river valleys within the range. This section is the region of highest rainfall and includes zones of summer fog-drip, which supplement summer drought especially in the conifer belt.

Conifers by far form the most extensive habitats in the eastern portions, and all but the driest and steepest exposures are forested by large stands of Douglas-fir and coast redwood. Douglas-fir dominated forests often are found on less mesic environments upslope from protected hollows and riparian zones where coast redwood dominates. Coast redwood again becomes more prevalent upslope from the Douglas-fir stands on gentler slopes along ridges in the fog-drip zone. The drier conifer sites contain Douglas-fir co-dominating with hardwoods such as coast live oak and are found on lower south trending slopes above the floodplain.

Several stands of tanoak may still exist along narrow ridges along the eastern portions of the mapping area and are a minor component to both Douglas-fir and coast redwood forests. Stands believed to be tanoak were flagged for the ecologist, but as of yet have not been answered; these polygons are still flagged for potential future field verification. Sudden oak death is a contributing factor to the decline of this community in stands previously mapped in the MROSD.

In this region, the extensive stands of coyote brush scrub found in the west are replaced by small openings in the forest canopy containing dense stands of manzanita-dominated chaparral. These stands are mainly sensitive manzanita but quite possibly are stands of the rare King Mountain manzanita. These two species of manzanita are not separable on the imagery, nor can they be modeled out at this time using biophysical parameters or plot data. The field ecologist has verified several mapped stands. Unverified stands remain flagged for future field verification, which may aid in corroborating these two unique manzanita communities.

III. SUMMARY OF THE MAPPING EFFORT IN THE POST STUDY AREA

The following is a brief outline of the mapping effort:

March 2007:
- Final contract implemented.
- POST data layers and digital imagery delivered to AIS.
- Aerial photographs delivered to AIS.

March 2007:
-Preliminary mapping classification refined (using MROSD's master classification).

April 2007:
- 2-day field reconnaissance with Chris Detwiller (POST Project Manager), Sarah Allen (POST Land Specialist), Stella Cousins (MROSD Open Space Planner & Field Ecologist), John Menke and Anne Hepburn (AIS photo interpreters).
- Received additional digital imagery from MROSD (flown in September 2003), used as ancillary data.

May 2007:
- Preliminary mapping descriptions completed.
- Initial draft vegetation map and field questions completed and sent to POST for field questions/verification by Stella Cousins.

June 2007:
- Answers to field questions received.
- Updates and final QC to preliminary map performed.
- Final maps, report and data sent to POST.

IV. VEGETATION MAPPING CRITERIA AND METHODOLOGIES

Vegetation mapping procedures include first conducting an initial field reconnaissance that establishes relationships between plant communities and biophysical attributes. Aerial photo signatures (color-tone-texture combinations that the photo interpreter views on the hard copy or digital photo) are then correlated to their corresponding plant communities or plant species viewed in the field.

A preliminary mapping classification and photo interpretation (PI) signature key are then developed using information derived from the field reconnaissance and any existing field plot data and vegetation classifications used in previous mapping efforts.

Initial vegetation units are then heads-up digitized directly into an ARCEDIT coverage reflecting a wide variety of habitats throughout the study. After the initial draft map is complete; the draft coverage is sent to the field ecologist for general quality assurance and to answer any questions from the photo interpreters. The photo interpreters then correct final inaccurate calls and extrapolate to other possible existing errors of similar photo signature correlates. A final in-house QC is then performed; geographic information systems (GIS) related procedures are completed and a final report and plot is made.

Minimum Mapping Unit - Vegetation Complexing Issues and Inclusions

A general guideline of ½ hectare was used as a minimum polygon size for delineating a visible alliance, association or vegetation mapping unit. Wetlands are the exception to this minimum mapping unit (MMU), and are mapped below MMU in some cases.

It is important to note that small inclusions of vegetation communities that may exceed ½ hectare when ecotones and gradations are included are a normal part of any vegetation map. The vegetation boundaries delineated on the digital imagery represent the photo interpreter's estimate at defining the modal break point between two communities, whether at a detailed association level of mapping or at a more general habitat level. When assessing the accuracy of a vegetation polygon, it is important to review the entire polygon for its accuracy, not just a small sample within that unit. Below are several examples of what might be considered vegetation lines dividing communities representing gradual continuous ecotones:

- Douglas-fir to Douglas-fir/coast live oak
- Coyote brush mesic to coyote brush xeric
- Annual grasslands to coyote brush open stands

Alliance / Association / Mapping Unit Assignments

The assignment of alliance and associations to the vegetation is based on the California Native Plant Society's Manual of California Vegetation. In the case of the POST study area, photo interpreters and plant ecologists decided which communities were mappable at either an alliance or ***potential*** association level.

Normally, associations must be supported with several surveys taken in the field (rapid assessment plots) and the data run through a vegetation analysis classifier program such as Two-Way Indicator Species Analysis (TWINSPAN). Results from the program are then analyzed and unique floristic communities are then described and placed into a key. The results are variants within the alliance, which may be defined as an association. Associations may be defined by key indicator species, which are not visible to the photo interpreter. In order to achieve association-level mapping, detailed plot data should be conducted in the study.

Mapping units were derived for types that could not be distinguished on the imagery at the alliance level or below, or that could not be defined in the field into any given alliance. These mapping units may be noted as two or more alliances or "super alliances" which commonly co-occur in the study such as coyote brush and blue blossom. Other mapping units may be more habitat derived such as coastal bluff scrub, which may encompass a number of alliances.

V. MAPPING CRITERIA SPECIFIC TO POST

Every effort was made to delineate invasive stands of pine, cypress, blue gum, Harding grass and pampas grass below the MMU. In addition, wetlands were delineated below MMU when either visible on the photography, or substantiated with field efforts. Linear wetlands that were often extremely narrow were also delineated when visible on the photography.

Digital Imagery and Aerial Photography

This project was mapped using the heads-up digitizing approach. Using digital imagery, the vegetation map was created by digitizing directly onscreen using ESRI software. There were three sets of digital imagery and one set of aerial photographic hard prints used for this project, and all are described below.

- **December 2005 imagery, mapping signature base**
  The natural color set taken in December 2005, with a resolution of one meter, was used as the base imagery for the photo signatures. Since this is the most recent imagery used on the project, this ensures that the most recent changes are mapped.

- **December 2003 imagery, spatial base**
  The natural color set taken in 2003, with a resolution of 1 meter, was used as the spatial base for this project. This imagery was determined to have a more accurate registration than the set of imagery from 2005, thus the reason for using it as the spatial base .

- **September 2003 imagery, ancillary**
  The third set of imagery has been used to map previous projects for MROSD. Given to AIS by MROSD, the natural color set taken in September 2003, with a resolution of 2 meters, was used as ancillary imagery.

- **March 2000 stereo-paired aerial photos, ancillary**
  Sometimes stereo viewing was necessary to discern subtle differences in the vegetation stands and in these situations the aerial photographs were used. Approximately 27 1:24000 natural color 9x9 aerial photographs (hard copy prints) were used to assist in interpreting vegetation within the study. The photography was flown in late March of 2000 following a lower than average rainfall year. Conditions were generally in leaf off for most of the cold season deciduous species; little if any spring flush was noted on the broad leaf evergreen species and initial greening of the annuals was well under way. Although the photography was excellent for interpreting many communities to a sub alliance level (exceptions within the herbaceous types), it was only used for ancillary purposes since the heads-up mapping method was used for this project.

Vegetation Mapping Study Area

Every effort was made to delineate beyond the required study area boundaries into adjacent public owned lands and private in-holdings. This was done in order to facilitate GIS analysis without gaps and to ensure a complete map without "doughnut holes" of non-mapped data. A comprehensive administrative boundary was provided in digital format to aid in placing the study area boundary. AIS did refine the study area boundary in some locations, which is described in detail below, under the heading titled Changes In the Study Area Boundary.

Line and code edge matching efforts were done along the northern edge to the adjacent Purisima Creek Redwoods and the La Honda preserves, both owned by MROSD. Since the POST project was mapped more recently using slightly different mapping criteria, a perfect match could not be obtained between POST and the MROSD, but every effort to match as close as possible was made. Code inconsistencies along the boundary exist in a few spots (one temporal related change from grain related crops to annual grasses), however linework does match between the two mapping areas for the most part.

Changes In the Study Area Boundary

AIS extended the northern study area boundary so the vegetation maps for La Honda and Purisima Creek Redwoods (properties of MROSD) and the POST vegetation map match seamlessly. This meant including an extra 400 acres into the POST study area in the northern section alone, so that there would not be any unmapped slivers between the POST and the MROSD properties. There are also discrepancies between the USGS topography maps (used in digital raster graphic format) and the POST project study area boundary. A few of the noted problems are that the study area boundary doesn't conform to state park boundaries, and the western edge boundary is not "straight". AIS only fixed the obvious discrepancies along the POST study area boundary, and moved it to conform to more obvious features such as roads – especially in the southwestern portion of the study area.

Field Reconnaissance

A two-day field reconnaissance effort was conducted in April 2007. The field reconnaissance crew consisted of:

- Chris Detwiller (POST Project Manager), Day 1
- Stella Cousins (MROSD Open Space Planner, Field Ecologist), Days 1, 2
- Sarah Allen (POST Land Specialist), Day 2
- Anne Hepburn (AIS Photo Interpreter), Days 1,2
- John Menke (AIS Photo Interpreter), Days 1,2

Prior to the field reconnaissance, several in-house preparations were performed in order to facilitate a more organized trip. Photo interpreters reviewed the imagery and delineated questionable signature areas and signature types into a draft initial coverage to be used by AIS for reference throughout the trip. Hard copy digital maps showing the imagery with these preliminary delineations of photo signatures were then produced for use in the field. POST and MROSD staff prepared and provided hard copy maps of the study area with the digital imagery that was used to help aid the field reconnaissance.

The field crew conducted on-site investigations during the field reconnaissance trip. During the field visit, the photo interpreters from AIS worked with Stella Cousins to identify the plant species, preliminary vegetation communities, and their photo signatures throughout the study. Sites on the hard copy maps, in addition to other areas not delineated in-house were visited and described in the field. Locations of remote sites were derived from the in-stand location, taken using a GPS and subsequently shot with a range finder (determining distance to remote site) and compass (determining the bearing to the remote site). The sites that were described included areas of initially selected sites, areas of noteworthy or unusual significance as determined by the field ecologist, and areas the photo interpreter deemed important in transit from site to site.

Preliminary Photo Interpretation

Photo interpretation is the process of identifying map units based on their photo signature. All land cover features have a photo signature. These signatures are defined by the color, texture, tone and pattern they represent on the aerial photography. By observing the context and extent of the photo signatures associated with specific vegetation types, the photo interpreter is able to identify and delineate the boundaries between plant communities or signature units. Additional collateral sources (existing vegetation maps, supplemental photography, soil data, etc.) can be of great utility to the photo interpreter. Understanding the relationship between the vegetation and the context in which it appears is useful in the interpretation process. Familiarity with regional differences also aids interpretation by establishing a context for a specific area.

The methodology used in this study involved a heads-up digitizing approach in an ARCEDIT session with one set of digital imagery used for the photo signatures (natural color flown in December 2005 with a resolution of approximately 1 meter) and one set of digital imagery used for spatial reference (natural color flown in December 2003 with a resolution of approximately 1 meter). Ancillary imagery was also used when necessary. Menu functions developed for this project enabled the photo interpreter to window in and out at varying scales while delineating the vegetation stands. The photo interpreters had the options of overlaying existing contour data, streams, farm data, and waypoint data taken by AIS during field reconnaissance. All normal GIS functions were available to the photo interpreter through menus located adjacent to the displayed image. In addition, photo interpreters were able to assess the size of each of the polygons delineated in order to conform to the minimum mapping unit rules.

Using a mirror stereoscope, with a 3X3 lens, photo interpreters further assessed stands of vegetation using the existing hard copy aerial photos. The aerial photos were especially helpful in separating out stands of coast redwoods and Douglas-fir and to get a better feel for the slope characteristics that the vegetation stand occurred in.

Photo interpretation did not begin actual production until after the initial field reconnaissance visit. Photo interpreters must use the reconnaissance trip as a tool to train on the signatures that are pertinent either to the special interests of the POST, or to differentiating the communities and alliances. Without this fundamental knowledge, photo interpreters will either miss what is supposed to be a meaningful distinction between two communities, or delineate areas, which may be of no significant ecological interest, but may yield a difference in signature on the photos. One obvious example is a signature difference reflecting the varying health (greenness) of vegetation within annual grass types. This wide variation in colors within the annual grasses is not addressed as polygon delineations for this project.

Approximately two weeks of pre-production training enabled a consistency in mapping throughout the study area between photo interpreters. Consistencies were addressed regarding minimum mapping unit, what represented a stand of vegetation and what defined a particular mapping class. Frequent interim quality control checks were performed to ensure consistency throughout the mapping effort.

Field Question Methodology

During the mapping process, the photo interpreters encountered questionable signatures that were not substantiated by prior mapping experience or field reconnaissance data. These polygons were flagged for the ecologist by assigning a field check value of 1 to the fieldck field in the database. In order to conduct quality control of the area, the photo interpreters also flagged polygons that were examples of good stand types for each vegetation type that was mapped for the POST area. A unique field question number was also assigned to every polygon that was flagged for the ecologist to review on the ground. If a polygon has a PI code of 9999, then this indicates that the photo interpreters did not feel confident in assigning a specific vegetation code.

There are also polygons with a fieldck value of 1 that have specific vegetation codes in the label instead of the 9999 code. An example of this would be the polygons that were coded as tanoak-(California bay) multiple alliance mapping unit (code 1140). Based on the other areas that AIS has mapped in this region in the past, the photo interpreters felt confident enough to label these polygons as tanoak, but would prefer that the ecologist verified these polygons.

Field check values are listed as fieldck field in the database, and the values are described below:

Fieldck = 0: Polygon not flagged for question or observed in the field
Fieldck = 1: Polygon is flagged for field check or verification
Fieldck = 2: Polygon has been checked by ecologist
Fieldck = 4: Area was observed by the field reconnaissance team

An excel spreadsheet was created that listed the polygon ID number, the vegetation code, the unique field question number assigned to the polygon, and any additional comment regarding the polygon. This document was sent along with the preliminary vegetation inventory database (that also contained all the information in the spreadsheet) to the ecologist for the field question/ quality control effort.

Answering Field Questions and Quality Control of the Interim and Final Draft

Stella Cousins of MROSD conducted quality control and answered the photo interpreter's field questions in June 2007 for the POST project. Feedback from Ms. Cousins in the form of notes in the aforementioned excel document replaced the normal verification efforts used in standard AIS mapping procedures where the photo interpreters performed the task themselves.

Approximately 70 out of the 220 field questions were answered. AIS left the remaining questionable polygons flagged as such (indicated by a fieldck field of 1) for any potential future efforts. This means that approximately 150 polygons are still flagged for field checking. Due to access problems, none of the polygons coded as tanoak were checked during this part of the project. As a result, all the polygons are coded as tanoak but have a fieldck value of 1 to indicate that the photo interpreter did not feel 100% confident in calling them tanoak without having it confirmed on the ground.

After the ecologist performed the quality control and answered the photo interpreter's questions, the answers were input into the spreadsheet and sent back to AIS. After implementing the answers in each polygon, the fieldck value is changed from a 1 to 2, indicating that that ecologist has verified the polygon.

Significant changes to the draft map and mapping classification are listed below:

While performing the field reconnaissance, there was a questionable signature that was thought to be manzanita, but since the team could not get close enough to evaluate it, it was not certain. Based on previous projects mapped in the area, this signature resembled Kings Mountain manzanita. AIS labeled the polygons with this signature as Kings Mountain manzanita (code 3107). Upon closer examination of limited areas, the ecologist discovered that it was not Kings Mountain manzanita, but was identified as sensitive manzanita instead. These areas are difficult to get to on the ground, so only a few polygons were checked. The ecologist recommended that the polygons that AIS had called Kings Mountain manzanita be recoded for sensitive manzanita, but note that these polygons could potentially contain Kings Mountain manzanita as well. These polygons have been relabeled as sensitive manzanita alliance (code 3175).

After the field questions were answered, AIS proceeded with the final revisions to the photo interpretation line work and labels. Other polygons with similar signatures that may have needed changing were also reviewed based on QC notes. The in-house quality control effort was completed. The quality control effort included the coverage being checked for completeness, consistency, and adherence to the mapping criteria and guidelines.

VI. FINAL GIS-RELATED PROCEDURES

Heads-up approach photo interpretation allows for minimal conversion procedures to the final product. The study area was broken into smaller pieces, and separate coverages were created which enabled two photo interpreters to work on the project.

Coverage Editing and Line Refinement

A line cleanup was performed. Once the line work passed the acceptance standard, all polygons were closed off to create topology. Coverage integrity was checked for open polygons, unlabeled polygons, unnecessary lines or missing lines and duplicate labels. For the POST project, there are few polygons that are next to each other that contain virtually the same coding structure with the exception of the fieldck field. One polygon is flagged for a field check and the other is not. By retaining the fieldck value of 1, it directs the field ecologist to the specific area in question if the polygon is verified in the future.

Valid Code Checks

A frequency was run on the final product to check for invalid codes and global searches were performed throughout the region to ensure spatial accuracy of coding.

Quality Assurance of the Final Draft Map

The final draft map underwent a quality assurance review. The coverage was reviewed for line placement and code accuracy and overall consistency.

VII. DATA DICTIONARY – PENINSULA OPEN SPACE TRUST STUDY AREA

Data Format Outline:

Variable Structure:

FIELD NAME	WIDTH	TYPE
Area	19	F
Perimeter	19	F
Veg62807_	11	N
Veg62807_I	11	N
PI	4	I
Density	2	I
Landuse	4	I
Comment	200	C
Fieldck	1	I
AIS_ID	5	I

Data Dictionary Defined Fields

PI: 4-digit code to indicate the vegetation type mapped (see classification)
Density: Defines the density of the life form of the mapped alliance/mapping unit category
Landuse: Numerically defines the land use for polygon
Comment: Used for field check references
Fieldck: Value for field check status
AIS_ID: Unique numeric ID for each polygon

File Specifications

- Shape File

Coordinate System Used

- NAD83 UTM projection – Meters
- Zone 10

VIII. DATA SETS USED

The following data sets and the agencies where they came from were used for the POST study area:

- **Digital Elevation Models – USGS**
  30 Meter derived from USGS 7.5 Minute Quadrangle Maps

- **Digital Ortho-photo Quarter Quad Images – USGS**
  Scanned from December 2005 aerial photography – 1 meter

- **Digital Ortho-photo Quarter Quad Images – USGS**
  Scanned from December 2003 aerial photography – 1 meter

- **Digital Ortho-photo Quarter Quad Images – USGS**
  Scanned from September 2003 aerial photography – 2 meters

- **Natural Color Stereo-paired Aerial Photography – WAC Inc.**
  March 2000 -1:24000

- **Streams and Water - POST**

- **Streets-Roads-Trails – POST**

- **Farmlands Map – State of California - Department of Water Resources**

- **Field Reconnaissance Waypoints – compiled by AIS on April 2007 field reconnaissance trip**

APPENDIX A

DESCRIPTIONS OF MAPPING TYPES FOR THE POST STUDY AREA

1000 – FORESTS

1140 – Tanoak – (California Bay) Multiple Alliance Mapping Unit

Less than 10 polygons were coded as tanoak – (California Bay) multiple alliance mapping unit. These polygons are still flagged for review on the ground by the POST staff.

1150 – Eucalyptus Alliance

Distribution:

- Abundant in a wide variety of stand structure and stand size. Best developed stands are in the southwestern portion of the study north of Pescadero along Bradley Creek.

Environmental Characteristics:

- No slope or environmental correlations can be determined in this study. Disturbance related and expanding out from edges of the stand.

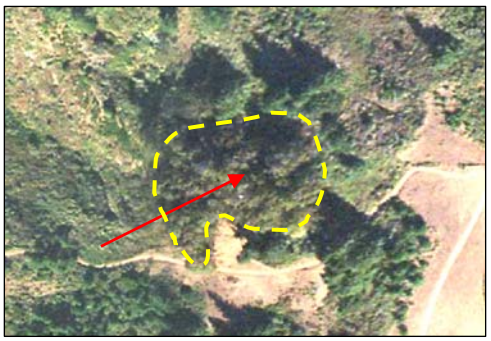
Description:

- Usually found in linear patterns near homes or along roads, although some stands are too small to be mapped. Blue gum is often the dominant and the only species distinguishable on the aerial photography.

Photo Interpretation Signature:

- Eucalyptus trees appear tall and range from a dark brown to a dark green color on the imagery, depending on leaf conditions.

Note billowy crown in this closed canopy example.



Color and texture remains fairly constant within the stand.

1151– Blackwood Acacia Alliance

Stands are found locally and uncommon in small patches below the minimum mapping unit. Noted as an invasive especially in riparian corridors such as Butano Creek. Blackwood acacia dominates the stand in riparian corridors often adjacent to red alder or box elder, but not expansive enough to be delineated alone in this environment. The only stands mapped are in a plant nursery. Photo interpretation signature was not established due to small stand size. Based on field ecologist's notes, less than 5 polygons mapped in this study area, specifically on a nursery's property.

1200 – Temperate Needleleaf Evergreen Forests

1201 – Planted Stands of Pine

Distribution:

- Fairly common in small to medium stands; often in rows especially near the coast and adjacent to large estates. Several good examples mapped along Cloverdale Road.

Environmental Characteristics:

- Generally found in disturbance related settings; sometimes adjacent or near blue gum stands.

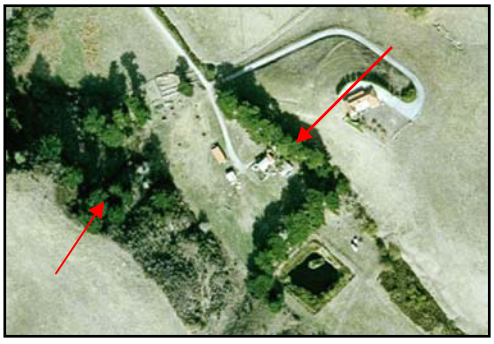
Description:

- Planted stands of non-native exotic species located along roads and close to homes. Some stands are below the minimum mapping unit (mmu). Density is high, close to 90% crown cover in most cases. Most species include Monterey pine and/or Monterey cypress.

Photo Interpretation Signature:

- Trees are variable in crown shape and size but generally form linear patterns often occurring along road and property boundaries. Shades of green vary according to what species of pine has been planted.

An example of a small stand of Monterey cypress on a hillside overlooking the ranch (see corresponding aerial photo below).



Example includes linear stands along with natural stand as depicted above.

1210 – Redwood Alliance

There are less than 10 stands mapped in the study area, occurring in the eastern edge of the study area. This code was used to delineate polygons that are either pure or dominated by coast redwood (containing over 85% coast redwood).

1211 – Redwood / Tanoak (Madrone) Mapping Unit

Distribution:

- Common in the eastern portions of the POST property. Extensive stands occur along Butano Creek south of Dearborn Park and along Pescadero Creek east of Loma Mar. Smaller stands occur along McCormick Creek.

Environmental Characteristics:

- Found in riparian settings at lowest elevations towards the western portions of their range. Extends upslope on to north facing aspects at higher elevations where fog drip adds a significant component of the total annual precipitation.
-

Description:

- Although coast redwoods dominate the canopy, tanoak is a subordinate or co-dominant tree; California bay or madrone may also be present in the stand. Alder or maple may also be a subordinate species under the canopy along the stream edges. Douglas-fir may be a minor component to one or more layers of the canopy.

Photo Interpretation Signature:

- Coast redwoods are an olive green color on both the aerial photos and DOQQs. Trees are tall, often emergent to the main canopy and have a variable crown shape. Mature trees have large crowns extending well above the upper half of the tree. Younger trees often form clonal looking patterns of several individuals. Tanoaks tend to have very narrow crowns and form dense canopies; however, many of the stands have opened up due to sudden oak death. Most tanoak trees are not visible since they usually grow as an understory layer to the conifers.

Coast redwood noted in the southeastern portions of this image as a yellow-green signature. Northwestern portion of the image is dominated by Douglas-fir.

Note how crowns maintain broad structure well up into the upper portions of the crown.

1220 – Douglas-fir Alliance

Distribution:

- Extensive stands occur throughout the entire study area with the exception of close proximity to the coast.

Environmental Characteristics:

- Generally found in more xeric settings than coast redwood, usually located on lower ridges and mid-slope settings below the fog drip zone and above the protected concavities and lower slopes

Description:

- Can be found in dense patches dominated by Douglas-fir or in a disturbed or open setting where Douglas-fir is emergent to an understory of grass or shrubs.

Photo Interpretation Signature:

- Photo signature contains the dark green (nearly blue green) color of the Douglas-fir. Mapped to the alliance level in this study since associated hardwoods could not be seen nor modeled in this effort.

1221 – Douglas-fir - / Mixed Hardwoods Mapping Unit

Distribution:

- Extensive stands occur throughout the eastern portions of the study, best developed on north facing slopes southwest of Dearborn Park. Most stands tend to be west of the coast redwood forests.

Environmental Characteristics:

- Generally found in more xeric settings adjacent (usually upslope) to redwood-Douglas-fir mixed conifer forests. Common in small stands closer to the coast in more protected settings.

Description:

- Douglas-fir dominates the forest canopy with hardwood species generally occurring as a minor component, depending on elevation as well as environmental aspect. On lower more protected slopes, California bay is often a subordinate species, while tanoak and madrone will often occur upslope. Mapped where Douglas-fir makes up at least 80% of the relative conifer canopy cover and hardwoods make up at least 10-20% of the overall tree canopy. When Douglas-fir falls below a 10-20% conifer component to associated hardwoods, it is mapped as a hardwood type.

Photo Interpretation Signature:

- Photo signature contains the multiple green colors of a typical mixed conifer-hardwood forest, with the dark green (nearly blue green) color of the Douglas-fir emergent to the mixed hardwoods. Hardwoods are often not visible when they are in the secondary canopy layer but are more visible toward the edges of the stand or where the stands open up.

On this example stands contain variable crown shape opening up extensively in areas, possibly from sudden oak death. Younger trees are visible toward the western edge.

Example of a fairly open stand with mature and young Douglas-fir trees and some madrone.

1223 – Douglas-fir – Coast Redwood Association

Distribution:

- Fairly extensive stands in the eastern portions of the POST properties, especially on mid and upper slopes southeast of Loma Mar and on the slopes southeast of Dearborn Park

Environmental Characteristics:

- Generally found on drier settings (upslope) from more mesic pure redwood forests.

Description:

- Mixing of these two conifers do not generally cover large areas, however on POST properties, some of the largest stands occur on the peninsula. Mapped where either conifer contains at least 10-20% relative canopy cover. Hardwood species are more common in the understory tree layer.

Photo Interpretation Signature:

- Mature Douglas-firs generally have a branching crown with a dark green to blue green color. Coast redwood trees are also tall, but their crowns have a fuller shape and they are a much lighter color of green than the Douglas-fir. Older individuals of either species are more difficult to distinguish, as their colors are less distinct.

In this example, Douglas-fir dominates the upper center of the image while coast redwood forms dense patches in the north east & southwest corners.

Coast Redwood

Douglas-fir

Looking southwest towards a stand dominated with Douglas-fir with a significant component of coast redwood on the lower slopes.

1225 – Douglas-fir – Coast Live Oak Mapping Unit

Distribution:

- Fairly common in small to medium stands – good examples on southeasterly slopes west of Newell Gulch and south of Windmill Gulch.

Environmental Characteristics:

- Noted on somewhat exposed southwest to southeast trending slopes.

Description:

- Dense to open stands of Douglas-fir with at least a 10% cover of coast live oak. Other hardwood species, especially madrone and California buckeye can be important in the canopy.

Photo Interpretation Signature:

- Douglas-fir signature stands out adjacent to the more rounded crown of the coast live oaks and madrone. Often, hardwoods will become more dominant towards the edges of the stand or adjacent to openings in the canopy. In open settings, Douglas-fir trees tend to have a broad and irregular shaped crown.

On this image, Douglas-fir is visible as an emergent to the dominant hardwood stand. Note the crown shadows at the stand edge.

This picture depicts an open stand with a mixed conifer-hardwood component on a concave to convex southerly exposure.

1300 – Temporarily Flooded Cold Season Deciduous Forests

Note: Several stands mapped to this more general level where photo interpreters could not distinguish species dominance.

1310 – Mixed Willow Alliance Mapping Unit

Distribution:

- Common in the major drainages in the western portions of the study; best developed example occurs where the riparian corridor opens to a broad flood plain just inland from the Pescadero Marsh Natural Preserve.

Environmental Characteristics:

- Found on larger watersheds; generally off slopes where arroyo willow tend to dominate.

Description:

- At least two species of willow dominate; often with a component of cottonwood and red alder in the canopy.

Photo Interpretation Signature:

- December imagery shows gray to white in leaf off conditions; September imagery yields a dark green signature with some leaf change detection in the alder and cottonwood.

This example contains both arroyo and yellow willow with minor components of both red alder and cottonwood.

Example photo depicts both arroyo and yellow willow with some alder in the background.

1330 – Arroyo Willow Alliance

Distribution:

- Widely distributed throughout the study area.

Environmental Characteristics:

- Common in riparian settings that are at least seasonally flooded, often on upper drainages and in seeps or springs.

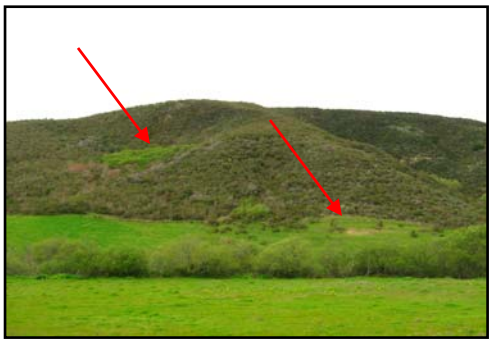
Description:

- Arroyo willow is the dominant willow in riparian stands. Usually occurs in drainages that feed into larger creeks containing other riparian tree species such as red alder. Alder or other willow species may be a minor component to willow drainages, generally less than 10% relative cover.

Photo Interpretation Signature:

- Generally bright green and shorter in stature than other willow species in this study. Mapping the willow in the shadow of tall stands of eucalyptus can result in minor positional errors towards the stand edge in those areas.

Stand running southeast to northwest through the center of the image; arroyo willow dominates with some alder.



Narrow bands are typical expressions for this shrub willow species; also note stands on mountain slopes above.

1340 – Red Alder Alliance

Distribution:

- Found throughout the study area; best examples are along Pescadero and Butano Creeks.

Environmental Characteristics:

- Common along perennial stream courses in somewhat narrower channels than mixed willow stands where alder may only form a minor component to the riparian vegetation.

Description:

- Stand cover is generally closed; red alder dominates or co-dominates the canopy often with a significant component of willow. In areas adjacent to conifer forests, big-leaf maple can be an important component to the riparian stand.

Photo Interpretation Signature:

- Tall, narrow, bright green trees with narrow crowns is the normal signature in early spring conditions (aerial photography – March 2000). PI signature on the early fall imagery depicts early leaf change conditions against the still green willow. December imagery stands can be recognized by the larger crown size than adjacent willow. Young alders are not distinguishable from willow.

Red alder runs through the center of the image; note large crowns along the riparian corridor.

Red alder dominates in this picture showing Pescadero Creek in the center.

2000 – WOODLANDS

2100 – Xeric Sclerophyll Evergreen Woodlands

2110 – Coast Live Oak Alliance

Distribution:

- Fairly common as small stands generally west of the conifer forests. Several examples have been mapped on slopes above Pomponio Reservoir and along Pescadero road just east of the Pescadero High School.

Environmental Characteristics:

- Best developed stands are found on south trending exposed lower to mid slopes.

Description:

- Coast live oak dominates the hardwood canopy, often with a sparse emergent of Douglas-fir of less than 10%. Stands are open to closed. Other species in the hardwood canopy layer may include madrone or small amounts of California bay.

Photo Interpretation Signature:

- Crowns are rounded with a smooth texture; colors vary widely depending on growth characteristics of the plant; flush leaf individuals often appear bright green.

Note the smooth rounded crown; color varies considerably depending primarily on the leaf age and health.

This example occurs on a south trending mid slope; an open canopy with a grassy understory.

2220 California Buckeye Alliance

Distribution:

- Uncommon; stands are small occurring mainly west of the conifer forests. Small stand mapped southwest of Newell gulch.

Environmental Characteristics:

- Mapped on steep south trending slopes; occasionally in riparian areas and draws.

Description:

- California buckeye dominates the canopy, generally in open stands with a shrubby understory often consisting of poison oak. Coast live oak may be a component to the hardwood canopy.

Photo Interpretation Signature:

- Crowns are rounded with a very smooth texture; colors on winter imagery are generally white to light gray, on fall imagery they tend to be light green.

California buckeye trees tend to drop their leaves not long after the onset of summer drought; note September imagery trees appear in leaf change morphology.

Photo depicting early spring conditions showing the rounded even-structure crown.

2340 – Box Elder Alliance

Distribution:

- Common along both Butano and Pescadero Creeks.

Environmental Characteristics:

- Found in riparian areas, especially along the drier margins of alder and willow.

Description:

- Small stands of box elder dominate the stand with other species, including red alder and willow.

Photo Interpretation Signature:

- September photography yields a yellow-green color in early leaf change status. Crown canopy is rounded and larger than alder and willow. Individual trees are about as tall as arroyo willow.

Note early leaf-change morphology of the box elder against the still-green willow immediately adjacent.

Typical stands are dense small trees; this picture taken in April in leaf flush conditions.

3000 – SHRUBLANDS

3100 – Temperate Broadleaf Sclerophyll Evergreen Shrublands

3101 – Chaparral – Coastal Scrub Transition Mapping Unit

Distribution:

- Uncommon, small stands occur generally east of the Coast Highway and below the conifer forest zone.

Environmental Characteristics:

- Generally found in settings transitional to coastal sage scrub types and mesic chaparral on southwest to southeast trending slopes.

Description:

- This community is transitional between northern coastal scrub and chaparral types. The presence of blue blossom ceanothus and coffeeberry is a helpful indicator for mapping this type. Mapped where chaparral species make up at least 25% of the relative cover of shrubs. Stands may have a significant component of coyote brush, generally not exceeding 50% relative cover. Driest settings may support a significant component of monkey flower to the shrub layer. Poison oak is often a component to these types. Stands in the POST study area have little or no manzanita component. This vegetation type typically intergrades with the mesic deciduous shrubs vegetation (code 3430) throughout the study area, but particularly close to the coast and on north facing slopes.

Photo Interpretation Signature:

- Highly variable depending on component of chaparral; blue blossom shows up a dark green; coffeeberry often has dead growth in the plant which gives it a gray color.

This example depicts an opening in a Douglas-fir forest where coffeeberry and blue-blossom ceanothus mix with coyote brush, blackberry and poison oak.

In this example, coffeeberry dominates the shrub layer, with small amounts of coyote brush, elderberry and blue-blossom.

3104 – Blue Blossom - Jimbrush Mapping Unit

Distribution:

- Uncommon in small stands generally west of the conifer forest.

Environmental Characteristics:

- Located on ridges, or convexities in rather dry settings.

Description:

- Generally in pure stands or with a small component of coffeeberry.

Photo Interpretation Signature:

- Smooth, uniform dark green signature with a distinct edge; signature is generally consistent throughout the stand.

Note pure patches in this example; shrub layer is generally smooth and uniform throughout the stand.

Blueblossom dominates the stand in this photo with smaller amounts of coffeeberry.

3175 – Sensitive Manzanita Alliance

Distribution:

- Fairly common in small stands (often as openings in the conifer forests) especially in the southeastern portions of the study area. Best examples exist along Butano Ridge.

Environmental Characteristics:

- Located on ridges or convexities on upper exposed south trending slopes in dry settings.

Description:

- At POST, manzanita dominates the stand with interior live oak more common towards the peripheries as it transitions to mixed conifer & hardwood forest.

Photo Interpretation Signature:

- Smooth, uniform dark green signature with a distinct edge is characteristic of manzanita, light greenish yellow signature is typical of interior live oak. Signature varies considerably within the stand.

Canopy typically varies from open to closed; opens up where manzanita dominates. Note rounded irregular shaped crown of the manzanita.

A small stand of prostrate sensitive manzanita along a road cut.

3200– Temperate Microphyllous Evergreen Shrubland

3201 – Coastal Bluff Scrub Habitat

Distribution:

- Limited to the coastal bluffs adjacent to the intertidal zones as a nearly continuous polygon, broken up only by small estuaries at the mouth of several streams.

Environmental Characteristics:

- Located on steep bluffs.

Description:

- Extremely sparse stands along cliff faces and in the sand along the base of the cliffs. Ice plant, dwarf coyote brush, sea rocket, seaside woolly sunflower (also known as lizard tail), silvery beachweed, and yellow sand-verbena are the most common species present.

Photo Interpretation Signature:

- Mix of sparse white, tan and brown signature, usually surrounded by rocks.

Bluff signatures can vary in size depending on orientation to the coast; north trending bluffs often hide the signature in shadow.

3220 – Coyote Brush Alliance

Distribution:

- Uncommon throughout entire study area.

Environmental Characteristics:

- Found on gentle slopes or flat areas.

Description:

- Mapped where Coyote Brush is either pure or disturbed and does not fit into any other mapping type for coyote brush.

Photo Interpretation Signature:

- Coyote brush has a variable green color with a textured appearance..

3221 – Coyote Brush Mesic Stands

Distribution:

- The most common and extensive coyote brush type within the study.

Environmental Characteristics:

- Found in mesic settings on north trending slopes on all aspects and settings. Also found on south trending aspects where it is generally restricted to concavities and lower slopes.

Description:

- Mapped where Coyote Brush dominates with subordinate species including one or more of the following: poison oak, blackberry, golden yarrow, or ocean spray. Generally found in dense stands

Photo Interpretation Signature:

- Coyote brush has a variable green color with a textured appearance, while the mesic shrubs that co-dominate this Alliance have a smooth, lighter green signature.

In this example, coyote brush dominates with patches of blackberry and poison oak throughout the stand.

This photo shows a common example where coyote brush dominates over poison oak. Poison oak is scattered through the stand.

3222 – Coyote Brush Xeric Stands

Distribution:

- Much less common than mesic coyote brush; generally found on dry slopes below the conifer forests inland from the immediate coast. Fairly extensive examples of this type are mapped along south slopes of the Deer Park ridge.

Environmental Characteristics:

- Found only in the most xeric settings on steep mid and upper convex to neutral south to southwest trending slopes.

Description:

- Mapped where coyote brush dominates with subordinate species including both of the following: California sagebrush and sticky monkey flower. Generally found in open to dense stands. Lizard-tail may be a component to stands near the coast.

Photo Interpretation Signature:

- Coyote brush has a variable green color with a textured appearance, while the more xeric California sagebrush tends to have a smoother green-blue color.

This example shows a continuous southwest facing slope where sagebrush and coyote brush share dominance.

Photo shows shared dominance of sagebrush and coyote brush with individual ceanothus in bloom.

3223 – Coyote Brush Open Stands

Distribution:

- Common throughout the study especially in post disturbance settings. Most extensive stands are within a couple of miles of the coast.

Environmental Characteristics:

- Found in highly variable settings, but most commonly on gentle upper slopes with variable aspects.

Description:

- Open stands with a significant component of annual grasses; California blackberry may be a co-dominant shrub in some stands.

Photo Interpretation Signature:

- Generally dark green, somewhat textured signature found near roads and in, or close to annual grasses and forbs. Stands with California blackberry tend to have some orange-brown color to the signature.

This example depicts stands where densities range from 10-20% cover over an annual grass setting.

Open stand of coyotebrush with poison oak in the foreground.

3224 – Coyote Brush Coastal Fringe

Distribution:

- Uncommon with less than 5 stands mapped; limited to the coastal fringe and generally adjacent to the coastal bluff scrub habitat. May not be a separate association from stands containing dwarf coyote brush.

Environmental Characteristics:

- Fairly steep settings adjacent to the coastal bluffs and coastal terrace.

Description:

- Quite diverse with dense to moderately dense stands of coyote brush with a co-dominance or presence of lizard-tail, yellow bush lupine, beach strawberry, and/or goldenbush. Other species often present include: seaside daisy, cutleaf plantain, coast buckwheat, iceplant, seaside woolly sunflower, powdery dudleya, and California blackberry.

Photo Interpretation Signature:

- Similar to mesic coyote brush (see type 3221), colors and textures vary considerably within the stand. Overall, texture is somewhat smoother than type 3221.

3225 – Dwarf Coyote Brush Prairie

Distribution:

- Limited to the coastal plain adjacent to the coastal bluffs. Many good examples along the Coast Highway extending several hundred meters east of the highway in places.

Environmental Characteristics:

- Minimal to nearly level slopes adjacent to the coastal bluffs; stands are often exposed to strong ocean winds which greatly reduce the size of the shrub canopy.

Description:

- Open stands of dwarf coyote brush with a component of native bunch grasses and forbs.

Photo Interpretation Signature:

- Dwarf coyote brush generally yields a brighter green signature and has a smoother texture than the taller coyote brush communities found further inland. Dense native grasses such as California wild oats generally are inseparable from the adjacent annual grasses.

In this example, dwarf coyote brush forms a dense mat no more than a half meter tall yielding a smooth green signature consistent throughout the stand.

Dwarf coyote brush dominates this stand with native grasses in the upper left portion of the picture.

3310 - California Sagebrush Alliance

Less than 5 stands mapped in the study. Stands are found near the northern boundary in the eastern section of the study area. Found on moderate slopes with a smooth, tan or brown photo signature.

3400 – Temperate Broadleaf Cold Season Deciduous Shrubland

3410 – Poison Oak Alliance

Distribution:

- Found throughout the study in small stands.

Environmental Characteristics:

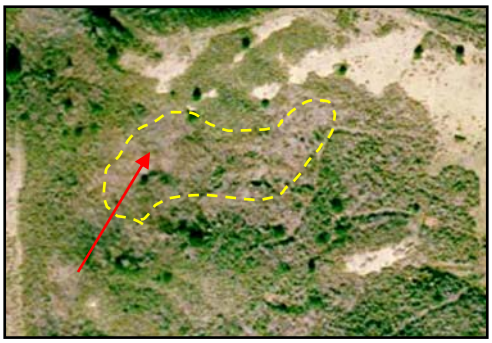
- Pure stands of poison oak are found in mesic environments; more extensive on north trending slopes but also abundant on lower concave southerly slopes.

Description:

- Poison oak forms extensive stands and is widespread in the study area. Mapped to alliance level, it can be the sole component of a stand. Coyote brush and California blackberry, along with other deciduous shrubs often form a minor component; isolated hardwood trees occasionally emerge from the dense canopy.

Photo Interpretation Signature:

- Signature varies on the imagery depending on the season. Fall imagery tends to yield a reddish tone while winter imagery shows up tan. In all cases, the texture is smooth but somewhat mottled in appearance.



This example depicts pure poison oak within a larger stand of coyote brush and poison oak.

Poison oak dominates this small stand with a component of California blackberry (greener margins).

3430 – Mesic Deciduous Shrubs

Distribution:

- Common throughout the study area.

Environmental Characteristics:

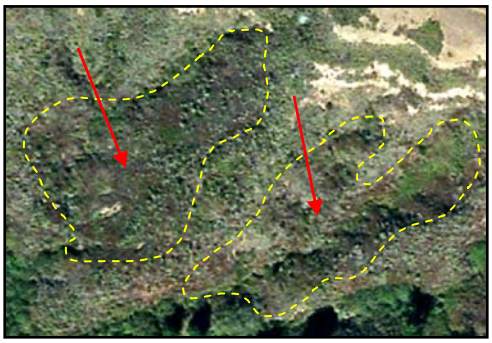
- Found on low slope north facing concavities, often adjacent to riparian areas and poison oak (see code 3410). This vegetation type typically intergrades with the chaparral-coastal scrub transition vegetation (code 3101) throughout the study area, but particularly close to the coast and on north facing slopes. Coyote brush often is found adjacent in more xeric settings. Also common in openings to conifer forests.

Description:

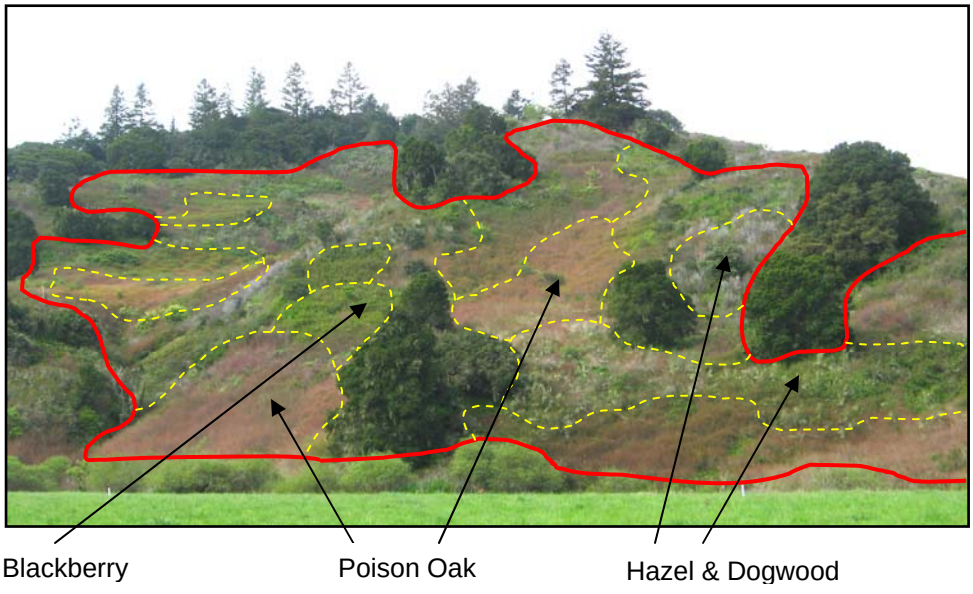
- In most locations within the POST properties, California blackberry usually dominates. Other common deciduous shrubs include: poison oak, Western creek dogwood, ocean spray, elderberry, golden yarrow, hazelnut, and thimbleberry. Stands are rarely comprised of a sole dominant and often contain a mosaic patchwork of three or more species within a very small area. There was very little dogwood and hazelnut, but more blue blossom and ocean spray observed in these stands near the coast in the POST study area.

Photo Interpretation Signature:

- Varying tones and shades of green – mixing with gray or brown representing small components of poison oak or coyote brush.



These examples contain a dominance of California blackberry, poison oak with some hazelnut.



Example depicts a myriad of small patches of vegetation making up a typical 3430 community. Brown colors show poison oak dominance, greener areas are either blackberry, cape ivy or dogwood patches.

4000 – HERBACEOUS

4100 – Saturated Temperate Perennial Graminoids

4101 – Undifferentiated Marsh

Distribution:

- Uncommon, but found adjacent to small ponds and reservoirs in the study. Extensive stands occur just west of the study area in the Pescadero Marsh natural preserve.

Environmental Characteristics:

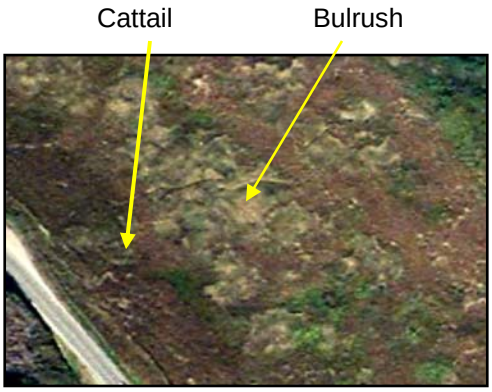
- Edge of water in permanently flooded conditions.

Description:

- May contain bulrush and/or cattail.

Photo Interpretation Signature:

- Photo interpretation signature is highly variable depending on species composition and growth status of the stand. Most marshes within the study area are too small to distinguish individual species.



Example shows a mosaic of both cattail and bulrush in the upper portions of the Pescadero Marsh natural preserve.

An example of a small stand of bulrush just outside of the study area north of the town of Pescadero.

4120 – Bulrush Alliance

Only 1 stand mapped in this study area. Found next to small pond with a dark green signature.

4210 – Sedge – Juncus Meadow Mapping Unit

Distribution:

- Uncommon, generally limited to wet swales in annual grasslands in the western portion of the POST study. Several small wet areas mapped along Stage road north of Pescadero.

Environmental Characteristics:

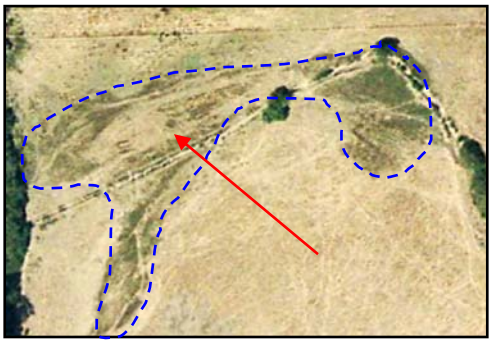
- Found in temporarily to seasonally flooded conditions in low lying areas.

Description:

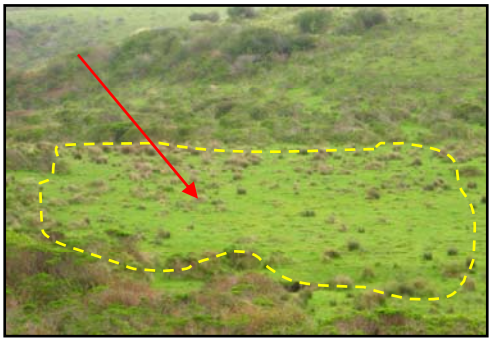
- Sedges, rushes and wet graminoids occur in these meadow-like environments; often with ruderal like forbs and annual grasses toward the drier edges. Invasive exotic perennial grasses such as velvet grass may be a component to the stand.

Photo Interpretation Signature:

- Highly variable depending on flooding regime, amount of upland annuals in the stand and species composition of wetland plants. Generally darker than adjacent upland annual grasses.



This example occurs in a highly disturbed setting, which regularly undergoes clearing. Upland annual grasses encroach the meadow edges.



Example below depicts *juncus. spp.* in an area dominated by wetter annuals; possibly *lolium.*

4300 – Tall Temperate Annual Graminoids

Note: Polygons are mapped to 4300 when the following conditions apply:

1. Multiple species of annual grasses may not dominate a stand but instead just one may dominated such as *lolium*. In these cases, grasses are planted for hay feed and cannot fall under the California Annual Grasslands Alliance.
2. Areas are dominated or co-dominated by tall forbs such as thistle or poison hemlock; these are generally ruderal like or wetland edge sites, which are often highly disturbed. Annual grasses generally do not dominate the community.

4310 – California Annual Grasslands Alliance

Distribution:

- Common; stands vary in size throughout the study.

Environmental Characteristics:

- Located in a variety of settings; generally on ridges and neutral to convex slopes.

Description:

- Common and extensive throughout the region. Nearly all stands are highly disturbed and contain a significant component of forbs along with annual grasses. May contain a small native grass component not separable with the aerial photography or imagery. Generally, multiple species (including *bromus spp. hordeum spp. lolium spp. avena spp and/or vulpia spp)* are co-dominants in the grassland.

Photo Interpretation Signature:

- Variable from yellowish brown to bright green depending on species composition, species growth cycle and imagery.

September imagery shows annual grasses that have long since gone to seed.

April growth in pre seeding conditions after ~50% normal precipitation. Note small stand of arroyo willow running through center of photo.

4320 – California Annual Grasslands with a Native Component Mapping Unit

Less than 5 stands mapped in this study area. These stands were mapped in flat areas that are adjacent to bluffs and near the coast. Usually in close proximity to dwarf coyote brush prairie type.

4340 – Poison Hemlock

Only 1 stand mapped in study area, which was based on ecologist's notes from the field. This type has no discernable signature, and is only mapped based on plot data

4400 – Tall Temperate Perennial Graminoids

4410 – Harding Grass Alliance

Distribution:

- Uncommon in study area; noted exclusively in the southwestern portions in the vicinity of Bean Hollow road.

Environmental Characteristics:

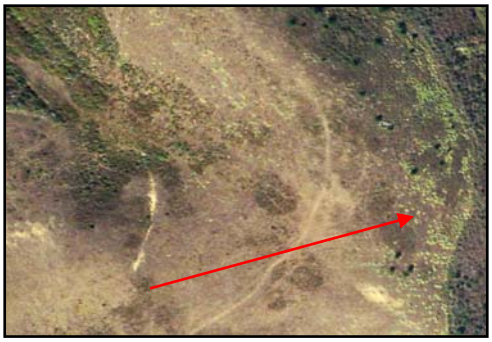
- Occurs in or near California annual grasslands.

Description:

- Perennial Harding grass dominates or is an important subordinate to other exotic annual forbs and grasses.

Photo Interpretation Signature:

- Larger clumps form a yellow to green stipple like pattern varying in density against the tan background of the annual grasses.



Densities vary in this picture with most individuals clustering towards the eastern edge of this image.

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In the early spring growth of the annual grasses, perennial Harding grass shows up as yellow-green clumps – individuals are most recognizable using imagery where annual grasses have yet to green up.

4430 – Pampas Grass Alliance

Distribution:

-

Environmental Characteristics:

- Disturbance related – invasive exotic.

Description:

- Pampas grass dominates or shares dominance; generally with non native annual grasses and forbs.

Photo Interpretation Signature:

- Very similar to Harding grass; possibly with a lighter tone overall. Crowns are generally not as well defined.

Note lighter color grasses in center of the image; texture is stipple like and very similar to Harding grass.

Example at Bean Hollow road is the largest mapped in the POST study.

4600 – Tidally Flooded Grasslands

4601 – Estuarine Marsh Habitat

Distribution:

- Only small examples in the POST study area; an extensive estuarine marsh is located just outside of the properties at Pescadero marsh natural preserve.

Environmental Characteristics:

- Intertidal zone at the mouth of several larger streams including Pescadero and Butano creeks; a small estuary is also mapped where Pomponio creek forms a small lagoon at Pomponio state beach.

Description:

- Species in this type include: salt grass, pickleweed, and/or cordgrass in varying densities in low to high tidal marsh settings.

Photo Interpretation Signature:

- Variable depending on species composition and density.

Example located at the mouth of Pomponio Creek.

APPENDIX B

PENINSULA OPEN SPACE TRUST VEGETATION CLASSIFICATION (MAPPING SHORT FORM)

Based on MROSD Vegetation Classification
Revised June 27, 2007

Classification of Vegetation Types (CNPS Alliance Level)

CLASS
- Formation
  - Alliance – (Code ending in a zero)
  - Potential Association – Mapping Units

****Items in bold are new for the POST project****

1000 – FORESTS

1100 – Temperate Broadleaf Sclerophyll Evergreen Forests

- 1101 – Lower Elevation Mixed Broadleaf Hardwoods (California Bay – Tanoak – Madrone - Coast Live Oak) Mapping Unit
- 1102 – Higher Elevation Mixed Broadleaf Hardwoods (California Bay - Tanoak, Madrone - Coast Live Oak - Canyon Live Oak) Mapping Unit

1110 – California Bay Alliance
- 1111 – California Bay Pure Stands

1120 – California Bay – Coast Live Oak Multiple Alliance Mapping Unit
1130 – California Bay – Canyon Live Oak Multiple Alliance Mapping Unit.
1140 – Tanoak – (California Bay) Multiple Alliance Mapping Unit
1150 – Eucalyptus Alliance
1151 – Acacia Alliance (Blackwood Acacia)
1160 – Madrone Alliance
1170 – Mixed Oak Mapping Unit (Including broad-leaf evergreen component of madrone & bay)
1180 – Giant Chinquapin Alliance

1200 – Temperate Needleleaf Evergreen Forests

- 1201 – Planted Stands of Pine (Monterey Pine – Monterey Cypress – other spp.)

1210 – Redwood Alliance
- 1211 – Redwood / Tanoak (Madrone) Mapping Unit

1220 – Douglas-fir Alliance
- 1221 – Douglas-fir - / Mixed Hardwoods Mapping Unit
- 1222 – Douglas-fir – California Bay Association
- 1223 – Douglas-fir – Coast Redwood Association
- 1224 – Douglas-fir – Chinquapin Association
- 1225 – Douglas-fir – Coast Live Oak Mapping Unit

1230 – Foothill Pine Alliance
- 1231 – Foothill Pine – Canyon Live Oak Association
- 1232 – Foothill Pine / Big Berry Manzanita Association

1240 – Knobcone Pine Alliance

1300 – Temporarily Flooded Cold Season Deciduous Forests

1310 – Mixed Willow Alliance Mapping Unit
1320 – White Alder Alliance
1330 – Arroyo Willow Alliance (Arroyo willow identified as dominant component; other willow may occur)
1340 – Red Alder Alliance (mixed willow)

1400 – Cold Season Deciduous Forests

1410 – Black Oak Mapping Unit
1411 – Black Oak - Madrone (Coast Live Oak) Mapping Unit

2000 – WOODLANDS

2100 – Xeric Sclerophyll Evergreen Woodlands

2110 – Coast Live Oak Alliance

2200 – Cold Season Deciduous Woodlands

2210 – Blue Oak Alliance
2211 – Blue Oak / California Annual Grasslands Association
2212 – Blue Oak Woodland Mapping Unit
2220 – California Buckeye Alliance
2230 – Valley Oak Alliance

2300 – Temporarily Flooded Cold Season Deciduous Woodlands

2310 – California Sycamore Alliance
2320 – Big-leaf Maple Alliance
2330 – Fremont Cottonwood Alliance
2340 – Box Elder Alliance

3000 – SHRUBLANDS

3100 – Temperate Broadleaf Sclerophyll Evergreen Shrublands

3101 –Chaparral – Coastal Scrub Transition Mapping Unit (contains Manzanita spp.– Blue-blossom – Coffeeberry – Toyon – Coyote Brush – Wax Myrtle)
3102 – Scrub Oak- (Manzanita – Wedge-leaf Ceanothus – Chamise - Scrub Interior Oak - Rhamnus Croc. - Toyon) Mapping Unit
3103 – Mixed Xeric Chaparral (Chamise – Sticky Monkey flower – Toyon – Sagebrush)
3104 – Blue Blossom-Jimbrush Mapping Unit
3106 – Brittleleaf Manzanita Mapping Unit
3107 –Interior Live Oak - Manzanita spp. (Kings Mountain Manzanita) Mapping Unit

3110 – Chamise Alliance
    3111 – Chamise – Leather Oak – (Garraya) – Serpentine Mapping Unit
3120 – Chamise – Wedge-leaf Ceanothus Alliance
3130 – Chamise – Mixed Manzanita Multiple Alliance Mapping Unit
3140 – Chamise – Mixed Oak Multiple Alliance Mapping Unit
3150 – Birch-leafed Mountain Mahogany – Mesic Chaparral Mapping Unit
3160 – Big Berry Manzanita Alliance
3170 – Manzanita – Mixed Oak Multiple Alliance Mapping Unit
3175 – Sensitive Manzanita Alliance
3180 – Chamise – Woollyleaf Manzanita Alliance
3190 – Chamise - California Sagebrush (Sticky Monkey Flower) Alliance

3200– Temperate Microphyllous Evergreen Shrubland

3201 – Coastal Bluff Scrub Habitat (sparsely vegetated coastal bluffs: Coyote Brush - Dune Sagebrush – Goldenbush – Iceplant)
3202 - Iceplant

3210 – Broom Alliance
3220 – Coyote Brush Alliance
    3221 – Coyote Brush Mesic Stands (Coyote Brush – Ocean Spray – Rubus spp. – Poison Oak – Cape Ivy)
    3222 – Coyote Brush Xeric Stands (Coyote Brush – California Sagebrush - Mimulus spp.; Coyote Brush, Successional Stage)
    3223 – Coyote Brush Open Stands (Coyote Brush / California Annual Grasslands)
    3224 – Coyote Brush Coastal Fringe (Coyote Brush – Lizardtail – Yellow Bush Lupine – Goldenbush)
    3225 – Dwarf Coyote Brush Prairie

3230 – Coyote Brush – California Sagebrush – Sticky Monkey Flower Association

3300 – Temperate Xeric Mixed Drought-Deciduous Evergreen Shrubland

3310 - California Sagebrush Alliance

3400 – Temperate Broadleaf Cold Season Deciduous Shrubland

3410 – Poison Oak Alliance
3420 – Bitter Cherry Alliance – *mapped based on field verification only*
3430 –Mesic Deciduous Shrubs (Hazelnut – Dogwood – Holodiscus – Poison Oak- Blackberry & Elderberry)

4000 – HERBACEOUS

4001 – Bracken Fern Stands

4100 – Saturated Temperate Perennial Graminoids

4101 – Undifferentiated Marsh (cattail, bulrush)
4110 - Cattail Alliance
4120 – Bulrush Alliance

4200 – Seasonally or Temporarily Flooded Graminoids

4210 – Sedge – Juncus Meadow Mapping Unit

4300 – Tall Temperate Annual Graminoids

4310 – California Annual Grasslands Alliance
4320 – California Annual Grasslands with a Native Component Mapping Unit
4330 – Yellow Star-thistle Alliance
4340 – Poison Hemlock –*mapped based on field verification only*

4400 – Tall Temperate Perennial Graminoids

4401 – Weedy Ruderal (Harding Grass – Velvet Grass – Thistle spp.)
4402 – Dunegrass Habitat (European Beachgrass – Sea-Rocket – Beach Bursage – Verbina – Dune Sagebrush)
4410 –Harding Grass Alliance
4420 – Meadow Barley Alliance
4430 – Pampas Grass

4500 – Native Temperate Perennial Grasslands

4510 – Mixed California Annual Grassland – Purple Needlegrass Mapping Units
4520 - Tufted Pine Grass - Purple Needlegrass Mapping Units
4530 – Purple Needlegrass Alliance

4600 – Tidally Flooded Grasslands

4601- Estuarine Marsh Habitat (Saltgrass – Pickleweed – Cordgrass)

9000 – LAND USE / UNVEGETATED
9800 – WATER

9100 – Government Related Facilities
9200 – Agriculture
9201 – Abandoned Orchards
9202 – Orchard
9210 – Rangeland – Pastureland
9220 – Olive Groves
9230 – Christmas Tree Farm
9240 – Plantation Pines
9300 – Built-up / Urban Disturbance
9302 – Quarry
9400 – Sparsely Vegetated or Unvegetated Areas
9410 – Landslides
9420 – Cliffs – Rock Outcrops
9500 – Vegetation Restoration Sites
9810 – Reservoirs
9820 – Small Ephemeral Ponds

9999 – Field questions

FIELDCK VALUES

0 = No field check necessary
1 = Field check requested
2 = Answered/verified in the field by field ecologist’s
4 = Verified on field reconnaissance trip

COVER CLASS DENSITY VALUES

1 = >60%
2 = 40-60%
3 = 25-40%
4 = 10-25%
5 = 2-10%
9 = Not Applicable

APPENDIX C

SPECIES MENTIONED IN TEXT

Trees:

Arroyo Willow *(Salix lasiolepis)*
Big-leaf Maple (*Acer macrophyllum*)
Blackwood Acacia (*Acacia melanoxylon*)
Blue Gum *(Eucalyptus globulus)*
Box Elder (*Acer negundo* var. *californicum*)
California Bay *(Umbellularia californica)*
California Buckeye (*Aesculus californica)*
Coast Live Oak *(Quercus agrifolia)*
Coast Redwood (*Sequoia sempervirens)*
Douglas-fir *(Pseudotsuga menziesii)*
Eucalyptus *(Eucalyptus spp.)*
Madrone *(Arbutus menziesii)*
Monterey Cypress (*Cupressus macrocarpa*)
Monterey Pine (*Pinus radiata*)
Pine *(Pinus spp.)*
Red Alder (*Alnus rubra*)
Tanoak *(Lithocarpus densiflorus)*
Willow *(Salix* spp.)

SPECIES MENTIONED IN TEXT

Shrubs, Herbs:

Blackberry *(Rubus spp.)*
Blue Blossom (*Ceanothus thyrsiflorus*)
Bulrush (*Scirpus spp.*)
California Blackberry (*Rubus ursinus*)
California Sagebrush *(Artemisia californica)*
Cape Ivy (*Senecia mikanioides*)
Cattail (Typha spp.)
Coffeeberry (*Rhamnus californica*)
Coyote Brush (*Baccharis pilularis*)
Cordgrass (*Spartina spp.)*
Dwarf Coyote Brush (*Baccharis pilularis, pilularis)*
Golden Yarrow (*Eriophyllum confertiflorum*)
Hazelnut (*Corylus cornuta* var. *californica*)
Harding Grass *(Phalaris aquatica)*
Iceplant (*Carpobrotus* spp.)
Manzanita *(Arctostaphylos* spp.)
Ocean Spray (*Holodiscus discolor*)
Pacific Coast Elderberry (*Sambucus racemosa var racemosa, Sambucus racemosa var callicarpa*)
Pickleweed (*Salicornica* spp.)
Poison-hemlock (*Conium maculatum*)
Poison Oak (*Toxicodendron diversilobum*)
Rush (Juncus spp.)
Saltgrass (*Distichlis spicata*)
Sea Rocket (*Cakile maritima*)
Seaside Daisy (*Erigeron glaucus*)
Seaside Woolly Sunflower (Lizard Tail) (*Eriophyllum staechadifolium*)
Silvery Beachweed (*Ambrosia chamisonnis*)
Sticky Monkey Flower *(Mimulus aurantiacus)*
Toyon (*Heteromeles arbutifolia*)
Western Creek Dogwood (*Cornus sericea* ssp. o*ccidentalis*)
Yellow Bush Lupine (*Lupinus arboreus*)
Yellow Sand-verbena (*Abronia latifolia*)

avena
bromus
hordeum
lolium
vulpia

APPENDIX D

Frequency and Area of Mapped Vegetation Types

PI	FREQUENCY	AREA (acres)
1140	8	33
1150	80	274
1151	2	14
1201	28	78
1210	8	40
1211	15	1144
1220	165	1369
1221	20	1283
1223	29	1340
1225	75	1256
1300	6	13
1310	15	294
1330	116	369
1340	14	352
2110	78	215
2220	15	30
2340	18	26
3100	1	1
3101	88	451
3104	29	54
3175	46	58
3201	3	23
3202	1	2
3220	58	166
3221	416	2587
3222	139	413
3223	323	1664
3224	4	22
3225	7	110
3310	4	4
3410	102	257
3430	277	1356
4101	19	13
4120	1	0
4200	10	18
4210	6	18
4300	60	732
4310	243	3158
4320	5	25
4340	1	9
4410	8	29
4430	8	21
4601	1	2
9000	230	1922
9800	68	93
9999	21	59