Garcia River
Vegetation Mapping Report

Photo Interpretive Guidelines for Mapping Vegetation

November 2007

Prepared for:

The Nature Conservancy

By:

Aerial Information Systems, Inc.

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1. INTRODUCTION

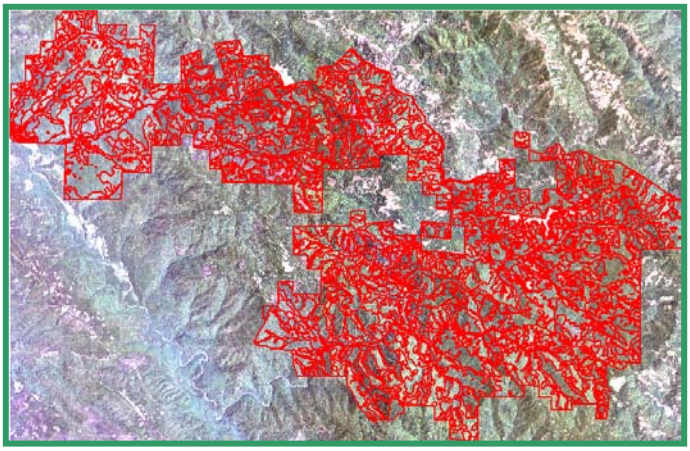
Aerial Information Systems, Inc. (AIS) was contracted by The Nature Conservancy (TNC) to create a vegetation map covering approximately 23,800 acres (~37 square miles) of the Garcia River Watershed east of Point Arena. The mapping area is split by the north coast and outer north coast range floristic provinces as defined by The Jepson Manual – Higher Plants of California, Hickman.

The goal of the project was to create a baseline vegetation map depicting existing conditions within the study area at the time the base imagery was flown in 2005.

The vegetation map will be used by TNC for three primary purposes:

- Track changes that may occur to vegetation and associated wildlife habitats over time.
- To better understand the distribution of oaks and related tanoak which may in the future be susceptible to sudden oak death.
- To contribute to building a better Statewide vegetation map on lands where TNC has a conservation interest.

The Garcia Mapping Area



2. DESCRIPTION

The Garcia River study area is situated approximately 5 miles east of Point Arena just south of Mountain View County Road which connects the towns of Point Arena and Booneville. The Point Arena Air Force Station is almost completely surrounded by the property.

The mapping area encompasses mixed coniferous forests primarily consisting of Douglas-fir and coast redwood, in addition to mixed Douglas-fir – hardwood communities in the somewhat drier eastern portions of the mapping area. Several conifer species including western hemlock and grand fir are represented within the mapping area as the southern most stands within their range.

The property covers approximately one third of the entire 72,000-acre watershed. The Conservation Fund, 2006. *Garcia River Forest Integrated Resource Plan*. *(See Figure 1)*

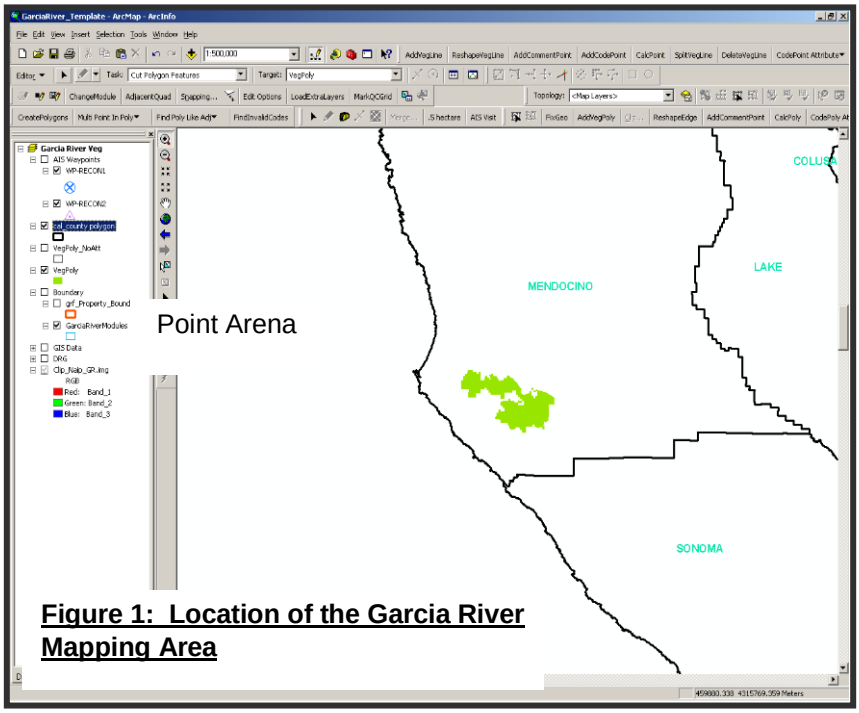


Figure 1: Location of the Garcia River Mapping Area

Elevations within the mapping area range from near sea level in the extreme western portions to nearly 2500' on Qualala Mountain in the south central portion of the study. The western portions of the mapping area along the lower slopes of the Garcia River and the north fork of the Garcia River are most heavily influenced by maritime air masses throughout the year. It is in this zone along the north slopes where most of the western hemlock and grand fir occur. The upper elevations in the eastern portions of the property exhibit trends towards more interior habitats and contain small stands of pure Oregon oak and communities containing mixed Douglas-fir with Oregon or Shreve oak. Precipitation at these more inland sites is probably highest in the mapping area due to orographic influences from increased elevation and watershed orientation.

1. SUMMARY OF THE MAPPING EFFORT

- April 2007 – Proposal of work delivered to TNC

- July 2007 – First field reconnaissance
    - TNC Ecologists
    - AIS Photo Interpreters

- July & August 2007 – Signature correlations developed along with preliminary mapping classifications & keys.

- August 2007 – Second field reconnaissance
    - TNC Ecologists
    - AIS Photo Interpreters
    - Local Ecologists
    - DFG & CNPS Ecologists

- August & September 2007 – Finalizing signature correlations and working mapping classification
    - Delivered to all interested parties for review

- September-November 2007 – Photo interpretation & QC
    - Study broken into nine modules to facilitate PI & GIS related functions

- November 2007 – Interim delivery to TNC & ImageTree Corp.
    - Eight of nine modules delivered – Not QC'd

- November 2007 – First Delivery to TNC (final product – pre-TNC review)
    - Awaiting TNC's review & comments

2. VEGETATION MAPPING CRITERIA & METHODOLOGIES

Vegetation mapping procedures include first conducting an initial field reconnaissance that establishes relationships between plant communities and their physiognomic requirements. The first reconnaissance visit consisted of a three-day effort and involved the photo interpreters along with TNC field botanists and ecologists. Approximately 125 GPS points were taken along most passable routes within the study area capturing the major floristic variability within the property. A second visit was conducted with additional staff from the Department of Fish & Game along with the California Native Plant Society (CNPS) and local expertise to aid in the identification of vegetation types from the perspective of the National Vegetation Classification (NVC). An additional 55 GPS waypoints were gathered along routes during this effort.

Using these points, air photo signatures (color-tone-texture combinations that the photo interpreter views on the hard copy or digital photo) were then correlated to their corresponding plant communities or plant species viewed in the field. AIS photo interpreters evaluated these correlations between the vegetation units and photo signatures and refined them to insure that the map would be useful at a resolution needed to meet TNC's goals.

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

The vegetation units were then interpreted across the entire study area using heads-up digitizing techniques through custom tools developed in the Arc GIS 9.2 Software that were enhanced by AIS. As a general rule, common and widespread vegetation units were delineated down to a minimum mapping unit (MMU) of approximately ½ hectare. Small wetlands and forest openings were delineated in several incidences below the MMU.

One-meter National Agricultural Inventory Program (NAIP) imagery flown in July of 2005 was used as a base for the delineated polygons and photo interpretation signature. Additional hard-copy aerial photos were supplied by the client to aid in further recognizing difficult signatures with the following specifications

- Date: - June 2004
- Natural Color 9" by 9" prints with ~60% overlap along the flightline
- Ten flightlines running in a south to north direction (85 total)

The following ancillary datasets were supplied by the contractor to further aid in mapping the vegetation types:

- Contour data
- Hydrology
- Fire History
- Herbicide
- Soils
- Roads
- Vegetation Sampling Transect Data
- Existing Vegetation Maps

VEGETATION DENSITY & FLORISTIC ASSIGNMENTS OF POLYGONS

Densities are mapped for each vegetation layer that exists in the stand except for herbaceous types. Vegetation densities can be assigned for up to three layers of vegetation (conifer – broadleaf tree and shrub layers). Density values are generalized into the following five category ranges:

- 1 = >60% - (Forests & woodlands)
- 2 = 40-60% - (Woodlands)
- 3 = 25-40% - (Savanna-like open woodlands)
- 4 = 10-25% - (Sparse woodlands)
- 5 = 2-10% - (Sparse emergent – sparse vegetation)

Alliances are normally defined by the dominant overstory vegetation layer when that layer contains at least 10% cover. For example, stands of Douglas-fir of containing approximately 25% cover, over a dense Oregon oak woodland will be assigned to the Douglas-fir alliance and labeled as a 1214: Douglas-fir – Oregon oak –(Shreve oak). This example stand will have a vegetation density assignment of 1 in the hardwood field (>60%) and a density assignment of 3 in the conifer field (25-40%). All density values are measured in absolute cover, not relative cover. Stands of Douglas-fir of ~5% over a dense Oregon oak woodland will be assigned to the Oregon oak alliance and will receive a density category of 5 (2-10%) in the conifer layer and a density category of 1 (>60%) in the hardwood category. This way, sparse emergent stands of Douglas-fir can be accounted for without assigning it to a conifer type when there is a strong dominance of oak in the non-emergent tree canopy. Detailed descriptions of the mapping units are included in section 5 of this report.

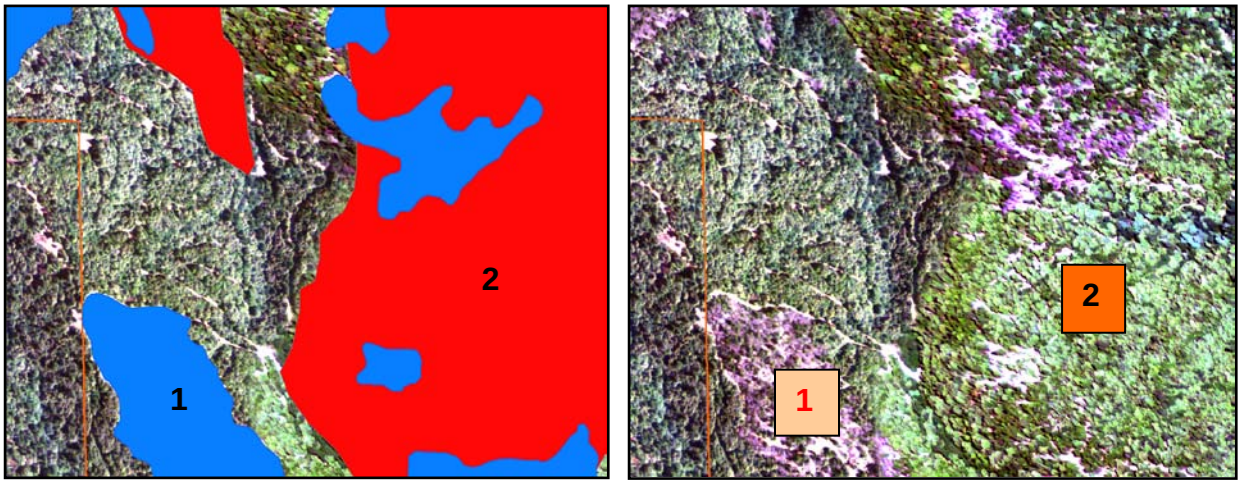
HARDWOOD MORTALITY INDICATORS

A special field has been added to the data layer denoting areas where the NAIP imagery depicts recently dead stands of hardwood. In almost all cases, death is a result of the "hack-and-squirt" efforts to reduce tanoak within the property. The following values have been attributed to each polygon mapped in the study:

- 0 = No perceptible hardwood death visible
- 1 = Trace amounts to approximately 10% of the mapped polygon contain hardwood death
- 2 = Approximately 10-25% of the mapped polygon contain hardwood death
- 3 = Approximately 25% or greater contain hardwood death

It should be noted that the herbicide overlay supplied to AIS does not always conform to what was visible on the NAIP imagery. In some cases, PI's noted areas of mortality not identified on the herbicide overlay, in other cases the overlay depicted mortality not visible on the photography. These discrepancies may be the result of a number of factors including differences in interpretation data sources (such as the date of the imagery). See figures below for examples.

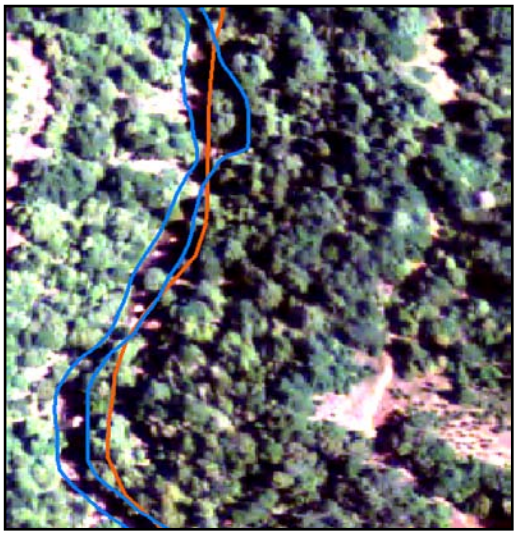
Mapped: - Blue = AIS : Red = Herb. Overlay



- 1 = Example Areas Mapped by PI's with a mortality, not mapped on herbicide map.
- 2 = Example Areas Mapped on herbicide overlay with a mortality not mapped by AIS PI's

SPECIAL NOTATIONS REGARDING THE MAPPING PRODUCT

Property boundary: In several areas the mapping study area boundary has been extended slightly to incorporate significant features into the analysis. Along the north, the boundary was extended slightly into the agricultural area to denote significant landuse adjacent to the study. In areas where the Garcia River bounds the study, the entire river "polygon" was included in the mapping area. *See figure 2 below for example of boundary modifications:*



Blue lines represent AIS modifications
Orange line is original boundary

California bay: Presence of dominant stands of California bay within the mapping area although a high priority are quite rare and limited in extent. It was therefore extremely difficult for photo interpreters to correlate a "signature" to these small areas where bay was present or dominant in the overstory. All visible stands are at or below the minimum mapping unit of ½ hectare. Approximately a dozen sites have been mapped and appear on the layer with a floristic code of 1110 where the PI's suspect the presence of bay. These areas need to be checked for accuracy and until then should be considered a low confidence category.

Field Check Sites: 36 sites (several of which are California bay) have been denoted in a special field *(see data dictionary for details – Section 6)* marked for site visitations. They are small patches of vegetation where PI's are having difficulty classifying the polygon. Several additional polygons have been coded to coarse levels in the classification (1100 or 1300 for example) for similar reasons. *(See figure 3 – right for location of field sites)*

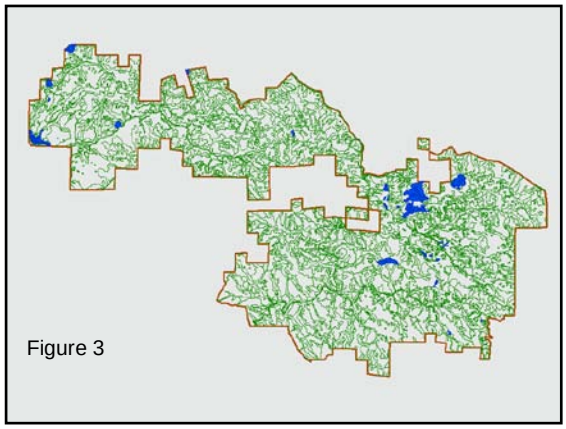
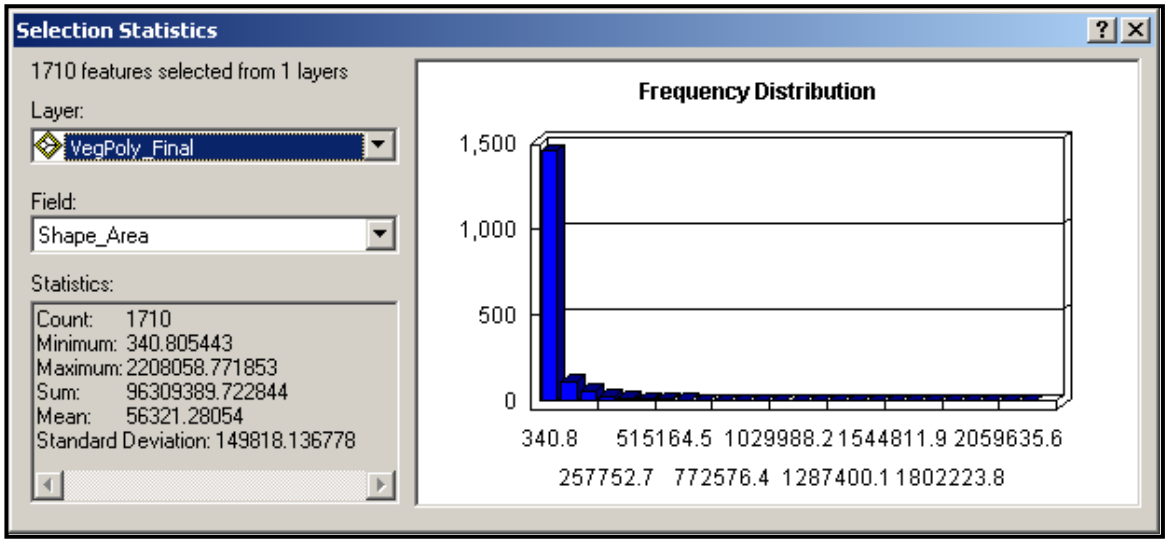


Figure 3

Map Statistics: 1710 polygons were mapped over approximately 24,000 acres of land yielding an average polygon size of about 14 acres. This figure represents a slightly larger average than other regions mapped for the Nature Conservancy in more arid locations where life form changes (breaks between trees, shrubs and grasses) occur more frequently as a result of changes in slope characteristics and other physiognomic factors. Several polygons measured less than ¼ acre in size (small riverine flats) to over 500 acres (one polygon coded as 1223 – Coast Redwood – Western Hemlock)

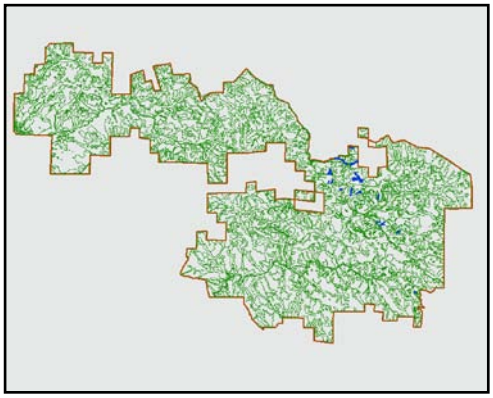
See figure below for visual of the polygon statistics:
(Area is given in square meters)



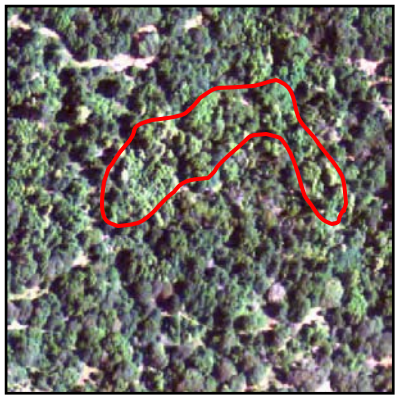
5. MAPPING DESCRIPTIONS

1110 California Bay Alliance

Minor draw in western portion of the mapping area – example here shown with shreve oak



Type 1110: 37 Acres



Narrow crowns – very small stand

Mapping Descriptions: Mapped where California bay *(Umbellularia californica)* dominates the canopy. Stands are generally dense, usually over 70% cover and may occur in riparian settings with white alder or in upland draws associated with a component of Douglas-fir and other hardwoods, especially shreve oak. NOTE: Stands are extremely small and signature correlates at this time are not confidently defined.

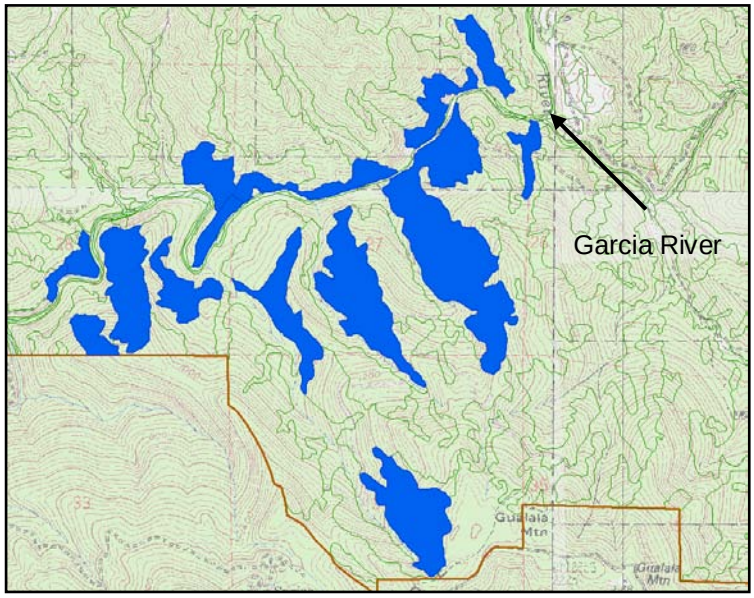
Environmental Parameters: Mapped in interior locations and generally not in proximity to tanoak forests. Common as an associate in riparian settings and also noted in upper small drainages adjacent to mixed chaparral or Douglas-fir forests. Much more common east of the study area.

1120 – Canyon Oak Alliance

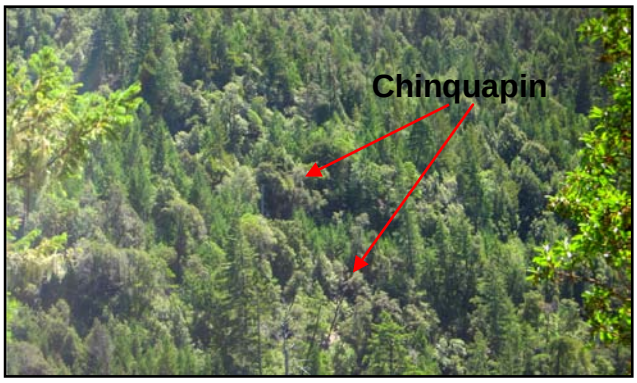
Only several small stands noted in the western portions of the study area; most stands of canyon oak are mapped in conjunction with Douglas-fir and coded to 1213.

1140 – Giant Chinquapin Alliance

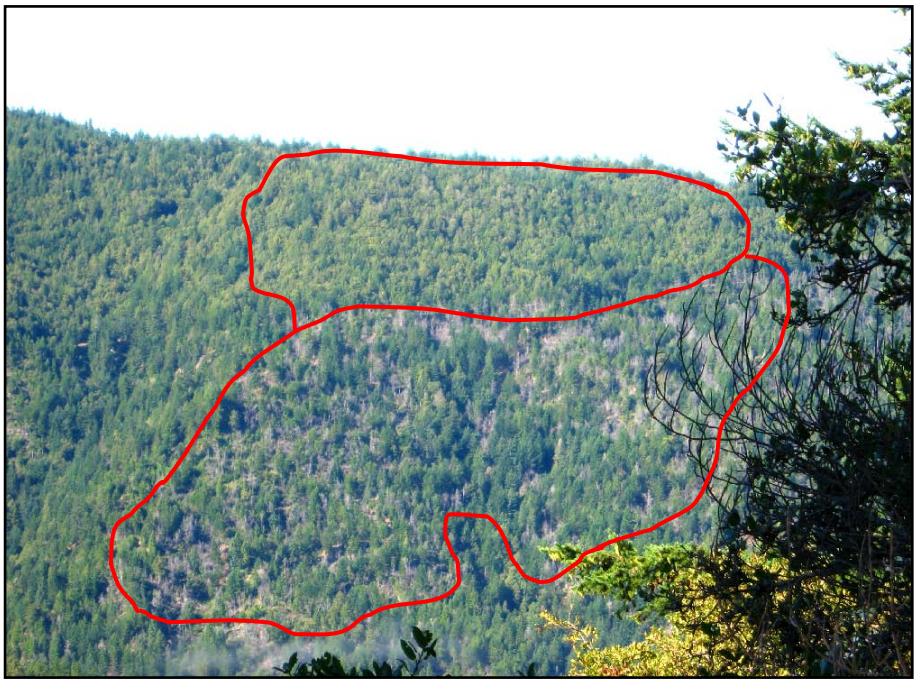
Not mapped as dominant (Alliance) but in conjunction with Douglas-fir and Canyon Oak. Several large polygons (mapped to code 1213) were observed south of the Garcia River on steep northern exposures near Gualala Mountain. *(See Figure 3 below)*



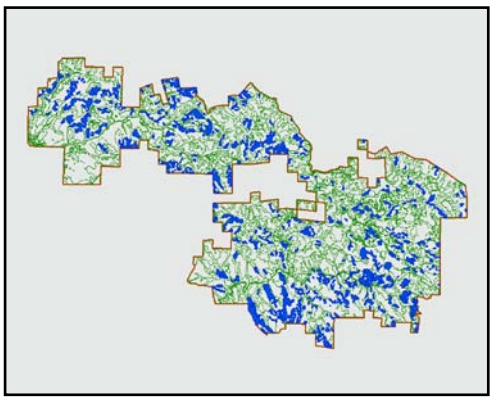
(Figure 3)



1130 – Tanbark Oak Alliance



Upper polygon denotes dense tanoak over 60% cover; lower polygon has been sprayed yielding a sparser cover of hardwoods overall.



Type 1130: 2237 Acres

Note signature variability due to slope exposure

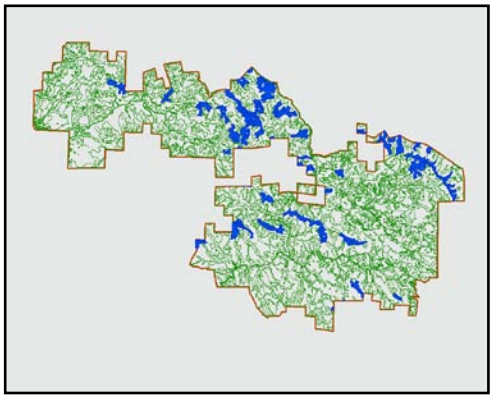
Mapping Descriptions: Mapped where tanbark oak *(Lithocarpus densiflora)* dominates the canopy. Stands are generally dense, usually over 70% cover except in areas that have been sprayed (hack-and-squirt). Conifers (Douglas-fir, coast redwood or both) can be an emergent to the canopy of up to 10% cover. Drier locations may contain a significant component of Pacific madrone.

Environmental Parameters: Mapped extensively throughout the study area in a variety of topographic locations in all but the most xeric settings.

1210 – Douglas-fir Alliance

1211 – Douglas-fir – Sugar Pine – (Tanoak – Pacific Madrone)

Example on upper slopes with Pacific madrone.



Type 1211: 1260 Acres

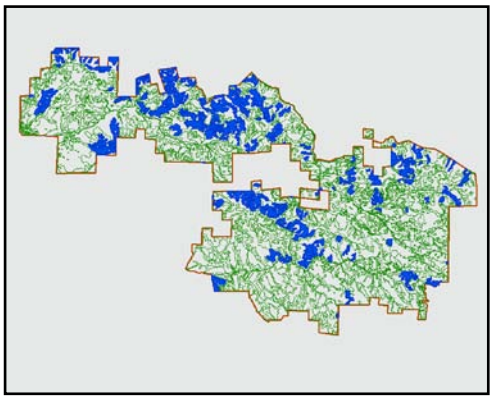
Mapping Descriptions: Mapped where Douglas-fir *(Pseudotsuga menziesii)* dominates or codominates the canopy with sugar pine (*Pinus lambertiana)*. Stands range in density from woodlands with a shrubby understory, but more often occur with hardwood species such as Pacific Madrone and or Tanoak as a component to the overstory layer.

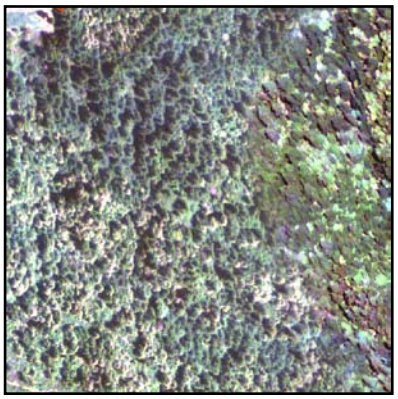
Environmental Parameters: Found on upper slopes, spurs and major ridgelines; more extensive stands in the northern and eastern portions of the study. Sugar pine is often present as a minor component to many of the mapped conifer throughout the study but is rarely significant off the upper slopes and ridges.

1210 – Douglas-fir Alliance

1212 – Douglas-fir – Tanoak – (Pacific Madrone)

Example depicts Douglas-fir with both tanoak & Pacific madrone





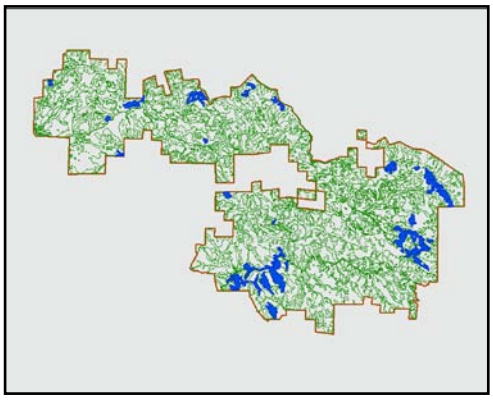
Type 1212: 2761 Acres

Mapping Descriptions: The most common of the Douglas-fir types; found where Douglas-fir *(Pseudotsuga menziesii)* is generally a dominant or codominant to a hardwood layer usually composed primarily of tanoak *(Lithocarpus densiflorus).* Sugar pine may be a minor component to the conifer layer. In more xeric settings, Pacific madrone *(Arbutus menziesii)* may locally dominate the hardwood layer. In some cases, hardwood species may locally dominate the canopy.

Environmental Parameters: Found on mid & upper south trending slopes; generally in convex settings. North trending stands are limited to the most exposed upper slopes in higher elevations.

1210 – Douglas-fir Alliance
1213 – Douglas-fir – Canyon Oak

Douglas-fir with canyon oak



Type 1213: 890 Acres

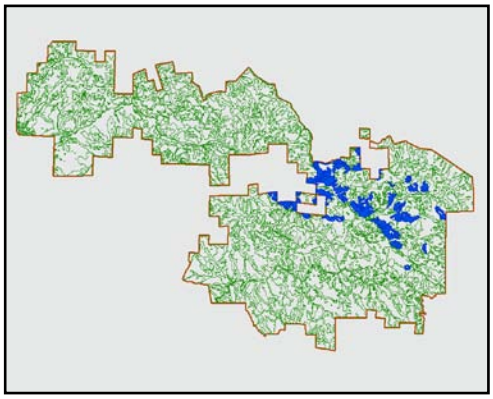
Mapping Descriptions: Mapped in woodland settings where Douglas-fir *(Pseudotsuga menziesii)* usually dominates the overstory canopy with a minor component of canyon oak *(Quercus Chrysolepis).* Other hardwood species may codominate with the canyon oak such as tanoak, or Pacific madrone. Several stands contain an important component of giant chinquapin *(Chrysolepis chrysophylla)* in the canopy or sub-canopy.

Environmental Parameters: Found on steep to very steep slopes on neutral settings, generally on mid and lower sites. Sites are often somewhat rocky with thin soils.

1210 – Douglas-fir Alliance

1214 – Douglas-fir – Oregon Oak – (Shreve Oak)

Oregon oak with emergent Douglas-fir



Type 1214: 708 Acres

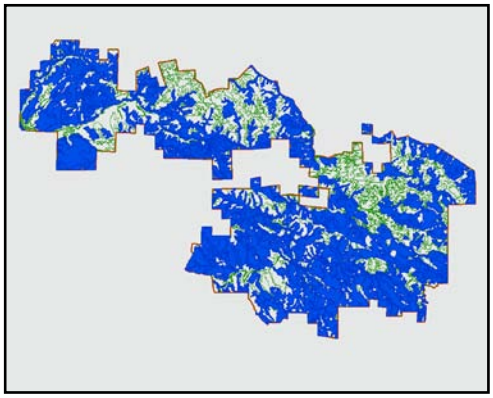
Mapping Descriptions: Mapped in woodland settings where Douglas-fir *(Pseudotsuga menziesii)* codominates or is subordinate (at least 10% cover) to Oregon oak *(Quercus garryana)*. Shreve oak *(Quercus parvula var. shrevei)* may replace or codominate with Oregon oak as the hardwood component in denser woodland settings. Understory herbaceous layer often contains a significant component of annual grasses.

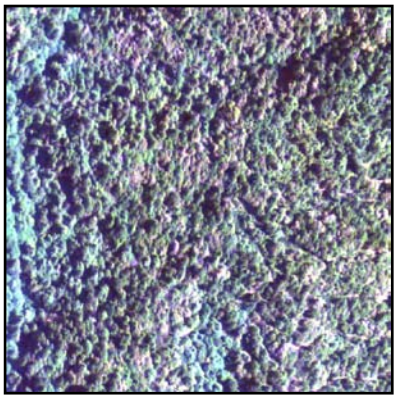
Environmental Parameters: Found on gentle to moderately steep slopes on well developed soils. Limited to the eastern third of the mapping area.

1220 Coast Redwood Alliance

1221 – Coast Redwood – Douglas-fir – Tanoak

Steep setting of Douglas-fir, coast redwood and tanoak





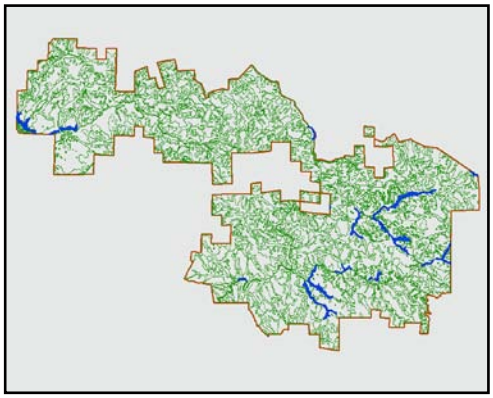
Type 1221: 12,725 Acres

Mapping Descriptions: Mapped extensively throughout the study area in all but the most xeric interior settings. Coast redwood *(Sequoia sempervirens)* is dominant, co-dominant or a subordinate to Douglas-fir *(Pseudotsuga menziesii),* usually in forest settings of over 60% cover except in disturbed sites. Hardwoods often codominate the canopy layer and at times dominate, with tanoak generally the dominant hardwood species.

Environmental Parameters: Found on all topographic settings except the most exposed sites (usually south trending upper slopes) on areas of well developed soils. Fully half of all mapped polygons (total acreage) are designated with this floristic assignment.

1220 Coast Redwood Alliance
1222 – Coast Redwood – Tanoak

Narrow stand of pure coast redwood



Type 1222: 266 Acres

Narrow riparian settings

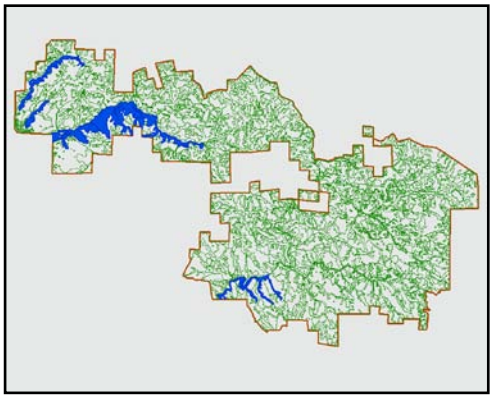
Mapping Descriptions: Mapped sparingly in small portions of the study area in very mesic settings. Coast redwood *(Sequoia sempervirens)* is dominant; several stands may contain a minor component of tanoak *Lithocarpus densiflorus).* Stands occur in forest settings of over 60% cover except in disturbed sites. Redwood generally makes up at least 90% relative cover of the overstory canopy.

Environmental Parameters: Found in the most protected (north facing cove-like settings) environments on well-developed soils or along riparian fringes.

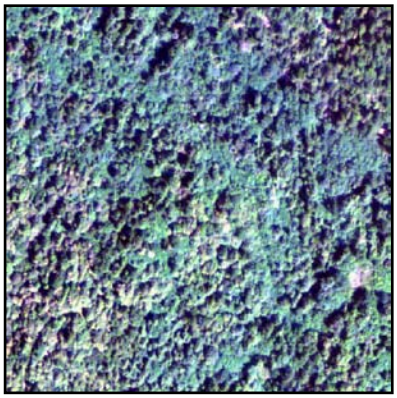
1220 Coast Redwood Alliance

1223 – Coast Redwood – Western Hemlock – (Douglas-fir – Sugar Pine)

Stand includes some tanoak on upper slopes



Type 1223: 853 Acres



Example contains upland red alder

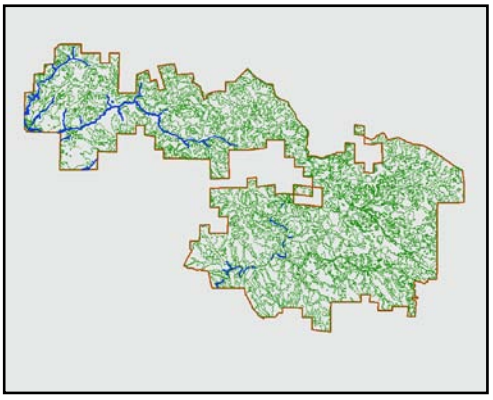
Mapping Descriptions: Generally mapped where Coast redwood *(Sequoia sempervirens)* is dominant; Western hemlock *(Tsuga heterophylla)* is often just a minor component to the conifer cover with a minimum of 5-10% relative cover. Douglas-fir is also often a minor component to the conifer layer. Western hemlock is a strong indicator species of this type. Tanoak *(Lithocarpus densiflorus)* or red alder *(Alnus rubra)* may be a significant component to the canopy. Stands occur in forest settings of over 60% cover except in disturbed sites. Redwood generally makes up at least 80 - 90% relative cover of the overstory canopy. Drier fringes may contain small amounts of sugar pine. Red alder generally replaces tanoak in the most mesic settings as small clumps within the overall stand. Understory components may contain but are not limited to thimble berry, swordfern and huckleberry.

Environmental Parameters: Found in maritime foggy settings along the major drainages within the mapping area. Exclusively noted on north trending aspects, usually on mid to lower neutral or concave settings.

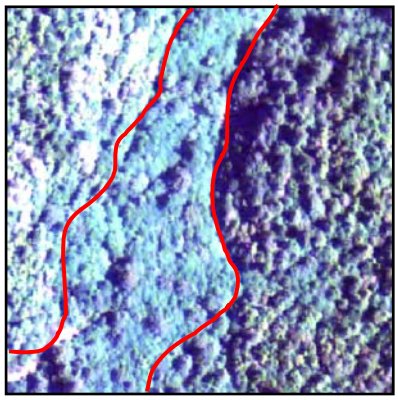
1310 – Red Alder Alliance

1311 – Red Alder – (Sitka Willow)

Red alder & Sitka willow



Types 1310 & 1311: 162 Acres



Riparian corridor of red alder; tanoak adjacent

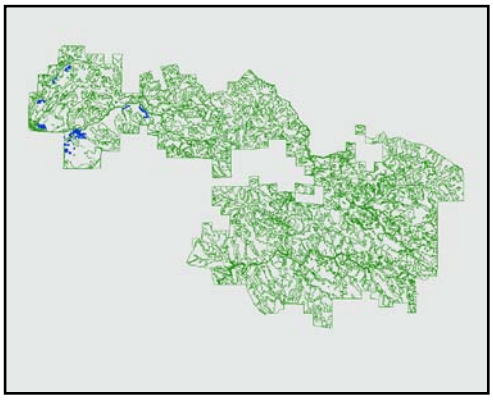
Mapping Descriptions: Mapped where red alder *(Alnus rubra)* dominates the hardwood canopy in riparian settings, often with an emergent conifer component of coast redwood. Sitka willow *(salix sitchensis)* often occurs as a shrub or small understory tree closer to the stream edge. White alder *(Alnus incana)* may also be a component to the small tree layer closer to the stream edge.

Environmental Parameters: Mapped in riparian settings, primarily in the northwestern portion of the mapping area and along the Garcia River where it flows out of the study area in the southwestern corner. Separated out from white alder based on maritime locations and its proximity to western hemlock and upland stands of red alder.

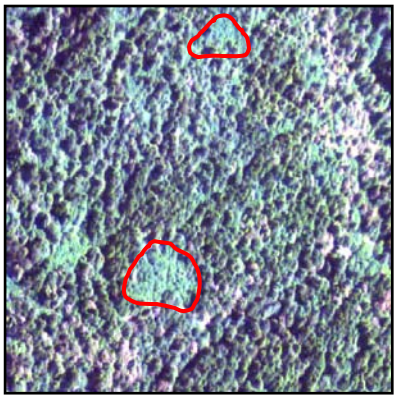
1310 – Red Alder Alliance

1312 – Red Alder Upland Stands

Red alder in upland setting



Type 1312: 47 Acres

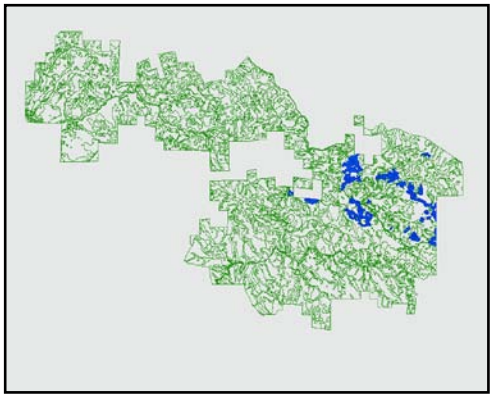


Small examples depicted

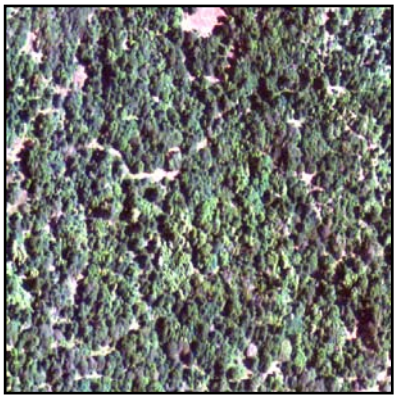
Mapping Descriptions: Mapped where red alder *(Alnus rubra)* dominates the hardwood canopy in upland mesic settings, often with a minor conifer component of coast redwood, western hemlock or Douglas-fir. Stands are very dense, with hardwoods exceeding 60% cover.

Environmental Parameters: Mapped in upland settings exclusively in the cool-summer maritime environment in small patches within the western most portions of the study area. Perhaps these stands represent the southern most examples of extensive upland stands of red alder more common in the Pacific Northwest.

2101 – Shreve Oak – (Mixed Evergreen Woodland)



Type 2101: 401 Acres



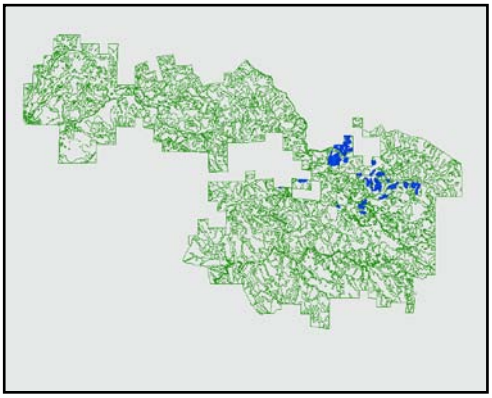
Stand has some emergent Douglas-fir

Mapping Descriptions: Mapped in dense woodland settings where Shreve oak *(Quercus parvula var. shrevei)* is dominant or shares dominance with other hardwood species such as Pacific madrone, Oregon oak and or canyon oak. Emergent Douglas-fir can occupy the canopy upwards of 10% cover. Understory herbaceous layer is often quite dense and is generally dominated by annual grasses.

Environmental Parameters: Mapped on gentle to moderately steep settings on well developed soils on a variety of aspects. Not as xeric as Oregon oak stands and usually contains an emergent conifer component.

2210 – Oregon Oak Alliance

Example depicts both Shreve & Oregon Oak over annual grasses

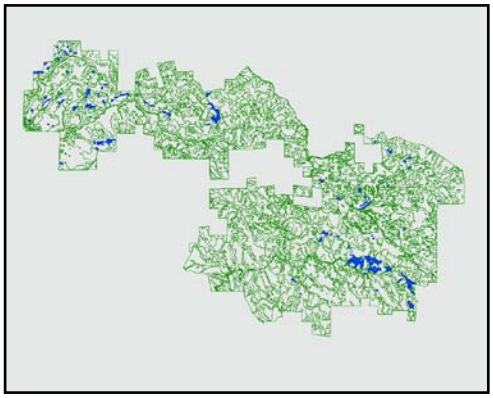


Type 2210: 213 Acres

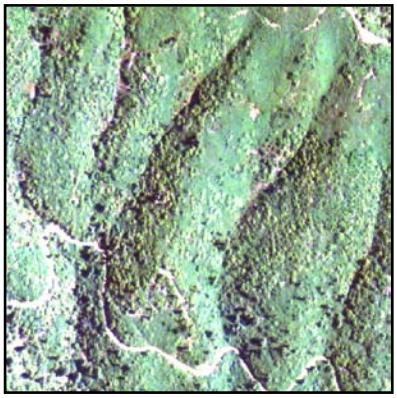
Mapping Descriptions: Mapped in dense woodland settings where Oregon oak *(Quercus garryana)* strongly dominates the hardwood canopy generally with a dense understory of annual grasses and forbs. Other hardwood species can make up a minor component to the canopy; rarely conifers except toward more mesic edges of the stand.

Environmental Parameters: Mapped on gentle to moderately steep settings on well-developed soils, usually on southerly trending aspects. Exclusively noted in the northeastern portion of the mapping area away from major watersheds which funnel cool maritime breezes from the west.

3110 – Coast Whitethorn Alliance



Type 3110: 211 Acres

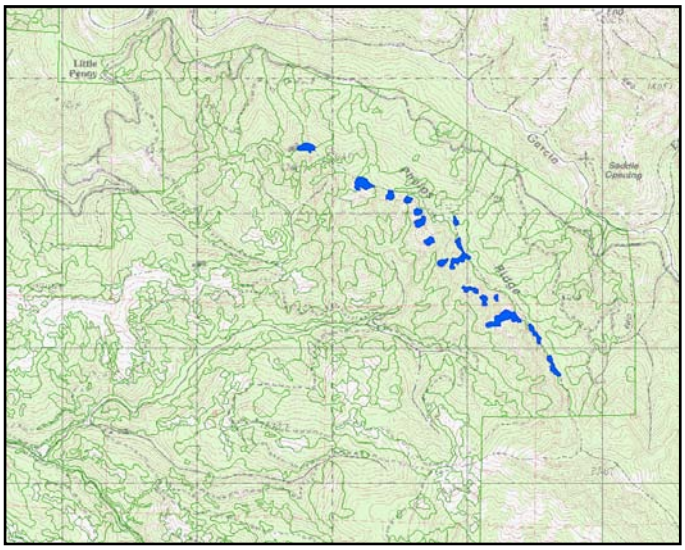


Noted here with shrubby tanoak

Mapping Descriptions: Mapped as dense shrubland, usually with coast whitethorn *(Ceanothus incanus)* as a strong dominant or sole component to the shrub layer. Emergent shrubby hardwoods are at times a minor component to the stand especially in post burn settings.

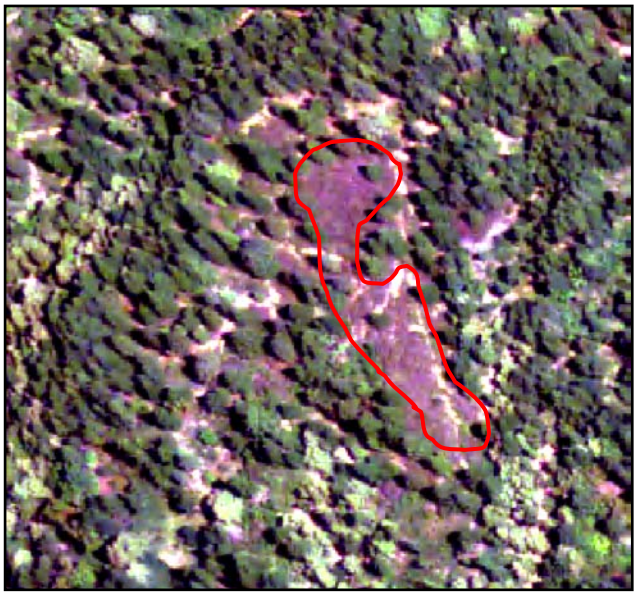
Environmental Parameters: Normally mapped as small or very small stands or patches as openings to the forests or along road edges. Associated with disturbance or post burn settings. Most extensive examples are noted in the southeastern portion of the mapping area within the Fishrock Burn.

3120 – Chamise – Backrush – Birchleaf Mountain Mahogany – Toyon Mapping Unit



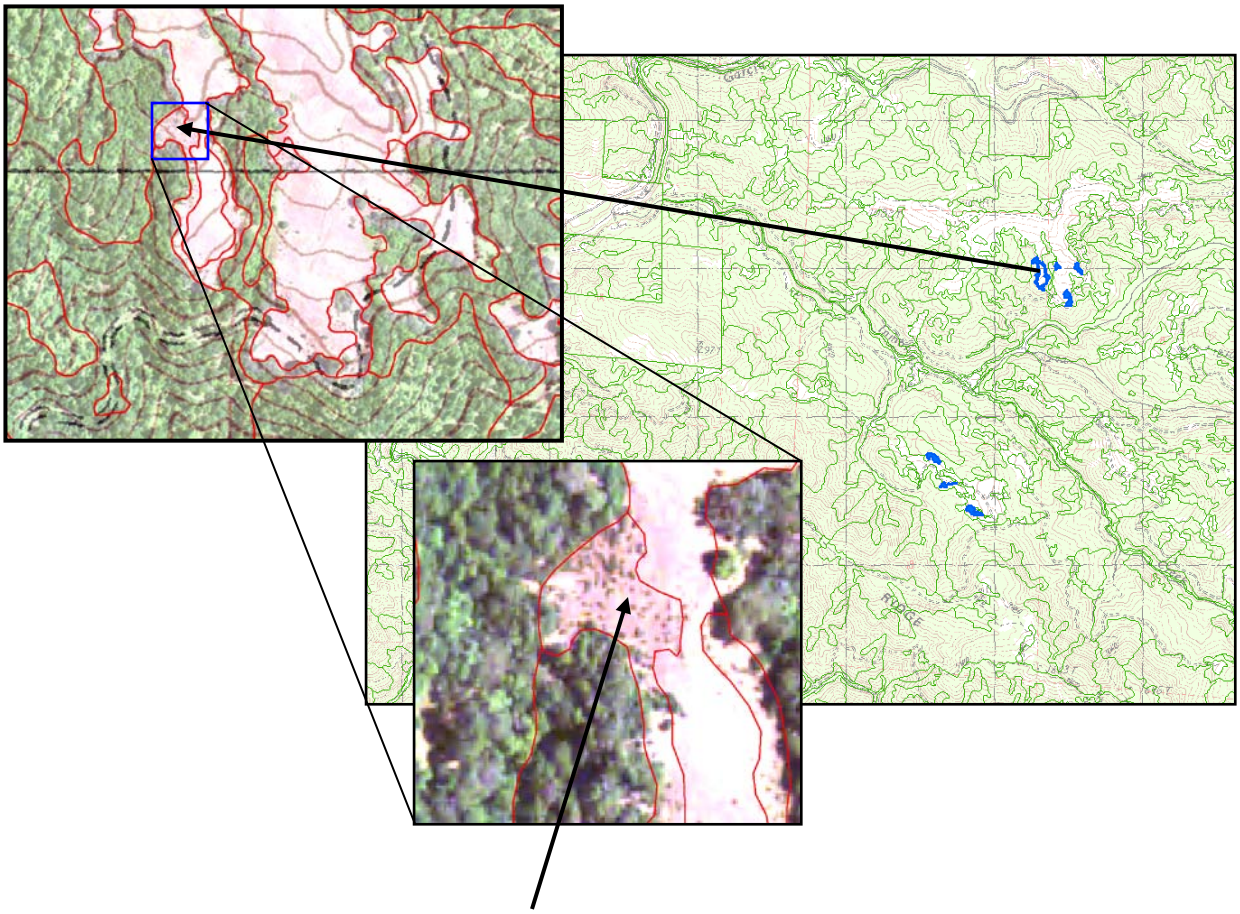
Limited to about 15 small patches totaling about 17 acres along the upper slopes and summits of the Phelps Ridge on exposed south trending sites. All patches are mixed and generally below 1 hectare in size. Most patches contain a mix of xeric chaparral species.

3130 – Mixed Manzanita Mapping Unit



Only ten polygons mapped totaling about 8 acres – most are openings in Douglas-fir forests on ridgelines as depicted above. Nearly all patches are well below the minimum mapping unit. Several mapped stands are flagged for field to determine species composition.

3210 – Coyotebrush Alliance

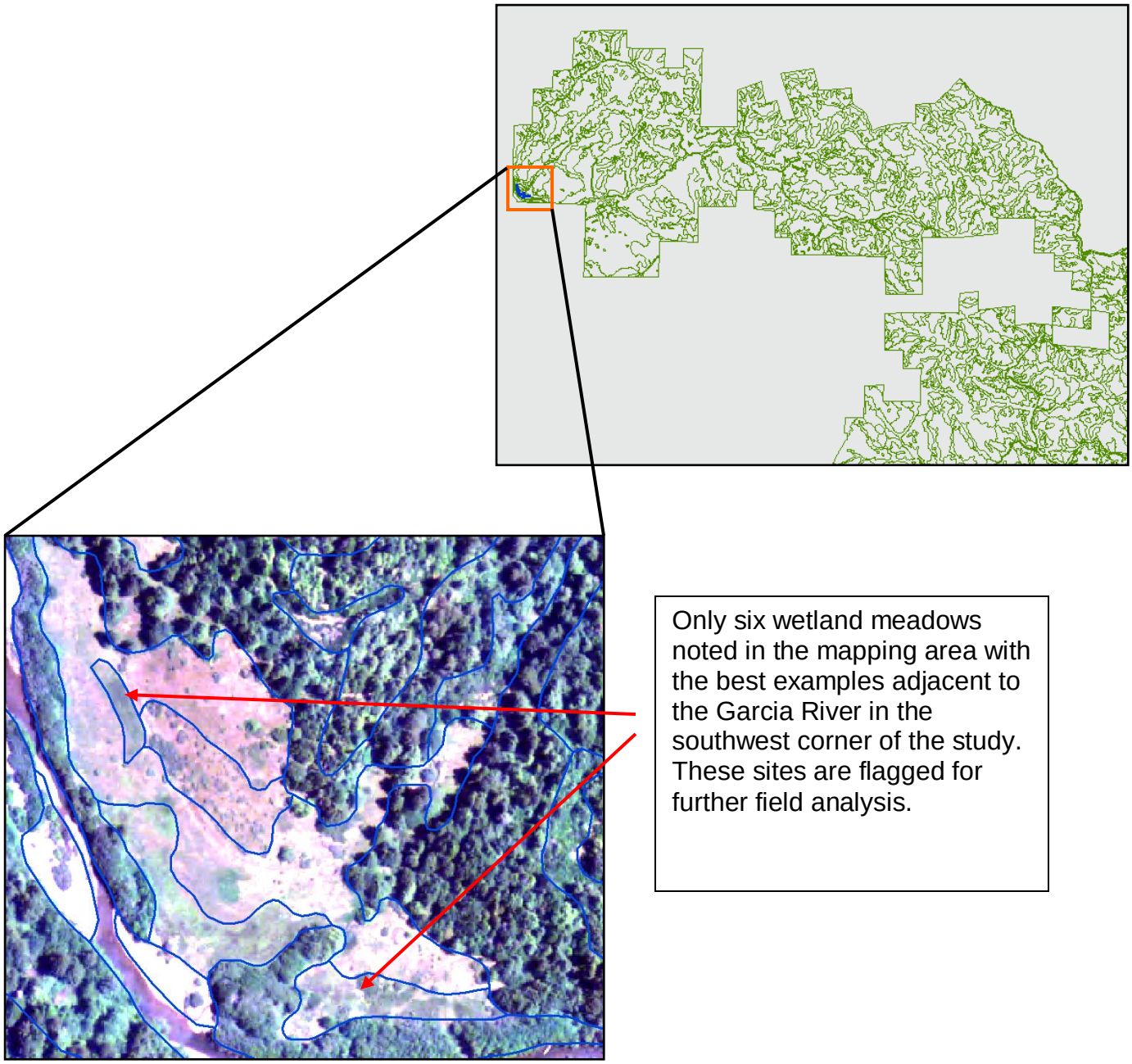


This type contains only thirteen polygons totaling about twelve acres within the mapping area; generally found in grassland edges as a sparse shrub layer.

3220 – French Broom

One polygon mapped approximately ½ acre in size about 1 mile north of the confluence of the Garcia River and Signal Creek.

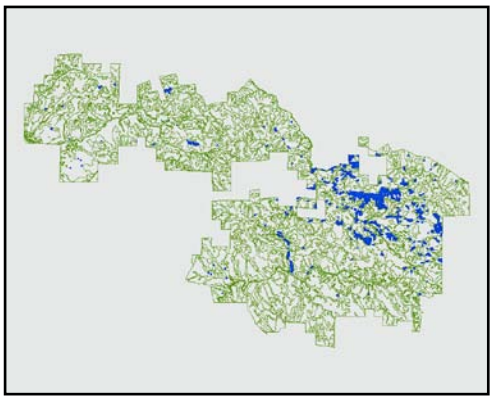
4201 – Seasonally or Temporarily Flooded Springs, Seeps & Meadows



Only six wetland meadows noted in the mapping area with the best examples adjacent to the Garcia River in the southwest corner of the study. These sites are flagged for further field analysis.

4300 – California Annual Grasslands Alliance

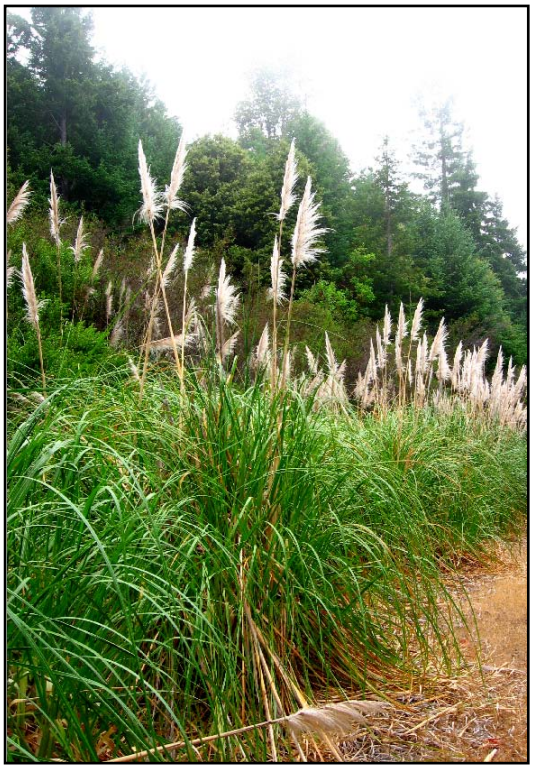
Foreground with *Avena spp.* dominating the stand



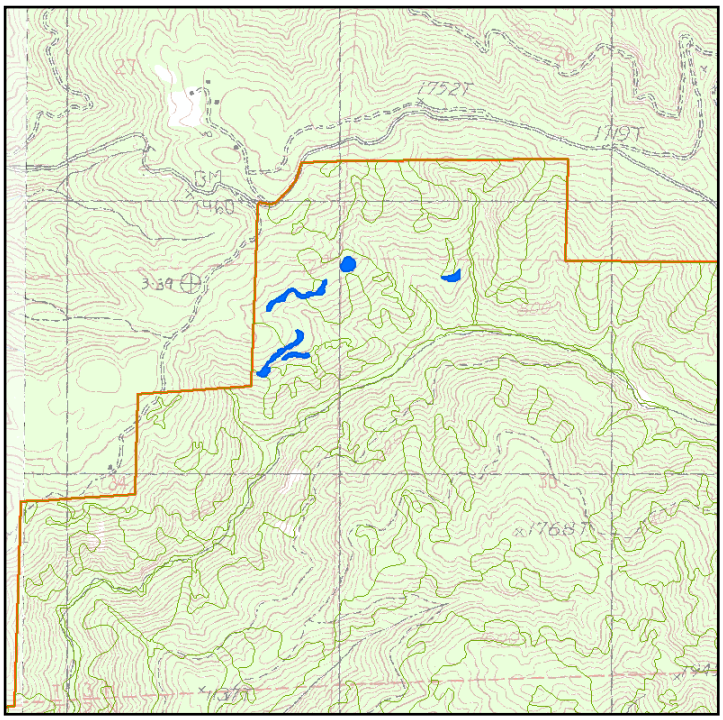
Mapping Descriptions: Annual grasses and forbs dominate the herbaceous layer with up to 10% cover of woody vegetation.

Environmental Parameters: Stands are mainly associated with Oregon oak and Shreve oak - mixed hardwood stands in the drier eastern portions. Nearly all grasslands in this area are ringed by a pure stand of hardwoods of either types and vary in size. Generally annual grassland stands contain a minor native component mixed throughout.

4321 – Pampas Grass

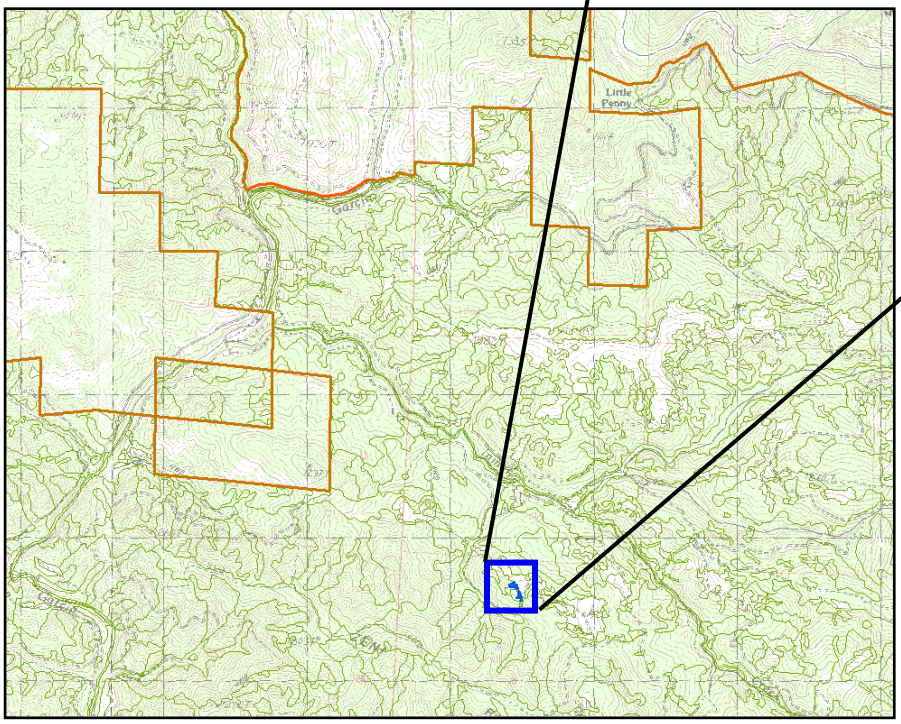


Pampas grass along roadway



Stands of pampas grass are often too narrow to capture in polygonal form and must include the adjacent roadway to depict location. Mapped based on reconnaissance only; stands are too small to observe on the 1-meter NAIP imagery.

4600 – Serpentine Grasses



Two small polygons mapped, (possibly one stand). Delineated polygons contain a total area of about 2/3 of an acre. Location based on information supplied by local field ecologists and correlated to a PI signature.

6. Garcia River Mapping Mapping Classification (With Notations)

Updated, October 1, 2007 – Based on July & August Reconnaissance Effort with TNC & DFG & Contacting Botanists.

CLASS

Formation

Mapping Units – Potential Groups of Alliances or sub alliances

Alliance (Code ending in a zero)

Sub Alliance – Potential Associations **(Associations not defined)**

Note: Species denoted with parenthesis in the name may or may not occur in individual stands.

1000 – 2000 FORESTS & WOODLANDS

1100 – Temperate Broadleaf Sclerophyll Evergreen Forests

1110 – California Bay Alliance

Noted as mappable stands only in a few areas, more often as a component to riparian vegetation in drainages in the eastern portion of the study area. Several small pure stands were noted on steep south facing upper slopes adjacent to small patches of chaparral.

1120 – Canyon Oak Alliance

Noted on steep canyons in sparse to moderate cover in the eastern and southern portion of the mapping area, most canyon oak in the study is associated with Douglas-fir – mapped as type 1213.

1130 – Tanoak Alliance

Noted in forest settings primarily in the central portions of the study as pure stands or where tanoak strongly dominates the canopy. Conifers (coast redwood or Douglas-fir) can be present as emergent to the hardwood canopy up to 10-20% cover. "Hack & squirt" areas (areas where tanoaks have been removed) were also noted and probably would still fall into this alliance (or type 1221) with a sparse hardwood and conifer cover. Dense young stands were also noted in recent burn recovery areas adjacent to coastal whitethorn.

1140 – Giant Chinquapin Alliance

Noted on very steep north trending slopes south of the main branch of the Garcia River in small narrow bands; canyon oak and tanoak is a common component and is often adjacent to the stands. Douglas-fir can also be a sparse emergent to the canopy. May not be separable from adjacent vegetation; often patchy. Chinquapin is often a component to other hardwood or Douglas-fir-hardwood types.

1200 – Temperate Needleleaf Evergreen Forests & Woodlands

1210 – Douglas-fir Alliance

1211 – *Pseudotsuga menziesii – Pinus lambertiana*
Noted especially in the eastern portions on most ridges, upper slopes and adjacent spurs; several major ridgelines are conspicuously absent of sugar pine and it is unclear why, maybe as a result of previous logging efforts. The sugar pine component is generally quite young, (under 50 years old) and therefore lacks the branching patterns that make that species easily recognizable to the photo interpreter. Hardwood component is generally low, usually with small amounts of Pacific madrone.

1212 – *Pseudotsuga menziesii – Lithocarpus densiflorus (Arbutus menziesii)*
Noted on reconnaissance on mid and upper south trending slopes throughout the study area. Douglas-fir dominates the conifer layer; sugar pine can be a minor component. Tanoak is the dominant hardwood and ranges in cover from a minor component to an equal mixing of hardwoods and conifers. Pacific madrone may be a component to the hardwood layer in drier locations.

1213 – *Pseudotsuga menziesii – Quercus chrysolepis*
Noted on steep slopes and in canyons in the eastern and southern portion of the study area. Observed in woodland settings where canyon oak is a significant component to the sub canopy.

1214 – *Pseudotsuga menziesii – Quercus garryana – (Quercus parvula var. shrevei)*
Noted in the eastern most portions of the study area in woodland settings on gentle to moderate slopes. Oregon white oak may dominate in areas over the conifer layer which contains Douglas-fir emerging over the hardwood canopy with at least 10-20% cover. Understory appears primarily herbaceous. Shreve oak may be a component to the hardwood layer.

1220 – Coast Redwood Alliance

1221 – *Sequoia sempervirens – Pseudotsuga menziesii – Lithocarpus densiflorus*
Noted extensively throughout the mapping area – probably by far the most common mixed conifer type. Observed on all slope aspects on neutral to convex settings. Mapped where either conifer contains at least 10-20% relative cover; generally in forest settings with a minor to significant component of tanoak. California bay may be present in more mesic settings.

1222 – *Sequoia sempervirens– Lithocarpus densiflorus*
Noted as a much less common type than type 1221, and generally found in more mesic settings. Conifers are a strong dominant in the canopy – coast redwood is the sole dominant conifer but Douglas-fir can make up to 10-20% relative cover. Tanoak is generally a component to the canopy or sub canopy but is generally less common than type 1221.

1223 - *Sequoia sempervirens – Tsuga heterophylla (Pseudotsuga menziesii)*
Noted on steep north trending mid and lower slopes generally on the north branch of the Garcia River and to a lesser extent on the main branch. Reliably not found on south facing or gently sloping convex spurs. This is probably the most mesic of the conifer types noted on reconnaissance. Drier fringes of this type can have a minor component of Douglas-fir, sugar pine and/or tanoak. Red alder generally replaces tanoak as a hardwood component in dense small clumps within the stand. Coast redwood usually dominates the conifer layer. Understory components noted include thimble berry, swordfern and huckleberry.

1240 – Ponderosa Pine Alliance

Individuals noted in the northeastern portion of the study – no environmental or signature correlates developed as of yet.

1300 – Temporarily Flooded Cold Season Deciduous Forests & Woodlands

1310 – Red Alder Alliance

1311 – *Alnus rubra – (Salix sitchensis)*
Modeled primarily in the western portions of the mapping area in riparian corridors where Mixed conifer is generally mapped upslope. White alder may be a shrubby component on exposed bars adjacent to the streambed.

1312 – *Alnus rubra* Upland
Noted in the westernmost portions of the study on low protected slopes in patchy stands adjacent to type 1223. Stands are usually pure alder and often quite dense and vary in size.

1320 – White Alder Alliance
Note: Alder species were not distinguished on the first reconnaissance: As per Jen's notes: White alder is more common in riparian settings in the drier upper elevations in the eastern portions of the mapping area.

2100 – Xeric Sclerophyll Evergreen Woodland

2101 – Shreve Oak – (Pacific Madrone – Oregon Oak) Mapping Unit
Currently not mapped to alliance level (overstory dominance) – generally a mixing of more xeric hardwoods. Dominance is difficult to distinguish and stand size is usually small.

2200 – Cold Season Deciduous Forests & Woodlands

2210 – Oregon Oak Alliance
Noted in the eastern portions of the study in pure stands or mixing with Shreve oak and Pacific madrone. Oregon oak is a dominant or sole component to the hardwood canopy. Douglas-fir can be an emergent component to the conifer layer of up to 10-20% cover. Several pure stands of Oregon oak were noted in dense woodland settings on convex north trending mid and upper slopes.

3000 – SHRUBLANDS

3100 – Temperate Broadleaf Sclerophyll Evergreen Shrublands

3110 – Coast Whitethorn Alliance
Noted throughout the study in extremely small stands, usually in forest openings or along road cuts. One very large stand was noted in a post burn area (Fishrock fire) mixing with scrubby madrone and tanoak and also as mappable pure stands.

3120 – Chamise – Buckbrush – Birchleaf Mountain Mahogany – Toyon Mapping Unit
Several very small patches were observed in the eastern portions of the mapping area on very steep upper south trending slopes in xeric rocky settings.

3130 – Manzanita Mapping Unit

3200– Temperate Microphyllous Evergreen Shrubland

3210 – Coyotebrush Alliance
Small patches noted in several areas.

3220 – French Broom

3300 – Temperate Xeric Mixed Drought-Deciduous Shrubland

3400 – Temporarily Flooded Cold Season Deciduous Shrubland

3410 – Sitka Willow Alliance
Noted in extremely small bands immediately adjacent to several branches of the Garcia River; probably most individuals will be included into the red alder (sitka willow) mapping unit.

3500 – Cold Season Deciduous Shrubland

4000 – HERBACEOUS

4100 – Saturated Temperate Perennial Graminoids
4101 – Bullrush – Cattails Mapping Unit

4200 – Seasonally or Temporarily Flooded Graminoids
4201 – Seasonally or Temporarily Flooded Springs, Seeps, & Meadows Mapping Unit Sedges/Rush/Wet Graminoids)
4202 – Seasonally or Temporarily Flooded Vernal Pools

4300 –Temperate Annual Grasslands or Forbs
4310 – California Annual Grasslands Alliance R=1
4320 – Ruderal & Disturbed Forb-dominated annuals
4321 – Pampas Grass

9000 – LAND USE OR SPARSELY or UNVEGETATED AREAS

9100 – Built-up
9200 – Agriculture (Vineyards)
9400 – Sparsely Vegetated or Unvegetated Areas
9410 – Landslides
9420 – Cliffs – Rock Outcrops – Steep eroded slopes
9430 – Stream Beds and Flats
9500 – Water

9999 – Field questions or Unknown

ADDITIONAL FIELDS CONTAINED IN THE DATABASE

November 2007

COVER CLASS DENSITITY VALUES (Separate fields – attributed to each polygon)

Note: Cover class categories for Conifers, Hardwoods & Shrubs – 1 field each

1 = >60%
2 = 40-60%
3 = 25-40%
4 = 10-25%
5 = 2-10%

HARDWOOD MORTALITY INDICATOR (death in the polygon due to the Hack and Squirt technique)

0 = No death
1 = low (1-10% of polygon contains dead hardwoods)
2 = moderate (10-25% of polygon contains dead hardwoods)
3 = severe (>25% of polygon contains dead hardwoods)

COMMENT

Field containing notes to TNC ecologists regarding questions or comments AIS photo interpreters had while mapping.

QC (INTERNAL QUALITY CONTROL)

Used by AIS photo interpreters to check their work and AIS QC staff to check PI's work. This is an internal field and has been set back to zero.

FIELDCHECK

0 = No Field Check – TNC ecologists may use these polygons to run their QC
1 = AIS PI Questions – Polygons denoted by photo interpreters where they have questions regarding the final label (call).

GIS-RELATED

Shape Length & Shape Area