Santa Cruz and Santa Clara Joint Fine Scale Vegetation Mapping Key
Final, Updated March 13, 2023

This key defines the map classes that will be used to create the countywide fine scale vegetation map of Santa Cruz and Santa Clara Counties. It is intended for use in image interpretation-based identification of vegetation. The key follows the hierarchy of the current United States National Vegetation Classification (USNVC) as of the publication of the Manual of California Vegetation (Sawyer et al., 2009). The USNVC hierarchy is promoted by the Federal Geographic Data Committee (FGDC) and the Ecological Society of America's Vegetation Panel (FGDC 2008, Faber-Langendoen et al. 2014).

The key is based on a more detailed floristic classification and key, which was developed by analyzing survey data collected for this and other relevant projects.

This key is designed to be used for remote sensing-based mapping of vegetation in Santa Cruz and Santa Clara Counties. Fine scale map classes will be mapped across Santa Cruz and Santa Clara Counties as they are defined in this key. The fine scale map classes were chosen based on feasibility of mapping using a remote sensing approach. As such, the map classes are generally to the Alliance level of the NVC for woody types, and to the group or macrogroup level of the NVC for herbaceous types. For each fine scale map class, this key includes information about the fine scale map class's group, macrogroup, and member associations.

This key is designed for remote-sensing based mapping in a countywide approach. For mapping to a finer floristic resolution in the field (e.g., the association level), use the full floristic key. A finalized version of that document will be available in the coming months.

If it seems that a stand of vegetation could key to more than one type, review the descriptions (e.g., stand tables, environmental information) for each type to determine which one fits best.

Mapping Key Terms and Concepts

Stand: The basic physical unit of plant communities in a landscape. It has no set size. Some vegetation stands are very small, such as certain wetland types, and some may be several square kilometers in size, such as certain forest types. A stand is defined by two main unifying characteristics:

1. It has compositional integrity. Throughout the stand, the combination of species is similar. The stand is differentiated from adjacent stands by a discernible boundary that may be abrupt or occur indistinctly along an ecological gradient.

2. It has structural integrity. It has a similar history or environmental setting that affords relatively similar horizontal and vertical spacing of plant species. For example, a hillside forest originally dominated by the same species that burned on the upper part of the slopes but not the lower would be divided into two stands. Likewise, a sparse woodland occupying a slope with very shallow rocky soils would be considered a different stand from an adjacent slope with deeper, moister soil and a denser woodland or forest of the same species. The structural and compositional features of a stand are often combined into a term called homogeneity. For an area to meet the requirements of a stand, it must be homogeneous at the scale being considered.

United States National Vegetation Classification (USNVC): A central organizing framework for how all vegetation in the United States is inventoried and studied, from broad scale formations (biomes) to fine-scale plant communities. The purpose of the NVC is to produce uniform statistics about vegetation resources across the nation, based on vegetation data gathered at local, regional, or national levels. The CAKILE Elatest classification standard was published in by the FGDC (2008).

The hierarchy units in the USNVC from highest to lowest (i.e., broadest to finest) are:

1. Formation Class
2. Formation Subclass
3. Formation
4. Division
5. Macrogroup
6. Group
7. Alliance
8. Association

Alliance: Plant communities based on dominant/diagnostic species of the uppermost or dominant stratum. Accepted alliances are part of the U.S. National Vegetation Classification (USNVC) hierarchy. For Santa Cruz and Santa Clara Counties Vegetation and Habitat map, map classes are typically at the alliance level of the USNVC hierarchy.

Association: The most botanically detailed or finest-scale plant community designation based on dominant species and multiple co- or sub-dominant indicator species from any strata. Associations are also part of the USNVC hierarchy. The Santa Cruz and Santa Clara Counties Vegetation and Habitat Map typically does not go down to the association level of classification detail.

Asterisks (*) – Those types not currently known for the study area, but that have a high potential to occur, are sometimes included in the key with an * after the alliance or association name.

Dagger (†) – After floristic classification analysis was completed, CNPS recommended changes to membership rules for these vegetation types which could not be adopted in the mapping key after fine scale editing had been completed.

Botanical nomenclature: We use the PLANTS database (USDA NRCS 2016) as our standard for botanical names, including scientific names, so this information can be shared nationally with our USNVC partners. However, when a more current name has been assigned in *The Jepson Manual, second edition* (Baldwin et al. 2012), we may substitute names by the TJM2 and a species code beginning with “2JM” is assigned. General vegetation types, such as moss and lichen, have codes beginning with the number 2 (e.g., 2MOSS).

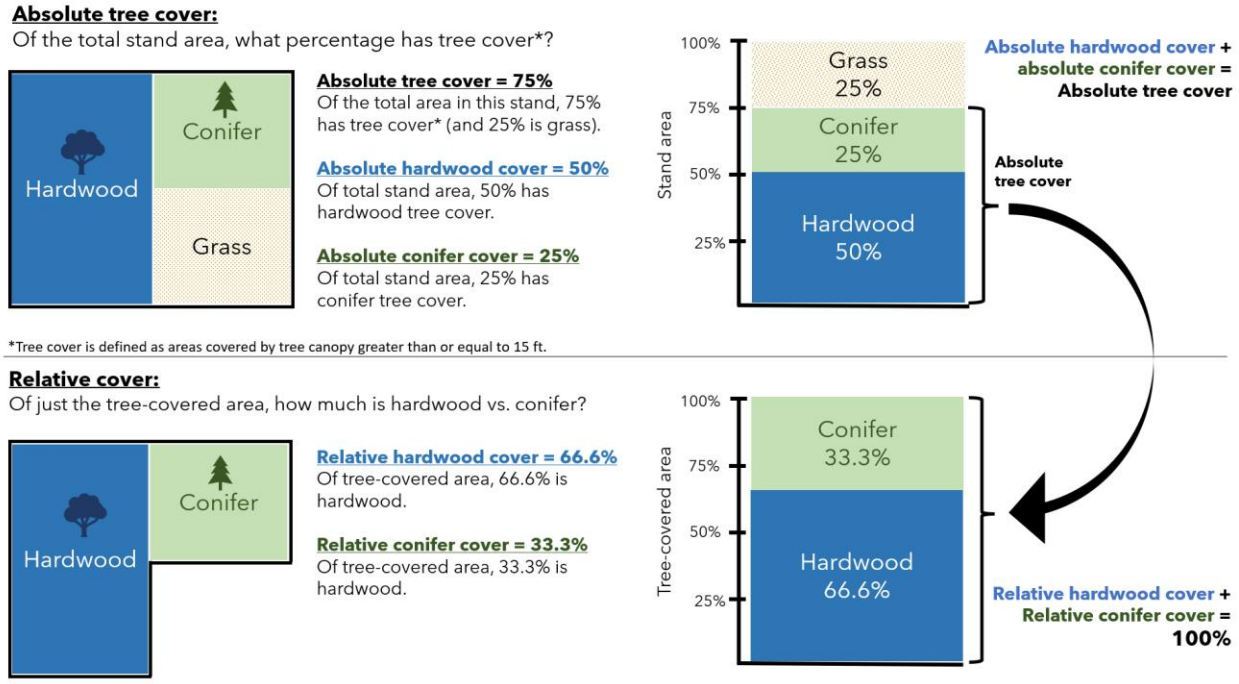
Plant community nomenclature: Taxa separated by "–" are typically within the same stratum; taxa separated by "/" are in different strata.

Cover: The primary metric used to quantify the importance/abundance of a particular species or a particular vegetation layer within a stand. It is measured by estimating the aerial extent of the living plants, or the bird's-eye view looking from above, for each category. Cover in this mapping project uses the concept of "porosity" or foliar cover rather than "opacity" or crown cover. Thus, field crews are trained to estimate the amount of light versus shade produced by the canopy of a plant or a stratum by taking into account the amount of shade it casts excluding the openings it may have in the interstitial

spaces (e.g., between leaves or branches). This is assumed to provide a more realistic estimate of the actual amount of shade cast by the individual or stratum which, in turn, relates to the actual amount of light available to individual species or strata beneath it. However, as a result cover estimates can vary substantially between leaf-on versus leaf-off conditions. Stands dominated by deciduous species (e.g., *Aesculus californica, Toxicodendron diversilobum*) should be sampled during *leaf-on* since they will have substantially less cover when leaves are absent and may key to another type.

Absolute cover: The actual percentage of the surface area of the survey that is covered by a species or physiognomic group (trees, shrubs, herbaceous), as in "tan oak covers 10 percent of the area being surveyed." Absolute cover of all species or physiognomic groups, when added together, may total greater than 100 percent, because this is not a proportional number and plants can overlap with each other. For example, a stand could have 25 percent tree cover in the upper layer, 40 percent shrub cover in the middle layer, and 50 percent herbaceous cover on the ground. However, when aerial interpretation is being used, the maximum absolute value is 100 percent, due to not being able to see the overlapping layers of vegetation from above.

Relative cover: The percentage of surface area within a survey area that is covered either by one species relative to other species within the same physiognomic stratum (tree, shrub, herbaceous) or one stratum relative to the total vegetation cover in a polygon. Thus, 50 percent relative cover of *Quercus douglasii* in the tree layer means that *Q. douglasii* comprises half the cover of all tree species within a stand, while 50 percent relative shrub cover means that shrubs make up half the cover of all vegetation within a stand. Relative cover values are proportional numbers that, when added together, total 100 percent for each species within a stratum or each stratum within a stand of vegetation.



Dominance: Dominance refers to the preponderance of vegetation cover in a stand of uniform composition and site history. It may refer to cover of an individual species as in "dominated by tan oak," or it may refer to dominance by a physiognomic group, as in "dominated by shrubs." When we use the

term in the key a species is dominant if it is in relatively high cover in each stand (e.g. relative cover exceeds 50% of a layer's total cover), however, see "dominance by layer," below, for further explanation.

> *Strongly dominant*: A species in the dominant life form stratum has 60 percent *or* greater relative cover.
>
> *Co-dominant*: Co-dominance refers to two or more species in a stand with similar cover. Specifically, each species has between 30 to 60 percent relative cover. For example, in a coastal scrub stand with 5% *Baccharis pilularis*, 4% *Frangula californica*, and 3% *Rubus ursinus* (total 13% shrub cover), technically only the *Baccharis* (5/13 = 39% relative cover) and the *Frangula* (4/13 = 31% relative cover) would be co-dominant because *Rubus* would only have 23% relative cover (3/13 = 23%).
>
> *Sub-dominant:* Sub-dominance refers to instances where the relative cover of a species is <30%. It is meant to identify species with notable cover that do not co-dominate with the dominants.
>
> *Intermix/ co-occur:* Indicates presence throughout the stand without indication of cover.

Characteristic/Diagnostic species: Should be present in at least 80 percent of the stands of the type, with no restriction on cover. Relatively even spacing throughout the stand is important particularly in vegetation with low total cover since an even distribution of the diagnostic species is a much better indicator than overall cover. Characteristic species that are evenly distributed are better indicators of a type than species with higher cover and patchy distribution.

Dominance by layer: Tree, shrub, and herbaceous layers are considered physiognomically distinct. A vegetation type is considered to belong to a certain physiognomic group if it is dominated by one layer. Layers are prioritized in order of height. If the tallest layer is dominant and characteristic (see definitions above) across multiple stands of one type, the alliance is usually named by the dominant and/or characteristic species of the tallest layer. Average covers within the dominant layer reflect the "modal" concept of the health/age/environment of a particular vegetation type. For example, a higher average cover of woody plants within a stand not recently affected by disturbance reflects a mode of general availability of water, nutrition, and equitable climate, while lower average cover under similar conditions would reflect lower availability of these things.

Woody plant: A vascular plant species that has a noticeably woody stem (e.g., shrubs and trees). It does not include herbaceous species with woody underground portions such as tubers, roots, or rhizomes.

Tree: A one-stemmed woody plant that normally grows to be greater than 5 meters tall. In some cases, trees may be multi-stemmed (ramified due to fire or other disturbance) but the height of mature plants typically exceeds 5 meters. If less than 5 meters tall, undisturbed individuals of these species are usually single-stemmed. Certain species that resemble shrubs sometimes but may be trees in other areas (e.g., *Aesculus californica*) are, out of statewide tradition or by the USNVC, called trees. It behooves one to memorize which species are "traditionally" placed in one life-form or another. We use the accepted lifeforms in the USNVC or the Plants Database (USDA, NRCS, 2015) to do this.

Tree-characterized vegetation: Trees are evenly distributed throughout the stand. In the Mediterranean climate of the North Coast, tree-dominated alliances typically have >10% absolute tree cover, providing a consistent structural component.

Forest: In the USNVC, a forest is defined as a tree-dominated stand of vegetation with 60% or greater absolute cover of trees. Most forest alliances tend to have average cover of trees >60%, but individual stands under certain conditions may drop lower than 60%.

Woodland: In the USNVC, a woodland is defined as a tree-dominated stand of vegetation with between 25% and 60% absolute cover of trees. Most woodland alliances tend to have average cover of trees with 25-60%, but individual stands under certain conditions may drop higher or lower than this range.

Emergent: A plant (or vegetation layer) is considered emergent if it has a low cover and rises above a layer with more cover in the stand. For example, individual *Pseudotsuga menziesii* trees may comprise an emergent tree layer of 2 percent cover over dense *Gaultheria shallon* and *Rubus parviflorus* in the shrub understory; the stand would be considered within the *Gaultheria shallon - Rubus (ursinus)* Shrubland Alliance because the total tree cover is <10% and the shrub cover is >10%. Additionally, medium to tall shrubs are not considered emergent over shorter shrubs, but short trees are considered emergent over tall shrubs.

Shrub: A multi-stemmed woody plant that usually is between 0.2-5 meters tall. Definitions are blurred at the low and high ends of the height scales. At the tall end, shrubs may approach tree-size based on disturbance frequencies (e.g., old-growth re-sprouting chaparral species such as *Cercocarpus montanus*, *Fremontodendron californicum*, *Prunus ilicifolia*, and so forth, may frequently attain "tree size", but are still typically multi-stemmed and are considered shrubs in this key. At the short end, woody perennial herbs or sub-shrubs of various species are often difficult to categorize into a consistent life-form (e.g., *Eriogonum latifolium, Lupinus chamissonis*); in such instances, we refer to the NRCS Plants Database or "pick a lane" based on best available definitions.

Sub-shrub: A multi-stemmed plant with noticeably woody stems less than 0.5 meter tall. May be easily confused with a perennial herb or small shrub. We lump them into the "shrub" category in stand tables and descriptions of vegetation types.

Shrub-characterized vegetation: Shrubs (including sub-shrubs) are evenly distributed throughout the stand, providing a consistent (even if sparse) structural component; the stand cannot be characterized as a tree stand; and one or both of the following criteria are met: (1) shrubs influence the distribution or population dynamics of other plant species; (2) shrubs play an important role in ecological processes within the stand. For the purposes of this project, shrub alliances have at least 10% absolute shrub cover.

Herbaceous plant: Any species of plant that has no main woody stem development and includes grasses, forbs, and perennial species that die back each year.

Herb-characterized vegetation: Herbs are evenly distributed throughout the stand, providing a consistent (even if sparse) structural component and play an important role in ecological processes within the stand. The stand cannot be characterized as a tree or shrub stand.

Nonvascular vegetation: Nonvascular organisms characterize a stand, providing a consistent (even if sparse) structural component and playing an important role in ecological processes within the stand.

Santa Cruz and Santa Clara Vegetation Map Notes and Conventions

- Herbaceous non-irrigated rangeland will be classed as herbaceous vegetation, not as agriculture.
- High resolution orthophotography from summer, 2020, will be the base imagery for mapping.
- All cover values in the key are non-overlapping cover values[1].
- Urban areas will be mapped using an urban window strategy[2]. An "urban window" mask will be created that identifies urban land use. The urban window will encompass fully developed areas that are part of a developed urban core. The urban window will be created using Definiens Ecognition and will be based on percentage of impervious surfaces. The areas mapped as urban land use will be labeled as urban window in the Santa Cruz and Santa Clara Counties Vegetation and Habitat Map. Vegetation within the urban window will be mapped to the same MMUs as for non-urban areas, but only to the lifeform level of floristic detail (see pages 7 & 8 of this key).
- This key is guided by the hierarchy of the current U.S. National Vegetation Classification (Faber-Langendoen et al. 2009) promoted by the Ecological Society of America's Vegetation Panel and the Federal Geographic Data Committee (FGDC 2008).
- Major roads are shown in the vegetation map, but minor roads are not. Major road polygons in the vegetation map are built from centerlines of major roads from the Santa Cruz and Santa Clara Counties Roads layer.
- For cultural types, the attribute table will contain a field that crosswalks fine scale map class to h USNVC name. The lookup for NVC cultural names are shown in Table 1 below.
- Stands will be assigned percent cover values as follows:
    - All forested, shrub, and herbaceous stands will receive absolute cover for trees in 1% increments
    - Absolute percent hardwood and conifer cover will be assigned to all stands
- Minimum mapping units (MMUs) will vary by the feature being mapped. Table 1 shows project minimum mapping units.

[1] Two or more overlapping crowns are only counted once toward the stand's cover, hence the maximum possible non-overlapping canopy cover for a stand is 100 percent

[2] For a more detailed description of the urban window approach, see page 38 of the Northern Sierra Nevada Foothills Vegetation Project: Vegetation Mapping Report: https://www.cnps.org/cnps/vegetation/pdf/n_sierra_fh_vegmap_report-2011.pdf

Santa Cruz and Santa Clara Counties vegetation map - minimum mapping units by feature type

Feature Type	Minimum Mapping Unit
Agricultural Classes	1/4 Acre
Woody Upland Classes	1/2 acre for contrasting lifeforms (e.g., '***forest fragments***' surrounded by non-forest); 1 acre for different alliances in the same lifeform
Woody Riparian Classes	1/4 acre for contrasting lifeforms; 1 acre for different alliances in the same lifeform
Upland Herbaceous Classes	1/2 acre for contrasting lifeforms; 1 acre for different alliances in the same lifeform
Wetland Herbaceous Classes	1/4 acre for contrasting lifeforms; 1 acre for different alliances in the same lifeform
Bare Land	1/2 Acre
Impervious Features (in the impervious surfaces map)	1000 square feet; 200 square feet for buildings*
Developed (in the vegetation map)	1/5 Acre
Tidal Wetland	400 square feet
Water	400 square feet

SANTA CRUZ AND SANTA CLARA VEGETATION MAP KEY

1. Water covers the area as it appears in the June 2018 high resolution imagery

   Water

2. Area is a major road, with polygon derived from county GIS road data (see bulleted discussion above)

   Major Road

3. Area is a manmade developed area greater than 0.2 acres. Areas should be considered developed if they contain significant man-made impervious cover or are highly altered by humans. Highly altered areas include lawns, heavily landscaped garden and patio areas, bocce courts, tennis courts, sport courts, developed horse riding arenas, baseball fields, soccer fields, swimming pools, and playground areas.

   Developed

4. One or more layers of the vegetation's structure and/or composition determined by human agricultural activities such as planting, tilling, cropping, mowing, harvesting, and/or irrigating. Agricultural areas with overstory trees (e.g., a valley oak savannah on an irrigated pasture) will be mapped as forest in the vegetation and habit map (and as agriculture in the separately published Santa Cruz and Santa Clara Counties Croplands Layer).

   4a. Area is an orchard or grove of fruit or nut trees.

   Orchard or Grove

   4b. Area is a vineyard.

   Vineyard

   4c. Areas that are either active annual or perennial row crops or are tilled and prepped for planting of row crops or are in between plantings. Row crops include annual crops like lettuce, spinach, corn, etc. and perennial crops such as strawberries, raspberries, lavender, or actively managed Christmas tree farms. Temporary greenhouses should be classified as row crops.

   Row Crop

   4d. Area is a nursery or horticultural area.

   Nursery or Ornamental Horticulture Area

   4e. Area is an intensively managed hayfield that is mechanically turned over every year.

Intensively Managed Hayfield

4f. Area is an irrigated pasture that appears green in the June 2018 imagery.

Irrigated Pasture

5. Trees (woody vegetation greater than 5 meters in height) are at least 10% absolute cover

Class A. Woodland and Forest Vegetation[3] (page 10)

6. Woody shrubs (basal, multi-branched woody plants < 5 m in height) are at least 10% absolute cover

Class B. Shrubland Vegetation[4] (page 23)

7. Herbaceous vegetation is at least 10% absolute cover and is not overtopped by woody vegetation of equal or higher cover. Herbs in some cases (arundo, typha, etc.) may be as tall as some woody vegetation.

Class C. Herbaceous Vegetation[5] (page 38)

8. Areas where shrub, forest, and herbaceous cover are each less than 10% absolute cover. Barren or sparse areas of little vegetation. These are cliffs, rock outcroppings, river bars, beaches and the footprints of large mudslides.

Barren and Sparsely Vegetated

[3] The lifeform map divides this class into "native forest" and "non-native forest & woodland." Non-native forest is defined as stands dominated by non-native, ornamental, or landscaping trees. Common non-native trees in Santa Cruz and Santa Clara Counties include *Eucalyptus*, *Pinus radiata*, and *Hesperocyparis macrocarpa.* These three species will be mapped to their respective alliances in the fine scale vegetation map; other non-native and ornamental genera will be mapped to a generic non-native tree class in the final vegetation and habitat map.

[4] The lifeform map divides this class into "native shrub" and "non-native shrub." Non-native shrubs are defined as stands dominated by non-native, ornamental, or landscaping shrubs. These stands will also be mapped as non-native shrub in the final vegetation and habitat map.

[5] The lifeform map divides this class into "herbaceous" and "non-native herbaceous." Non-native herbaceous is defined as stands dominated by invasive or ruderal herbs. Common non-native herbaceous types which can be reliably photointerpreted include *Conium maculatum, Carthamus lanatus, and Cortaderia* spp. among others. These species will be mapped to their respective alliances in the fine scale vegetation map; other non-native and ruderal genera will be mapped to a generic non-native herbaceous class in the final vegetation and habitat map.

Class A. Woodland and Forest Vegetation

Section I: Woodlands and forests dominated or characterized by needle or scale-leaved conifer trees. Includes *Hesperocyparis*, *Pinus*, *Pseudotsuga*, and *Sequoia* (relative tree cover >30% conifer).

1. *Sequoia sempervirens* and/or *Pseudotsuga menziesii* dominant or co-dominant with hardwoods or *Pinus ponderosa* in the tree canopy.

Vancouverian Coastal Rainforest Macrogroup

Californian Coastal Redwood Forest Group

1a. *Sequoia sempervirens* has >20% relative conifer cover (30% conifer cover that is 24% DF and 5% RW would key to this class). Associated trees often include *Acer macrophyllum, Notholithocarpus densiflorus, Pseudotsuga menziesii, Torreya californica,* and *Umbellularia californica*, which are typically sub to co-dominant but may occasionally exceed *Sequoia* in cover. *Vaccinium ovatum*, *Oxalis oregana*, and *Woodwardia fimbriata* may intermix in the understory.

Fine Scale Map Class: *Sequoia sempervirens* Alliance

Member Associations:
Sequoia sempervirens Association
Sequoia sempervirens – Acer macrophyllum – Umbellularia californica Association
Sequoia sempervirens – Arbutus menziesii / Vaccinium ovatum Association
Sequoia sempervirens – Notholithocarpus densiflorus / Vaccinium ovatum Association
Sequoia sempervirens – Pseudotsuga menziesii – Notholithocarpus densiflorus Association
Sequoia sempervirens – Pseudotsuga menziesii – Umbellularia californica Association
Sequoia sempervirens – Umbellularia californica Association
Sequoia sempervirens / Oxalis oregana Association*
Sequoia sempervirens / (Pteridium aquilinum) – Woodwardia fimbriata Riparian Association
Sequoia sempervirens / Polystichum munitum Association

2. *Pinus ponderosa* and/ or *Pseudotsuga menziesii* dominant or co-dominant with hardwoods in the tree canopy.

Southern Vancouverian Montane-Foothill Forest Macrogroup

Californian Montane Conifer Forest & Woodland Group

2a. *Pinus ponderosa* is dominant or co-dominant in the overstory, usually at greater than 20% absolute cover and with a dense understory of shrubs.

***Pinus ponderosa* Alliance**
Fine Scale Map Class: *Pinus ponderosa – (Quercus agrifolia – Arbutus menziesii)*
Provisional Association

2b. *Pinus ponderosa* is scattered, usually less than 15% absolute cover (and the tree canopy <25% absolute cover), with an understory of subshrubs and herbs characteristic of sand parkland. It occurs primarily on south- and west-facing slopes in sand habitats of Santa Cruz County.

Fine Scale Map Class: *Pinus ponderosa / Chorizanthe pungens* Association

2c. *Pseudotsuga menziesii* is dominant or co-dominant *with Arbutus menziesii, Notholithocarpus densiflorus, Quercus agrifolia, Q. chrysolepis,* or *Umbellularia californica.* If *P. menziesii* co-dominates with *Quercus kelloggii* key to that alliance (*Q. kelloggii* Alliance (step 5c4) below).

Southern Vancouverian Dry Foothill Forest & Woodland Macrogroup

Californian Moist Coastal Mixed Evergreen Forest Group

***Pseudotsuga menziesii – (Notholithocarpus densiflorus – Arbutus menziesii)* Alliance**
Fine Scale Map Class: *Pseudotsuga menziesii – Notholithocarpus densiflorus / Vaccinium ovatum* Association

Member Associations:
Pseudotsuga menziesii / *(Toxicodendron diversilobum)* Association
Pseudotsuga menziesii – Arbutus menziesii Association
Pseudotsuga menziesii – Chrysolepis chrysophylla – Notholithocarpus densiflorus Association
Pseudotsuga menziesii – Notholithocarpus densiflorus – Umbellularia californica / Toxicodendron diversilobum Association*
Pseudotsuga menziesii – Notholithocarpus densiflorus / Vaccinium ovatum Association
Pseudotsuga menziesii – Quercus agrifolia Association
Pseudotsuga menziesii – Quercus chrysolepis Association
Pseudotsuga menziesii – Umbellularia californica / (Toxicodendron diversilobum) Association
Pseudotsuga menziesii – (Umbellularia californica) / Frangula californica Association
Pseudotsuga menziesii – Umbellularia californica / Polystichum munitum Association
Pseudotsuga menziesii / Baccharis pilularis Association
Pseudotsuga menziesii / Corylus cornuta / Polystichum munitum Association

3. Forests and Woodlands with tree canopy dominated or co-dominated by needle or scale-leaved conifer trees, with relative tree cover > 60% conifer (except in the case of *Pinus ponderosa*). Close-cone or xerophyllic conifers, including *Hesperocyparis* spp., *Juniperus californica, Pinus attentuata, Pinus coulteri, Pinus muricata, Pinus ponderosa, Pinus radiata* or *Pinus sabiniana* is dominant or co-dominant in the overstory.

California Forest & Woodland Macrogroup

Californian Conifer Forest & Woodland Group

3a. *Hesperocyparis abramsiana* dominates on slopes of sandstone or other substrates. *Adenostoma fasciculatum*, *Arctostaphylos* spp., and *Quercus parvula* or *Quercus wislizeni* are commonly found in stands.

***Hesperocyparis (pigmaea, abramsiana, macrocarpa, goveniana)* Alliance**
Fine Scale Map Class: *Hesperocyparis abramsiana / Arctostaphylos spp. – Adenostoma fasciculatum* Association

3b. *Pinus attenuata* dominates or co-dominates with Quercus chrysolepis in the tree overstory, often with moderately dense cover of shrubs such as Arctostaphylos spp. and Vaccinium ovatum in the understory.

Fine Scale Map Class: *Pinus attenuata* Alliance
Member Associations:
Pinus attenuata / Arctostaphylos (crustacea) Association
Pinus attenuata / Arctostaphylos (manzanita, canescens) Association

3c. *Pinus coulteri* dominates or co-dominates in the tree overstory.

Fine Scale Map Class: *Pinus coulteri* Alliance*

3d. *Pinus sabiniana* is dominant or co-dominant in the tree canopy with *Juniperus californica*, *Juniperus occidentalis*, *Pinus coulteri*, *Quercus chrysolepis* and *Quercus wislizeni*. *Pinus sabiniana* is dominant in the tree canopy with *Aesculus californica*.

Fine Scale Map Class: *Pinus sabiniana* Woodland Alliance
Member Associations:
Pinus sabiniana / Artemisia californica – Ceanothus ferrisiae – Heteromeles arbutifolia Association
Pinus sabiniana / Ceanothus cuneatus – Rhamnus ilicifolia Association
Pinus sabiniana / herbaceous Association
Pinus sabiniana / Quercus durata Association

3e. Naturally occurring stands of *Pinus radiata* or *Pinus muricata* dominant, co-dominant with conifers, or subdominant with hardwoods in the tree overstory and/or regenerating tree layer. The understory may include moderate to dense cover of shrubs such as *Arctostaphylos spp., Baccharis pilularis, Gaultheria shallon, Toxicodendron diversilobum* and *Vaccinium ovatum*. Most stands of Monterey Pine in Santa Cruz County are planted or naturalized except for a limited area between Ano Nuevo and Davenport.

Fine Scale Map Class: *Pinus muricata – Pinus radiata* Alliance
Member Associations:
Pinus radiata – Quercus agrifolia / Toxicodendron diversilobum Association*
Pinus radiata / Toxicodendron diversilobum Association

3f. Stands dominated or co-dominated by *Juniperus californica.* While no surveys were collected, the alliance may potentially occur in northeast Santa Clara Co.

with *Pinus sabiniana* and *Quercus douglasii*. When *Q. douglasii* co-dominates with *J. californica*, the stand is mapped as *Q. douglasii.*

Great Basin-Intermountain Dry Shrubland & Grassland Macrogroup
Mojave Mid-Elevation Mixed Desert Scrub Group
Fine Scale Map Class: *Juniperus californica* Alliance*

3g. Stands dominated Stands dominated or co-dominated by planted or naturalized conifer species including *Hesperocyparis macrocarpa* and/or *Pinus radiata.*

Californian Ruderal Forest Macrogroup

Californian Ruderal Forest Group

***Hesperocyparis macrocarpa – Pinus radiata* Semi-Natural Alliance**

3g1. *Pinus radiata* dominates the conifer canopy. Planted stands of *Pinus radiata* are found along roadsides or on slopes where they were introduced. Note that native populations of *Pinus radiata* occur in Santa Cruz Co. in a limited area between Ano Nuevo and Davenport; these would key to the *Pinus muricata – Pinus radiata* Alliance above.

Fine Scale Map Class: *Pinus radiata* Plantation Provisional Semi-Natural Association

3g2. Planted *Hesperocyparis macrocarpa* domaintes in patches or along roads. In this region of California, stands are considered semi-natural since they are not naturally occurring.

Fine Scale Map Class: *Hesperocyparis macrocarpa* Ruderal Semi-Natural Association

Section II. Woodlands, forests, and riparian vegetation dominated mainly by native and non-native broadleaved evergreen and deciduous trees. Includes species of *Aesculus*, *Acer*, *Alnus*, *Arbutus*, *Fraxinus*, *Juglans*, *Notholithocarpus*, *Populus*, *Quercus*, *Salix*, and *Umbellularia*.

4. Vegetation dominated, co-dominated, or characterized by one or more of the following broadleaf trees: *Acer macrophyllum, Arbutus menziesii*, *Chrysolepis chrysophylla*, *Notholithocarpus densiflorus* or *Umbellularia californica*.

4a. Broadleaf trees *Arbutus menziesii* and/or *Notholithocarpus densiflorus* dominate, co-dominate, or characterize moist, coastal, mixed evergreen forests and woodlands.

4a1. *Arbutus menziesii* is either dominant with sub-dominant *Quercus agrifolia* or is dominant to co-dominant with *Quercus kelloggii* and/or *Umbellularia californica*. *Pseudotsuga menziesii*, *Heteromeles arbutifolia*, and *Toxicodendron diversilobum* are often present. If *Arbutus* is sub- to co-dominant with *Quercus agrifolia*, *Q. chrysolepis*, or *Notholithocarpus densiflorus*, key to the one of these alliances instead of *A. menziesii*.

Southern Vancouverian Dry Foothill Forest & Woodland Macrogroup

Californian Moist Coastal Mixed Evergreen Forest Group

Fine Scale Map Class: *Arbutus menziesii* Alliance
Member Associations:
Arbutus menziesii – (Quercus agrifolia) Association
Arbutus menziesii – Umbellularia californica Association

4a2. *Notholithocarpus densiflorus* is strongly dominant in the broadleaf canopy or co-occurs with sub-dominant to co-dominant *Arbutus menziesii* or *Umbellularia californica.*

Fine Scale Map Class: *Notholithocarpus densiflorus* Alliance
Member Associations:
Notholithocarpus densiflorus Association
Notholithocarpus densiflorus – Arbutus menziesii Association
Notholithocarpus densiflorus – Quercus chrysolepis Association
Notholithocarpus densiflorus / Vaccinium ovatum Association

4b. *Chrysolepis chrysophylla is strongly dominant in dense, clonal stands occurring on upper slopes and ridges, often transitional between forest and chapparal.*

Californian Chaparral Macrogroup

Californian Maritime Chaparral Group

Fine Scale Map Class: *Arctostaphylos (nummularia, sensitiva) – Chrysolepis chrysophylla* Alliance
Member Associations:
Chrysolepis chrysophylla / Vaccinium ovatum Association

4c. *Umbellularia californica* is dominant in riparian stands with *Acer macrophyllum* or *Pseudotsuga menziesii* characteristically present. An understory of riparian shrubs such as *Rhododendron occidentale* may be present.

Fine Scale Map Class: *Umbellularia californica* Mapping Unit
***[Acer macrophyllum – Alnus rubra* Alliance]**
Member Associations:
Umbellularia californica – Acer macrophyllum Association
Umbellularia californica / Rhododendron occidentale Association*

4d. *Acer macrophyllum* co-dominates with *Pseudotsuga menziesii*. *Notholithocarpus densiflorus* may also be present and co-dominant.

Fine Scale Map Class: *Acer macrophyllum – Pseudotsuga menziesii / Polystichum munitum* Association

5. Vegetation dominated or co-dominated by the following broadleaf, primarily upland tree species: *Aesculus californica*, *Quercus agrifolia*, *Q. chrysolepis*, *Q. douglasii*, *Q. kelloggii*, *Q. lobata*, *Q. parvula*, *Q. wislizeni*, and/or *Umbellularia californica*.

California Forest & Woodland Macrogroup

Californian Broadleaf Forest & Woodland Group

5a. *Aesculus californica* dominates the broadleaf canopy in open to moderately dense woodlands. If *Umbellularia californica* is present, it is sub-dominant. A variety of herbs may be found in the understory. If there are 3 or more oaks whose cover combined is greater or equal to that of the *Aesculus californica*, then it goes to the *Quercus (agrifolia, douglasii, garryana, kelloggii, lobata, wislizeni)* Alliance.

Fine Scale Map Class: *Aesculus californica* Alliance
Member Associations:
Aesculus californica – Umbellularia californica Association
Aesculus californica / Toxicodendron diversilobum / Moss Association

5b. *Umbellularia californica* is either dominant or co-dominant with *Quercus agrifolia* in open to dense woodlands. If *Quercus agrifolia* is co-dominant and the shrub layer is significant with toyon, scrub oak, or manzanita, key to the *Quercus agrifolia* Alliance. Found in a variety of upland settings, such as coastal bluffs, inland ridges, steep north-facing slopes, rocky outcrops and post-fire landscapes. If *U*. *californica* is co-dominant with *Arbutus*, *Acer*, *Pinus sabiniana* on serpentine or *Pseudotsuga menziesii*, *Quercus chrysolepis, Q. lobata, Q*. *kelloggii* or *Sequoia*, key to one of these other hardwood or conifer alliances instead.

Fine Scale Map Class: *Umbellularia californica* Mapping Unit
Member Associations:
Umbellularia californica Association
Umbellularia californica – Quercus agrifolia / Toxicodendron diversilobum Association
Umbellularia californica – Quercus wislizeni Association
Umbellularia californica / Polystichum munitum Association
Umbellularia californica / Toxicodendron diversilobum Association

5c. One or more species of *Quercus* listed above (step 5), dominates or co-dominates in the tree overstory.

5c1. Multiple *Quercus* species intermix (at least three species) and it is difficult to assign to an alliance defined by one oak species. Codominating oaks

may include *Quercus agrifolia*, *Quercus chrysolepis*, *Quercus douglasii*, *Quercus kelloggii, Quercus lobata, Quercus parvula,* and/or *Quercus wislizeni.* If one or more oak species dominate, read steps to key to individual oak alliances below.

Fine Scale Map Class: *Quercus* (*agrifolia*, *douglasii*, *garryana*, *kelloggii*, *lobata*, *wislizeni*) Alliance

Member Associations:
Mixed oak – *Quercus agrifolia / Toxicodendron diversilobum* Association
Mixed oak – *Quercus kelloggii* / grass Association
Quercus douglasii – Quercus lobata – Quercus agrifolia / Toxicodendron diversilobum Association

5c2. *Quercus chrysolepis* is dominant or co-dominant with *Arbutus menziesii* or *Umbellularia californica* in the tree overstory. *Quercus wislizeni* is occasionally found as a sub-dominant tree.

Fine Scale Map Class: *Quercus chrysolepis* (tree) Alliance

Member Associations:
Quercus chrysolepis Association
Quercus chrysolepis – Arbutus menziesii – Notholithocarpus densiflorus var. *densiflorus* Association
Quercus chrysolepis – Umbellularia californica Association
Quercus chrysolepis / Arctostaphylos crustacea Association
Quercus chrysolepis / Quercus (wislizeni, parvula) Association*

5c3. *Quercus douglasii* dominates or co-dominates with *Aesculus californica, Pinus sabiniana, Quercus agrifolia,* or *Arbutus menziesii* in the tree overstory. The understory herbaceous layer is often moderately dense to dense, with a mixture of native and non-native forbs and grasses.

Fine Scale Map Class: *Quercus douglasii* Alliance

Member Associations:
Quercus douglasii – Aesculus californica / grass Association
Quercus douglasii – Pinus sabiniana / Ceanothus cuneatus – Cercocarpus montanus Association
Quercus douglasii – Pinus sabiniana / grass Association
Quercus douglasii – Quercus agrifolia Association
Quercus douglasii – Quercus wislizeni – Pinus sabiniana Association
Quercus douglasii/ Mixed herbaceous Association
Quercus douglasii/Toxicodendron diversilobum / grass Association

5c4. *Quercus kelloggii* or *Quercus × morehus* dominates or co-dominates with *Pinus ponderosa, Pseudotsuga menziesii, Q. agrifolia, Q. chrysolepis*, and/or *Umbellularia californica* in the tree overstory. *Arbutus menziesii* is often present as a sub-dominant species. Stands are found inland, above maritime influence, often on northerly slopes.

Fine Scale Map Class: *Quercus kelloggii* Alliance

Member Associations:
Quercus kelloggii – Arbutus menziesii – Quercus agrifolia Association

Quercus kelloggii – Pinus ponderosa Association
Quercus kelloggii – Pseudotsuga menziesii – Acer macrophyllum Association
Quercus kelloggii – Quercus chrysolepis Association
Quercus kelloggii / grass – herb Association
Quercus kelloggii / Toxicodendron diversilobum Association

5c5. *Quercus lobata* dominates or co-dominates with *Quercus agrifolia*, *Quercus douglasii, Q. kelloggii* and/or *Umbellularia californica* in the tree overstory in an upland habitat. Stands are typically found on slopes and summit valleys with an open grassy understory and *Toxicodendron diversilobum* is a common understory shrub.

Fine Scale Map Class: *Quercus lobata* Mapping Unit
Member Associations:
Quercus lobata – Quercus agrifolia / Grass Association
Quercus lobata – Quercus douglasii Association
Quercus lobata / Baccharis pilularis – Diplacus aurantiacus Association
Quercus lobata / Grass Association

5c6. *Quercus lobata* dominates or co-dominates with *Fraxinus latifolia, Quercus agrifolia, Q. kelloggii, Salix lasiolepis* and/or *Umbellularia californica* in the tree overstory. Stands are typically found along valley bottoms and lower slopes on seasonally saturated soils that may flood intermittently. Common understory shrubs include *Rosa californica*, *Rubus* spp., and *Toxicodendron diversilobum.*

Fine Scale Map Class: *Quercus lobata* Mapping Unit
Quercus lobata* Riparian Alliance
Member Associations:
Quercus lobata – Quercus agrifolia/ Toxicodendron diversilobum – (*Symphoricarpo*s spp.) Association
Quercus lobata / Rubus ursinus – Rosa californica Association
Quercus lobata / herbaceous semi-riparian Association

5c7. *Quercus agrifolia, Q. parvula, Q. wislizeni,* or other *Quercus* spp. dominates and/or codominates as a shrub or regenerating tree, co-occurring with *Umbellularia*, *Adenostoma*, and a variety of other shrubs that prefer more mesic, northerly exposures. *Quercus parvula*, *Q. wislizeni* and *Quercus agrifolia* are not always morphologically distinct.

Fine Scale Map Class: *Quercus wislizeni – Quercus chrysolepis* (shrub) Alliance*
Member Associations:
Quercus agrifolia – Quercus chrysolepis – Quercus parvula (shrub) Provisional Association*
Quercus parvula (shrub) Provisional Association*

5c8. The tree form of *Quercus parvula* and/or *Q. wislizeni* dominates or co-dominates in the tree canopy, often with *Arbutus menziesii*, *Pseudotsuga*

menziesii, and/or *Umbellularia californica*. If the oaks have a shrubby habit or are regenerating and intermixing with a variety of other shrub species, key to the *Quercus wislizeni – Quercus chrysolepis* (shrub) Alliance above and in step 17b.

Fine Scale Map Class: *Quercus wislizeni – Quercus parvula* (tree) Alliance
Member Associations:
Quercus (parvula, wislizeni) – Arbutus menziesii / Toxicodendron diversilobum Association
Quercus parvula var. shrevei Association
Quercus wislizeni – Aesculus californica Association
Quercus wislizeni / Heteromeles arbutifolia Association

5c9. *Quercus agrifolia* dominates or co-dominates with *Arbutus menziesii* in the canopy in an upland setting (see step 6 for riparian settings). If *Q. douglasii* (or hybrid *Q. ×eplingii*), *Q. lobata*, *Q. wislizeni* or *Umbellularia californica* is dominant to co-dominant, key to one of these other alliances instead of *Q. agrifolia*. The understory herbaceous layer often contains a mixture of native and non-native herbs and/or shrubs.

Fine Scale Map Class: *Quercus agrifolia* Alliance†
Member Associations:
Quercus agrifolia Association
Quercus agrifolia – Aesculus californica Association
Quercus agrifolia – Arbutus menziesii – Umbellularia californica Association
Quercus agrifolia – Arbutus menziesii / Corylus cornuta – Rubus spp. Association
Quercus agrifolia – Quercus kelloggii Association
Quercus agrifolia – Umbellularia californica / Heteromeles arbutifolia – Quercus berberidifolia Association
Quercus agrifolia / Adenostoma fasciculatum – (Salvia mellifera) Association
Quercus agrifolia / Arctostaphylos (crustacea) Association
Quercus agrifolia / Artemisia californica Association
Quercus agrifolia / Frangula californica – Heteromeles arbutifolia Association
Quercus agrifolia / grass Association
Quercus agrifolia / Toxicodendron diversilobum Association

6. *Acer negundo*, *Juglans hindsii*, *Platanus racemosa, Populus fremontii, Quercus agrifolia,* or *Salix laevigata* is dominant, co-dominant or characteristic in permanently moist or riparian settings, where sub-surface water is available all year. Nearby upland vegetation is often dominated by broadleaf evergreen or deciduous trees, as opposed to conifers.

Interior Warm & Cool Desert Riparian Forest Macrogroup

Western Interior Riparian Forest & Woodland Group

6a. *Acer negundo* dominates in the tree overstory, often along major streams and rivers, with other riparian plants such as *Fraxinus*, *Populus*, *Rubus*, and *Salix*. Stands are considered rare in the state and may be small and monospecific.

***Acer negundo* Alliance**
Fine Scale Map Class: *Acer negundo / (Rubus ursinus)* Association

6b. *Salix laevigata* dominates along streams, rivers, ditches, floodplains, and lake edges. If *Populus fremontii* is emergent with >5% absolute cover, key to the *Populus fremontii – Fraxinus velutina – Salix gooddingii* Alliance**.** Associated trees and shrubs include *Alnus rhombifolia*, *Populus fremontii*, *Quercus agrifolia*, *Rubus*, *Salix*, and others.

Fine Scale Map Class: *Salix gooddingii – Salix laevigata* Alliance
Member Associations:
Salix laevigata Association
Salix laevigata – (Cornus sericea – Ribes spp.*) / Scirpus microcarpus – Carex* spp. Association
Salix laevigata / Salix lasiolepis Association

6c. *Juglans hindsii* or hybrids dominate in stands along riparian corridors, floodplains, and terraces. Other riparian species may be present, including *Acer*, *Fraxinus*, and *Rubus*. Type is rarely found in Santa Clara Co.

Fine Scale Map Class: Juglans hindsii* and Hybrids Special Stands and Semi-Natural Alliance
Member Associations:
Juglans hindsii / Sambucus nigra Provisional Association

6d. *Populus fremontii* dominates or co-dominates with *Acer negundo*, *Juglans*, and/or *Salix*, with *Populus* having as little as 5% absolute cover. If *Juglans hindsii* is co-dominant, but *Populus* has at least 20% relative cover in the tree layer, key to this alliance.

Fine Scale Map Class: *Populus fremontii – Fraxinus velutina – Salix gooddingii* Alliance
Member Associations:
Populus fremontii – Quercus agrifolia Association
Populus fremontii – Salix laevigata / Salix lasiolepis – Baccharis salicifolia Association

6e. *Quercus agrifolia* dominates in a riparian setting, or *Platanus racemosa* is dominant, co-dominant, or characteristically present at >15% relative cover in the tree canopy of riparian habitats with *Acer macrophyllum, Acer negundo, Aesculus californica, Juglans hindsii, Quercus agrifolia, Quercus lobata, Salix laevigata, or Umbellularia californica.* If *Populus fremontii* or *Populus trichocarpa* is present, key to the alliance of the species with the most cover.

Fine Scale Map Class: *Platanus racemosa – Quercus agrifolia* Alliance
Member Associations:
Platanus racemosa – Quercus agrifolia Association
Platanus racemosa – Quercus agrifolia – Populus fremontii – Salix laevigata Association
Platanus racemosa – Quercus lobata Association
Platanus racemosa – Salix laevigata / Salix lasiolepis – Baccharis salicifolia Association
Platanus racemosa / annual grass Association
Platanus racemosa / Toxicodendron diversilobum Association

Quercus agrifolia / Salix lasiolepis Association
Umbellularia californica – Platanus racemosa Association

7. *Alnus rhombifolia*, *Alnus rubra, Acer macrophyllum, Fraxinus latifolia*, *Populus trichocarpa,* and/or *Salix lucida* are dominant, co-dominant, or characteristic of broadleaf riparian tree vegetation. Stands are more likely to occur near cool temperate coniferous forests, unlike vegetation of the Western Interior Riparian Forest & Woodland Group described above. Found along riparian corridors, incised canyons, seeps, stream banks, mid-channel bars, floodplains, and terraces.

Vancouverian Flooded & Swamp Forest Macrogroup

North-Central Pacific Lowland Riparian Forest Group

7a. *Populus trichocarpa* dominates or co-dominates with *Alnus rubra* in the tree overstory. Stands for this type will often have other riparian trees present, such as *Acer macrophyllum*, *Acer negundo*, *Alnus rhombifolia*, *Alnus rubra*, *Fraxinus latifolia*, *Morella californica*, *Platanus racemosa*, *Populus fremontii*, *Quercus agrifolia*, *Salix exigua*, *Salix hookeriana*, *Salix laevigata*, *Salix lasiolepis*, and/ or *Salix lucida* ssp. *lasiandra*. A variety of shrubs and herbs may be found in the understory, including *Cornus sericea, Rubus ursinus*, *Salix lasiolepis*, and *Stachys bullata*.

Fine Scale Map Class: *Populus trichocarpa* Alliance
Member Associations:
Populus trichocarpa / Cornus sericea / Carex obnupta Association

7b. *Alnus rhombifolia* dominates or co-dominates with *Acer macrophyllum* or *Umbellularia californica* in the tree overstory. *Umbellularia californica* may be higher in cover, though stands for this type will often have other riparian trees along with *Alnus rhombifolia* to be classed here. If *Fraxinus latifolia* is co-dominant, key to the *Fraxinus latifolia* Alliance (step 7f) below. A variety of shrubs and herbs may be found in the understory, including *Rubus*, *Toxicodendron*, and numerous ferns. Careful identification of alder stands closer to the coast is necessary to differentiate from *A*. *rubra* stands.

Fine Scale Map Class: *Alnus rhombifolia* Alliance
Member Associations:
Alnus rhombifolia – Acer macrophyllum Association
Alnus rhombifolia – Platanus racemosa Association
Alnus rhombifolia – Umbellularia californica – (Quercus chrysolepis) Association
Alnus rhombifolia / Carex (nudata) Association
Alnus rhombifolia / Rubus ursinus Association

7c. *Alnus rubra* dominates in the tree canopy in riparian settings, typically within a few miles of the coast. The understory is often comprised of one-to-many species of *Rubus, Salix lasiolepis,* and *Sambucus racemosa*, which sometimes exceed *Alnus* in cover. If *Salix lucida* is co-dominant, key to that *Salix* alliance (step 7e). *Alnus rubra* stands were encountered in riparian or swampy bottomlands but can occur along rocky streambeds in similar settings to *A. rhombifolia* stands. Careful identification of the *Alnus* species is important closer to the coast.

Fine Scale Map Class: *Acer macrophyllum – Alnus rubra* Alliance
Member Associations:
Alnus rubra / Rubus spectabilis – Sambucus racemosa Association
Alnus rubra / Salix lasiolepis – Rubus spp. Association

7d. *Acer macrophyllum* dominates or co-dominates with *Umbellularia californica* or, occasionally, with *Fraxinus latifolia* in riparian or, occasionally, upland stands. *Pseudotsuga menziesii*, *Quercus agrifolia* and *Q. chrysolepis* may intermix. *Acer* stands are found farther than 10 miles from the coast or in the interior part of the county, usually in low-lying, rocky, steep canyons.

***Acer macrophyllum – Alnus rubra* Alliance**
Fine Scale Map Class: *Acer macrophyllum* Mapping Unit

7e. *Salix lucida* ssp. *lasiandra* dominates in the overstory, sometimes with higher or similar cover by shrubs in the understory, such as *Rubus* spp. and *Salix lasiolepis*. Sometimes *Alnus rubra* may be co-dominant with *S. lucida,* and adjacent stands may be dominated by *Alnus* spp., *Quercus agrifolia* or conifers.

***Salix lucida* ssp. *lasiandra* Alliance**
Fine Scale Map Class: *Salix lucida* ssp. *lasiandra* Association

7f. *Fraxinus latifolia* dominates or co-dominates with *Alnus rhombifolia* or *Umbellularia californica* in the tree overstory.

Fine Scale Map Class: *Fraxinus latifolia* Alliance*
Member Associations:
Fraxinus latifolia Association*
Fraxinus latifolia – Salix laevigata Association

8. Broadleaf tree canopy dominated by woody trees of *Eucalyptus, Acacia* or *Ailanthus altissima*. If *Acacia* is shrubby, then key in the Shrub key below.

Californian Ruderal Forest Macrogroup

Californian Ruderal Forest Group

***Eucalyptus* spp. – *Ailanthus altissima – Robinia pseudoacacia* Semi-Natural Alliance**

8a. *Eucalyptus* spp. dominates the tree canopy.

Fine Scale Map Class: *Eucalyptus (globulus, camaldulensis)* Provisional Semi-Natural Assocation

8b. *Ailanthus altissima* dominates the tree canopy.

Fine Scale Map Class: *Ailanthus altissima* Semi-Natural Association*

8c. *Acacia melanoxylon* dominates the canopy.

Fine Scale Map Class: *Acacia melanoxylon* Provisional Semi-Natural Association

Class B. Shrubland Vegetation

Section III. Riparian or moist hillside settings with vegetation dominated or co-dominated by the following shrubs: *Baccharis salicifolia, Frangula californica* (including all subspecies), *Lonicera involucrata, Morella californica*, *Rhododendron occidentale*, *Rosa californica, Rubus armeniacus*, *R. spectabilis*, *Salix breweri*, *S. exigua*, *S. lasiolepis*, *S. melanopsis*, *S. sitchensis, Sambucus nigra* and/or *Sambucus racemosa*. If *Rubus ursinus* or *Rubus parviflorus* dominates, key to the *Gaultheria shallon* – *Rubus* (*ursinus*) Alliance in Section IV below (step 15b4).

9. Non-native shrub *Rubus armeniacus, Rosa eglanteria,* or *Delairea odorata* is strongly dominant in riparian sites, mesic clearings, disturbed areas, and stock pond.

Interior West Ruderal Flooded & Swamp Forest & Woodland Macrogroup

Interior West Ruderal Riparian Forest & Scrub Group

***Rubus armeniacus* – *Sesbania punicea* – *Ficus carica* Semi-Natural Alliance**
Fine Scale Map Class: *Rubus armeniacus* Semi-Natural Association
Fine Scale Map Class: *Delairea odorata* Semi-Natural Association*

10. *Cornus sericea, Lonicera involucrata, Morella californica, Rubus spectabilis, Salix sitchensis* and/or *Sambucus racemosa* dominate or co-dominate with other *Rubus* spp.

10a. Vegetation dominated or co-dominated by *Lonicera involucrata, Morella californica*, *Sambucus racemosa,* and/or *Rubus spectabilis*. Stands may be small and are generally found close to the coast on moist or wet soils and in riparian areas.

Vancouverian Lowland Marsh, Wet Meadow & Shrubland Macrogroup

Vancouverian Wet Shrubland Group

Fine Scale Map Class: *Rubus spectabilis – Morella californica* Alliance
Member Associations:
Sambucus racemosa – (Rubus ursinus) Provisional Association
Morella californica – Rubus spp. Provisional Association
Rubus spectabilis Association

10b. *Cornus sericea is dominant in the shrub layer or co-dominant with plants such as Salix spp. Emergent riparian trees and shrubs such as Rubus ursinus and Toxicodendron diversilobum are often present.*
Cornus sericea Alliance
Fine Scale Map Class: *Cornus sericea – Salix (lasiolepis, exigua)* Association

10c. *Salix sitchensis dominates or co-dominates with S. lasiolepis along coastal or low elevation streams, lagoons. A variety of sub-dominant trees and shrubs may be present, including Acer, Alnus, Fraxinus, Salix, and Rubus.*

Fine Scale Map Class: *Salix hookeriana – Salix sitchensis – Spiraea douglasii* Alliance

Member Associations:
Salix sitchensis Provisional Association

11. *Frangula californica, Prunus virginiana, Rhododendron occidentale, Salix breweri, S. exigua, S. lasiolepis, S. melanopsis*, and/or *Sambucus nigra* dominant or co-dominant with *Baccharis pilularis* or *Rubus* spp.

    11a. *Frangula californica* and/or *Rhododendron occidentale* dominate or co-dominate together with *Rubus*. Stands are found along springs, seeps, and ravines in wetland and riparian settings, often on sedimentary and serpentine substrates that retain water much of the year. If *Frangula californica* is dominant in uplands along with *Baccharis pilularis,* key to the *Baccharis* alliance (Section 17b1).

Vancouverian Lowland Marsh, Wet Meadow & Shrubland Macrogroup

Vancouverian Wet Shrubland Group

Fine Scale Map Class: *Frangula californica – Rhododendron occidentale – Salix breweri* Alliance*

Member Associations:
Frangula californica ssp. californica Provisional Association
Frangula californica ssp. tomentella / Cirsium fontinale var. campylon – Mimulus guttatus Association
Rhododendron occidentale – Frangula californica ssp. tomentella Provisional Association

11b. *Baccharis salicifolia, Rosa californica, Salix exigua,* or *Salix lasiolepis* dominates or co-dominates with *Rubus* along stream banks and benches, slope seeps, and drainage stringers.

Southwestern North American Warm Desert Freshwater Marsh & Bosque Macrogroup

Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland Group

11b1. *Salix exigua* dominates along rivers and streams, or close to springs. They are often the first plants to colonize bars and cut banks, followed later by trees such as *Populus* and *Salix* spp.

Fine Scale Map Class: *Salix exigua* Alliance

11b2. *Salix lasiolepis* dominates or co-dominates with *Rubus* spp. or *Baccharis pilularis* along stream banks and benches, slope seeps, and drainage stringers. If *S. sitchensis* is co-dominant, key to the *S. sitchensis* Alliance instead (step 10c). If *Cornus sericea* is co-dominant, key to that alliance. Emergent riparian trees are often present, such as *Acer*, *Alnus*, *Fraxinus*, *Salix,* and others.

Fine Scale Map Class: *Salix lasiolepis* Alliance

Member Associations:

Salix lasiolepis Association
Salix lasiolepis – Rubus spp. Association
Salix lasiolepis – Salix lucida Association

11b3. *Baccharis salicifolia* is dominant or co-dominant in the shrub canopy with *Artemisia californica*, *Baccharis pilularis*, *Rubus* spp., *Salix exigua*, *Salix lasiolepis*, and *Sambucus nigra*. Emergent trees may be present at low cover, including *Pinus sabiniana*, *Platanus racemosa*, *Populus fremontii*, *Quercus* spp. or *Salix* spp.

Fine Scale Map Class: *Baccharis salicifolia* Alliance
Member Associations:
Baccharis salicifolia Association

11b4. *Rosa californica* dominates or co-dominates in the shrub canopy with *Artemisia californica, Baccharis pilularis, Rubus armeniacus, Salix lasiolepis, Saliva mellifera*, *Sambucus nigra* and *Symphoricarpos mollis*. Emergent trees may be present at low cover, including *Pinus sabiniana, Platanus racemosa, Populus fremontii, Quercus* spp. or *Salix* spp.

Fine Scale Map Class: *Rosa californica* Alliance

11c. *Sambucus nigra* dominates in the shrub overstory, often preferring stream terraces, bottomlands, and localized areas in uplands, where there was a past disturbance. Only mapped where found in the field.

Western North American Montane Marsh, Wet Meadow & Shrubland Macrogroup

Rocky Mountain-Great Basin Lowland-Foothill Riparian Shrubland Group

Fine Scale Map Class: *Rhus trilobata – Crataegus rivularis – Forestiera pubescens* Alliance*
Member Associations:
Sambucus nigra Association*

11d. *Prunus virginiana dominates in the shrub overstory, often on steep north-facing slopes.*

Cool Interior Chaparral Macrogroup

Western North American Montane Scrub Group

Fine Scale Map Class: *Ribes quercetorum – Rhus trilobata – Frangula californica* Alliance
Member Associations:
Prunus virginiana Coast Range Association

Section IV. Coastal scrub, dune/bluff, and disturbance-following vegetation dominated or co-dominated by drought-deciduous or seral (both deciduous and evergreen) shrubs. Includes *Artemisia californica, Baccharis pilularis*, *Ceanothus thyrsiflorus*, *Corylus cornuta, Ericameria ericoides*, *Eriodictyon californicum*, *Eriogonum fasciculatum, E. wrightii, Frangula californica, Garrya elliptica, Gaultheria shallon*, *Holodiscus discolor, Lupinus albifrons*, *L. arboreus*, *L. chamissonis*, *Rubus ursinus*, and *Toxicodendron diversilobum*. Resprouting, deep-rooted, sclerophyllous shrubs may at times be characteristic, but not dominant.

12. *Eriogonum wrightii* is dominant in the shrub overstory.

Great Basin-Intermountain Dry Shrubland & Grassland Macrogroup

Mojave Mid-Elevation Mixed Desert Scrub Group

Fine Scale Map Class: *Eriogonum wrightii – Eriogonum heermannii – Buddleja utahensis* Alliance

Member Associations:
Eriogonum wrightii (ssp. *subscaposum,* ssp. *wrightii*) Association

13. *Ericameria nauseosa* is dominant in the shrub overstory. Emergent trees may be present at low cover, including *Juniperus californica* and/or *Pinus jeffreyi*.

Mojave Mid-Elevation Mixed Desert Scrub Group

Fine Scale Map Class: *Ericameria nauseosa* Alliance

14. *Ericameria ericoides, Lupinus arboreus, and/or Lupinus chamissonis are dominant, co-dominant, or characteristic (sometimes with as little as 5% cover) in the shrub overstory on coastal dunes, bluffs,* or inland sandy and disturbed soils*. A variety of herbs, including many of the following non-natives, may be present with high cover in the understory: Bromus diandrus, Carduus, Holcus, Rumex acetosella, and Vulpia bromoides.*

Pacific Coastal Beach & Dune Macrogroup

California Coastal Beach & Dune Group

14a. *Lupinus arboreus* dominates or co-dominates with *Baccharis pilularis* and/or *Rubus ursinus*, often with high cover of grasses including *Bromus diandrus, Holcus lanatus, Lolium perenne, Vulpia bromoides*, and other non-native herbaceous species.

Fine Scale Map Class: *Lupinus arboreus* Alliance

Member Associations:
Lupinus arboreus Association
Baccharis pilularis – Lupinus arboreus Association*

14b. Along the immediate shoreline, *Ericameria ericoides* and/or *Lupinus chamissonis* dominate as individuals or incombination as co-dominants with *Baccharis pilularis* and *Lupinus arboreus*.

Fine Scale Map Class: *Lupinus chamissonis – Ericameria ericoides* Alliance
Member Associations:
Ericameria ericoides Association
Lupinus chamissonis Association
Lupinus chamissonis – Ericameria ericoides Association

14c. *Ericameria ericoides* dominated or co-dominates with other sandhill shrubs such as *Lupinus albifrons* away from immediate shoreline on sandy soils with recent disturbance.

Californian Coastal Scrub Macrogroup

Californian Coastal-Foothill Seral Scrub Group

Fine Scale Map Class: *Lotus scoparius – Lupinus albifrons – Eriodictyon* spp. Alliance
Member Associations:
Lupinus albifrons – Lotus scoparius / Chorizanthe pungens Association

15. Shrublands dominated or co-dominated by native, coastal scrub and disturbance-following shrubs, or by naturalized or planted species including *Artemisia californica, Baccharis pilularis, Ceanothus thrysiflorus, Eriodictyon californicum*, *Eriogonum fasciculatum, Gaultheria shallon*, *Genista, Heterotheca oregana, Lupinus albifrons, Rubus parviflorus, Rubus ursinus*, *Toxicodendron diversilobum,* and/or *Ulex europaeus.*

California Coastal Scrub Macrogroup

15a. *Diplacus aurantiacus, Eriodictyon californicum*, *Lupinus albifrons* or *Malacothamnus* dominates or co-dominates in the overstory.

Californian Coastal-Foothill Seral Scrub Group

15a1. *Eriodictyon californicum, Lepichinia calycina, Lotus scoparius, Lupinus albifrons,* or *Pickeringia montana* dominates or co-dominates with other seral scrub, often in stands that are open and/or display recent evidence of fire or other disturbance such as road cuts. Other coastal scrub may be present at lower cover, including *Artemisia californica, Baccharis pilularis,* and *Toxicodendron diversilobum.* The understory may be composed of mixed native and non-native herbs, which sometimes have higher cover than the overstory shrubs. Only mapped where found in the field.

Fine Scale Map Class: *Lotus scoparius – Lupinus albifrons – Eriodictyon* spp. Alliance
Member Associations:
Eriodictyon californicum / Herbaceous Association
Lotus scoparius Association
Lupinus albifrons Association*

15a2. *Diplacus aurantiacus* dominates often on steep slopes and ridgetops. Other coastal scrub may be present at lower cover. If *D. aurantiacus* is co-dominant with *Adenostoma fasciculatum* or *Artemisia californica*, key to those respective alliances. Only mapped where found in the field.

***Diplacus aurantiacus* Alliance**
Fine Scale Map Class: *Diplacus (aurantiacus, puniceus)* Association

15a3. A species of *Malacothamnus* is dominant or co-dominant in the shrub canopy with *Adenostoma fasciculatum*, *Artemisia californica*, *Cercocarpus montanus*, *Eriogonum fasciculatum*, *Heteromeles arbutifolia*, *Lotus scoparius*, and *Salvia mellifera*. Emergent trees may be present at low cover, including *Juglans californica*, *Platanus racemosa* or *Quercus agrifolia*.

Fine Scale Map Class: *Malacothamnus fasciculatus – Malacothamnus spp.* Alliance

15b. *Baccharis pilularis*, *Ceanothus incanus*, *C. thyrsiflorus*, *Corylus cornuta, Frangula californica, Garrya elliptica, Gaultheria shallon*, *Holodiscus discolor, Prunus virginiana, Rubus parviflorus, Rubus ursinus*, and/or *Toxicodendron diversilobum* dominate or co-dominate as shrubs. Shrubs are typically evergreen or winter-deciduous, not sclerophyllous or drought-deciduous species. Found along cool, coastal strips or on sheltered inland draws and lower slopes, where species are tolerant of disturbance and trees tend to be excluded.

California North Coastal & Mesic Scrub Group

15b1. *Baccharis pilularis* dominates or co-dominates with *Frangula californica*, *Toxicodendron diversilobum*, or *Rubus* spp. in the shrub overstory. If *Calamagrostis nutkaensis* or *Carex obnupta* is co-dominant with *B. pilularis*, key to the *C. nutkaensis* Alliance (see step 27). Stands with greater cover of *Artemisia californica*, *Ceanothus thyrsiflorus,* or *Toxicodendron diversilobum* than *Baccharis pilularis* should key to those respective alliances. A variety of native and non-native forbs and grasses may intermix in the herbaceous layer, sometimes with higher cover than *Baccharis* – including *Avena*, *Bromus*, *Danthonia*, *Deschampsia*, *Elymus glaucus*, *Festuca*, *Hypochaeris*, *Nassella pulchra,* and others.

Fine Scale Map Class: *Baccharis pilularis* Alliance
Member Associations:
Baccharis pilularis Association
Baccharis pilularis – Artemisia californica Association
Baccharis pilularis – Ceanothus thyrsiflorus Association
Baccharis pilularis – (Frangula californica) – Rubus spp. Association
Baccharis pilularis – Toxicodendron diversilobum Association
Baccharis pilularis / (Nassella pulchra – Elymus glaucus – Bromus carinatus) Association
Baccharis pilularis / Annual Grass – Herb Association
Baccharis pilularis / Carex obnupta – Juncus patens Provisional Association
Baccharis pilularis / Danthonia californica Association
Baccharis pilularis / Deschampsia cespitosa Association*
Baccharis pilularis / Eriophyllum staechadifolium Association

15b2. *Frangula californica* dominates or co-dominates with *Baccharis pilularis, Diplacus aurantiacus, Morella californica, Oemleria cerasiformis, Salix lasiolepis, and/or Toxicodendron diversilobum* in the shrub overstory. Stands occur on slopes above salt marsh and in upland coastal bluffs on mesic slopes, related to stands of *Baccharis pilularis*. (also see 17b1 above).

15b2a. *Frangula californica* co-dominates and exceeds the relative cover of *Baccharis pilularis*.

***Baccharis pilularis* Alliance**
Fine Scale Map Class: *Frangula californica* ssp. *californica* – *Baccharis pilularis / Scrophularia californica* Association

15b2b. *Frangula californica* subdominant or does not exceed the relative cover of *Baccharis pilularis*.

Fine Scale Map Class*: Baccharis pilularis* Alliance
Member Associations:
Baccharis pilularis – (Frangula californica) – Rubus ursinus Association

15b3. *Ceanothus thyrsiflorus* or *C. incanus* dominates in the overstory shrub layer, often with moderately dense cover. If *Baccharis pilularis* is present, *Ceanothus thyrsiflorus* is greater in cover. *Diplacus aurantiacus*, *Heteromeles*, *Pseudotsuga menziesii*, *Quercus wislizeni*, and other species may intermix as sub-dominants in the shrub and tree layers. Stands of *C. incanus* are included in the *C. thyrsiflorus* Alliance since they are more limited in distribution and are ecologically similar to *C. thyrsiflorus*.

Fine Scale Map Class*: Ceanothus thyrsiflorus* Alliance
Member Associations:
Ceanothus incanus Association
Ceanothus thyrsiflorus – (Rubus ursinus) Association
Ceanothus thyrsiflorus – Baccharis pilularis – Toxicodendron diversilobum Association

15b4. *Gaultheria shallon, Holodiscus discolor, Rubus parviflorus,* and/or *Rubus ursinus* dominate or co-dominate with *Baccharis pilularis, Holcus lanatus,* or *Toxicodendron diversilobum* on hillslopes, rock outcrops, coastal bluffs, or flats.

Fine Scale Map Class*: Gaultheria shallon – Rubus (ursinus)* Alliance
Member Associations:
Holodiscus discolor – Baccharis pilularis – Rubus ursinus Association
Rubus parviflorus Association
Rubus ursinus Association

15b5. *Toxicodendron diversilobum* dominates, sometimes intermixing with sub-dominant *Baccharis pilularis* and *Rubus* spp. If *B. pilularis* is present and greater than 50% relative cover, key to the *Baccharis pilularis* Alliance (step

17b1). For this project, stands were encountered close to the coast, although they are likely to occur inland as well.

***Toxicodendron diversilobum* Alliance**
Fine Scale Map Class*: Toxicodendron diversilobum – (Baccharis pilularis)* Association

15b6. *Corylus cornuta* dominates or co-dominates with *Baccharis pilularis* and other shrubs as a medium-tall scrub on steep concave slopes with northern to eastern exposures surrounded by *Pseudotsuga menziesii*. Other shrubs may include *Baccharis pilularis*, *Frangula californica*, *Rubus ursinus*, *Vaccinium ovatum,* and *Toxicodendron diversilobum*.

***Corylus cornuta* var. *californica* Alliance**
Fine Scale Map Class*: Corylus cornuta / Polystichum munitum* Association

15b7. Mosaic of mixed shrub species, which occur across a range of mesic settings, where no one type dominates. Topographically, stands are often found in concavities, on sheltered, north-facing, low-slope settings, and along seeps, but can also occur in atypical geographic locations due to fog-influenced climatic conditions. Diagnostic species include *Cornus sericea, Lonicera involucrata, Morella californica, Sambucus racemosa,* and *Salix lasiolepis* (outside of a typical riparian landscape setting) representing the wetter end of the mesic continuum with *Frangula californica, Holodiscus discolor, Corylus cornuta, Marah fabaceus, Toxicodendron diversilobum,* and *Rubus* spp. being more prevalent in drier mesic settings. Due to the difficulty in discerning dominant species, in addition to mixed photo signatures, this map unit will rely on plot data and environmental correlates. Where a single species can be seen to dominate and meets other existing Fine Scale Map Class (FSMC) criteria, it will be captured for the appropriate FSMC, such as those above.

Fine Scale Map Class: Mesic Coastal Scrub Mapping Unit

15b8. *Garrya elliptica* dominates with other shrubs such as *Baccharis pilularis* and *Toxicodendron diversilobum* as well as herbaceous species such as *Polystichum munitum.* Emergent trees may be present at low cover, including *Umbellularia californica.* Only mapped where found in the field.

***Baccharis pilularis* Alliance**
Fine Scale Map Class: *Garrya elliptica* Provisional Association

15c. *Artemisia californica* or *Salvia mellifera* dominates and may intermix with *Baccharis pilularis, Diplacus aurantiacus,* and/or *Toxicodedron diversilobum*.

Central & South Coastal Californian Coastal Sage Scrub Group

15c1. *Artemisia californica* dominates and may intermix with *Baccharis pilularis, Diplacus aurantiacus,* and/or *Toxicodendron diversilobum*. If *Baccharis pilularis* is present, *Artemisia californica* is greater in cover for this alliance. If *Adenostoma fasciculatum* is present, it is not co-dominant. If the cover of *Eriophyllum staechadifolium* and the other nominate species in the *Eriophyllum staechadifolium – Erigeron glaucus – Eriogonum latifolium* Alliance is more than twice the cover of *Artemisia*, key to that alliance in the herbaceous part of the key.

Fine Scale Map Class*: Artemisia californica – (Salvia leucophylla)* Alliance
Member Associations:
Artemisia californica
Artemisia californica - Diplacus aurantiacus Association
Artemisia californica / Nassella (pulchra) Association

15c2. *Salvia mellifera* dominates or co-dominayes with *Artemisia californica*, *Diplacus aurantiacus, Eriogonum fasciculatum,* or *Lotus scoparius.* If *Adenostoma fasciculatum* is present, it is not co-dominant.

Fine Scale Map Class*: Salvia mellifera - Artemisia californica* Alliance
Member Associations:
Salvia mellifera Association
Salvia mellifera – Artemisia californica Association

15d. *Eriogonum fasciculatum* or *Hesperoyucca whipplei* is dominant or co-dominant in the shrub canopy in cismontane stands with *Artemisia californica*, *Baccharis pilularis*, *Diplacus aurantiacus*, *Encelia californica*, *Encelia farinosa*, *Isocoma menziesii*, *Lotus scoparius*, *Malacothamnus fasciculatus*, *Salvia apiana* or *Salvia mellifera*. Emergent trees may be present at low cover including *Juniperus californica*. Mapped only where found in the field.

Fine Scale Map Class*: Eriogonum fasciculatum* Shrubland Alliance

15e. *Albizia lophantha*, *Cistus* spp.*, Cotoneaster* spp., *Cytisus scoparius, Genista monspessulana, Grevillea* spp.*, Helichrysum petiolare, Rosa rubiginosa, Ulex,* or other Mediterranean shrubs not native to Santa Cruz and Santa Clara Counties dominate in naturalized or planted stands. May be found invading disturbed areas, grasslands, or forest openings.

15e1. A non-native *Acacia, Albizia lophantha, Grevillea*, and/or *Leptospermum laevigatum* dominate or co-dominate together in the shrub or low tree canopy. If *Acacia melanoxylon* is dominant, key to the *Acacia melanoxylon* Provisional Semi-Natural Association (8c).

Californian Ruderal Grassland, Meadow & Scrub Group

Fine Scale Map Class: *Acacia* spp. – *Grevillea* spp. – *Leptospermum laevigatum* Semi-Natural Alliance

15e2. *Myoporum laetum* strongly dominates the shrub canopy.

California Ruderal Forest Group

Fine Scale Map Class: *Myoporum laetum* Invasive Mapping Unit
***Fine Scale Map Class: Schinus (molle, terebinthifolius) – Myoporum laetum* Semi-Natural Alliance**

15e3. *Cytisus* spp., *Cotoneaster* spp., *Genista monspessulana, Hypericum canariense, Ulex europaeus,* or other broom species/hybrids dominate in the shrub overstory. Fire promotes broom invasions in woodland settings; however, broom may invade coastal grasslands without fire.

Southern Vancouverian Lowland Ruderal Grassland & Shrubland Group

Fine Scale Map Class: *Cytisus scoparius – Genista monspessulana – Cotoneaster* spp. Semi-Natural Alliance

Member Associations:
Cotoneaster (lacteus, pannosus) Provisional Semi-Natural Association*
Cytisus scoparius Provisional Semi-Natural Association*
Genista monspessulana Semi-Natural Association
Hypericum canariense Provisional Semi-Natural Association*
Spartium junceum Semi-Natural Association
Ulex europaeus Provisional Semi-Natural Association*

Section V. Shrub vegetation dominated by evergreen sclerophyll-leaved species, including many that have developed growth strategies driven by a Mediterranean climate. Most of the core diagnostic species are endemic to California, including *Adenostoma*, *Arctostaphylos*, *Ceanothus cuneatus*, *C. oliganthus*, *Cercocarpus montanus*, *Quercus berberidifolia*, *Chrysolepis chrysophylla*, *Q. durata*, and shrubby *Q. parvula* var. *shrevei* or *Q. wislizeni*.

Californian Chaparral Macrogroup

17. *Arctostaphylos crustacea, A. andersonii, A. glutinosa, A. imbricata, A. montaraensis, A. sensitiva, A. uva-ursi, A. virgata, Chrysolepis chrysophylla* var. *minor,* and/or *Vaccinium ovatum* dominates or co-dominates with *Adenostoma fasciculatum, Ceanothus thyrsiflorus*, or other shrubs in maritime chaparral stands.

Californian Maritime Chaparral Group

17a. *Arctostaohylos glutinosa, A. imbricata, A. montarensis, A. sensitiva, A. uva-ursi,* or *A. virgata, Chrysolepis chrysophylla* var. *minor,* and/or *Vaccinium ovatum* dominates or co-dominates with *Adenostoma fasciculatum, Arctstaphylos*

crustacea, Ceanothus thrysiflorus, or other shrubs. *Pinus attenuata or P. muricata* and *Pteridium aquilinum* are often present. Stands are often transitional between forest and chaparral.

Fine Scale Map Class: *Arctostaphylos (nummularia, sensitiva) – Chrysolepis chrysophylla* Alliance

Member Associations:
Arctostaphylos glutinosa Association
Arctostaphylos sensitiva Association
Chrysolepis chrysophylla / Vaccinium ovatum Association

17b. *Chrysolepis chrysophylla* is strongly dominant, or is characteristic with *Vaccinium ovatum* dominant, in dense stands occurring on upper slopes and ridges, often transitional between forest and chapparal.

Fine Scale Map Class: *Arctostaphylos (nummularia, sensitiva) – Chrysolepis chrysophylla* Alliance

Member Associations:
Chrysolepis chrysophylla / Vaccinium ovatum Association

17c. *Arctostaphylos crustacea* or *A. andersonii* dominates or co-dominates with *Adenostoma fasciculatum, Arctostaphylos regismontana, Ceanothus cuneatus, C. papillosus, Frangula californica, Heteromeles arbutifolia, Quercus parvula,* or *Q. wislizeni* var. *frutescens*. Trees are often present but at significantly less cover.

Fine Scale Map Class: *Arctostaphylos (crustacea, tomentosa)* Alliance

Member Associations:
Arctostaphylos andersonii Association
Arctsostaphylos crustacea Association
Arctostaphylos crustacea – Adenostoma fasciculatum – Ceanothus (cuneatus, papillosus) Association

17d. *Arctostaphylos silvicola* is dominant or co-dominant in the shrub canopy with *Adenostoma fasciculatum*, *Arctostaphylos andersonii, A. crustacea* ssp. *crinita*, *Artemisia californica*, *Ceanothus cuneatus*, *Diplacus aurantiacus*, *Ericameria ericoides*, *Eriodictyon californicum*, *Frangula californica*, *Heteromeles arbutifolia*, *Lupinus albifrons* and *Vaccinium ovatum*. Emergent trees may be present at low cover, including *Arbutus menziesii*, *Pinus attenuata*, *Pinus ponderosa*, *Pseudotsuga menziesii* or *Quercus agrifolia*.

***Arctostaphylos (crustacea, tomentosa)* Alliance**
Fine Scale Map Class: *Arctostaphylos silvicola* Association

18. *Arctstaphylos glandulosa, A.* x *campbelliae, Ceanothus ferrisiae, Ceanothus papillosus, Cerocarpus montanus, Heteromeles arbutifolia, Prunus ilicifolia, Ptelea crenulata, Quercus berberidifolia* and/or *Quercus durata* dominate or co-dominate with *Adenostoma fasciculatum.* Sttands are mostly found inland from the coastal fog belt and are often composed of large shrubs occupying mesic sites such as north-facing slopes, concavities, and toeslopes with well-drained soils.

Californian Mesic & Pre-Montane Chaparral Group

18a. *Cercocarpus montanus* dominates the stand, sometimes with with *Adenostoma fasciculatum* or *Prunus ilicifolia* as codominants or subdominants. *Artemisia californica* and *Ribes californicum* often present.

Fine Scale Map Class: *Cercocarpus montanus* Alliance
Member Associations:
Cercocarpus montanus – Adenostoma fasciculatum Association
Cercocarpus montanus – Prunus ilicifolia Association
Cercocarpus montanus var. glaber Association

18b. *Quercus berberidifolia* dominates or co-dominates with *Adenostoma fasciculatum, Cercocarpus cuneatus* and/or other chaparral shrubs.

Fine Scale Map Class: *Quercus berberidifolia* Alliance
Member Associations:
Quercus berberidifolia Association
Quercus berberidifolia – Adenostoma fasciculatum Association
Quercus berberidifolia – Ceanothus cuneatus Association

18c. *Ceanothus ferrisiae, Heteromeles arbutifolia, Prunus ilicifolia* and/or *Ptelea crenulata* dominate or co-dominate with *Baccharis pilularis, Rhamus crocea, R. ilicifolia,* and/or *Toxicodendron diversilobum. Sanicula crassicaulis* and other herbs such as *Clinopodium douglasii* may be present to abundant in the understory.

Fine Scale Map Class: *Prunus ilicifolia – Heteromeles arbutifolia – Ceanothus spinosus* Alliance
Member Associations:
Heteromeles arbutifolia Serpentine Association
Prunus ilicifolia ssp. Ilicifolia – Heteromeles arbutifolia Association
Prunus ilicifolia ssp. Ilicifolia – Rhamnus (crocea, ilicifolia) Association
Prunus ilicifolia ssp. Ilicifolia / Sanicula crassicaulis Association

18c1. *Ceanothus ferrisiae* dominates or codominates.

Fine Scale Map Class: *Ceanothus ferrisiae – Heteromeles arbutifolia* Association

18c2. *Ceanothus ferrisiae* does not dominate or codominate. Instead, *Heteromeles arbutifolia, Prunus ilicifolia* and/or *Ptelea crenulata* dominate or co-dominate.

Fine Scale Map Class: *Prunus ilicifolia – Heteromeles arbutifolia – Ceanothus spinosus* Alliance
Member Associations:
Heteromeles arbutifolia Serpentine Association

Prunus ilicifolia ssp. Ilicifolia – Heteromeles arbutifolia Association
Prunus ilicifolia ssp. Ilicifolia – Rhamnus (crocea, ilicifolia) Association
Prunus ilicifolia ssp. Ilicifolia / Sanicula crassicaulis Association

18d. *Quercus durata* dominates or co-dominates with *Adenostoma fasciculatum, Arctstaphylos glauca,* or *Frangula californica* on ultramafic soils (e.g., serpentine, gabbro). *Heteromeles arbutifolia* and/or *Umbellularia californica* are often present in stands.

Fine Scale Map Class: *Quercus durata* Alliance†
Member Associations:
Quercus durata Association
Quercus durata – Adenostoma fasciculatum Provisional Association

18f. *Arctstaphylos glandulosa* or *A.* x *campbelliae* dominates or co-dominates with Adenostoma *fasciculatum* and/or *Quercus wislizeni* on convexities, outcrops, ridges, or slopes. Sometimes *Q. wislizeni* may be a tree, though often it is shrubby in stands sampled. Soils may be derived from sandstone, serpentine, or gabbro. Species commonly found as emergent trees or sub-dominant shrubs include *Arbutus menziesii, Arctostaphylos* spp., *Dipaclus aurantiacus*, and *Heteromeles arbutifolia*. This type is not found in the Santa Cruz Mountains.

Fine Scale Map Class: *Arctostaphylos glandulosa* Alliance
Member Associations:
Arctostaphylos glandulosa Association
Arctostaphylos glandulosa – Adenostoma fasciculatum Association
Arctostaphylos glandulosa – Adenostoma fasciculatum – Quercus berberidifolia Association

18g. *Ceanothus papillosus* dominates or co-dominates in the shrub canopy with *Adenostoma fasciculatum, Arctostaphylos glandulosa*, *Ceanothus cuneatus*, *Eriodictyon californicum*, *Heteromeles arbutifolia*, *Quercus berberidifolia*, *Quercus wislizeni*, *Salvia mellifera* and *Toxicodendron diversilobum*. Emergent trees may be present at low cover, including *Pinus coulteri*, *Pinus ponderosa*, *Quercus agrifolia*, *Quercus chrysolepis* or *Umbellularia californica*.

Fine Scale Map Class: *Ceanothus papillosus* Alliance
Member Associations:
Ceanothus papillous – Adenostoma fasciculatum Association
Ceanothus papillosus – Eriodictyon californicum Association

19. *Ceanothus leucodermis, C. oliganthus, Quercus wislizeni* var. *frutescens,* and/or *Quercus parvula,* dominate or co-dominate in the shrub overstory. These shrublands are more frost tolerant and typically found at higher, cooler, or more mesic sites than the California Xeric Chaparral Group.

19a. *Ceanothus leucodermis* or *C. oliganthus* dominates in shrublands that are often found in localized patches following fires. If *Quercus wislizeni* is co-dominant, key to the *Quercus wislizeni – Quercus chrysolepis* (shrub) Alliance directly below.

Fine Scale Map Class: *Ceanothus (oliganthus, tomentosus)* Alliance
Member Associations:
Ceanothus leucodermis Association
Ceanothus oliganthus Association

19b. *Quercus agrifolia, Q. parvula, or Q. wislizeni* or other *Quercus* spp. dominate and/or co-dominate as a shrubby regenerating tree, co-occurring with *Umbellularia*, *Adenostoma*, and a variety of other shrubs that prefer more mesic, northerly exposures. *Quercus parvula*, *Q. wislizeni* and *Quercus agrifolia* are not always morphologically distinct. When *Q. wislizeni* or *Q. parvula* dominates or co-dominates as an overstory tree, key to the *Q. wislizeni-Q. parvula* (tree) Alliance (step 5c7). *Umbellularia californica* is often emergent, while a variety of thick- and soft-leaved shrubs intermix as sub-dominants.

Fine Scale Map Class: *Quercus wislizeni – Quercus chrysolepis* (shrub) Alliance*
Member Associations:
Quercus agrifolia – Quercus chrysolepis – Quercus parvula (shrub) Provisional Association*
Quercus parvula (shrub) Provisional Association*

20. Sclerophyll (i.e., thick-leaved) shrublands dominated by one or more of the following taxa: *Adenostoma*, *Arctostaphylos canescens*, *A. glauca,* or *Ceanothus cuneatus*. Most stands occur on well-drained soils along exposures that are in full sun much of the growing season, including upper slopes, spur ridges, and convexities.

Californian Xeric Chaparral Group

20a. *Arctostaphylos canescens* and/or *A. manzanita* dominate or co-dominate, sometimes with co-dominant *Adenostoma fasciculatum*. *A. canescens* is restricted to Tertiary sandstones and shales in the Santa Cruz Mountains. One alliance is recognized for all three *Arctostaphylos* vegetation types, with associations specific to each species.

Fine Scale Map Class: *Arctostaphylos* (*canescens*, *manzanita*, *stanfordiana*) Provisional Alliance
Member Associations:
Arctostaphylos canescens Provisional Association
Arctostaphylos canescens – Arctostaphylos glandulosa – Adenostoma fasciculatum Association
Arctostaphylos manzanita Provisional Association

20b. *Arctostaphylos glauca* is dominant or co-dominant in the shrub canopy with *Adenostoma fasciculatum*, *Arctostaphylos glandulosa*, *Artemisia californica*, *Ceanothus cuneatus*, *Cercocarpus montanus*, *Heteromeles arbutifolia*, *Quercus berberidifolia*, *Quercus durata*, *Quercus wislizeni*, *Rhamnus ilicifolia* and *Salvia mellifera*. Emergent trees may be present at low cover, including *Quercus agrifolia* or *Quercus wislizeni* var. w*islizeni*.

Fine Scale Map Class: Arctostaphylos glauca Alliance
Member Associations:
Arctostaphylos glauca Association
Arctostaphylos glauca – Adenostoma fasciculatum Association
Arctostaphylos glauca – Artemisia californica – Salvia mellifera Association
Arctostaphylos glauca / Melica torreyana Association

20c. *Ceanothus cuneatus* dominated or co-dominates with *Adenostoma fasciculatum,* often on convexities with westerly exposures. A variety of shrubs may intermix, including *Arctostaphylos*, *Baccharis*, *Eriodictyon*, *Heteromeles*, *Quercus durata,* and others.

Fine Scale Map Class: *Ceanothus cuneatus* Alliance
Member Associations:
Ceanothus cuneatus Association
Ceanothus cuneatus – Adenostoma fasciculatum Association

20d. *Adenostoma fasciculatum* dominates, often with sub-dominant shrubs such as *Diplacus aurantiacus*. If *A*. *fasciculatum* co-dominates with *Arctostaphylos* spp., *Ceanothus cuneatus*, *Cercocarpus montanus*, *Quercus berberidifolia,* or *Q*. *durata*, key to one of the latter alliances instead of *A*. *fasciculatum*.

Fine Scale Map Class: *Adenostoma fasciculatum* Alliance
Member Associations:
Adenostoma fasciculatum Association
Adenostoma fasciculatum – Diplacus aurantiacus Association

20e. *Adenostoma fasciculatum* and *Salvia mellifera* codominate.

Fine Scale Map Class: *Adenostoma fasciculatum – Salvia spp.* Alliance
Member Associations:
Adenostoma fasciculatum - Salvia mellifera Association

Class C. Herbaceous Vegetation

Section VI. Vegetation of a) freshwater wetland or riparian settings with water or wet ground present temporarily, seasonally, or throughout the growing season, b) saline or alkaline lowlands where water accumulates in the winter, or c) tidal salt or brackish marshes with seasonal or ephemeral inundations. Includes herbaceous vegetation dominated, co-dominated, or characterized by: *Argentina* (=*Potentilla*), *Azolla, Bidens*, *Baccharis douglasii (= B. glutinosa), Bolboschoenus*, *Carex*, *Ceratophyllum*, *Distichlis*, *Eleocharis macrostachya*, *Grindelia stricta*, *Hydrocotyle, Juncus arcticus*, *J. effusus*, *J. lescurii*, *J. patens*, *Lasthenia glaberrima*, *Lemna*, *Lepidium latifolium*, *Leymus triticoides*, *Ludwigia*, *Mimulus guttatus*, *Nuphar*, *Oenanthe*, *Persicaria*, *Pleuropogon*, *Potamogeton, Ruppia, Sarcocornia* (=*Salicornia*), *Schoenoplectus*, *Scirpus*, *Sparganium, Spartina*, *Typha,* and/or *Xanthium*.

21. Freshwater stands dominated by aquatic, floating or submerged plants, including *Azolla, Ceratophyllum*, *Hydrocotyle, Lemna*, *Ludwigia*, *Nuphar, Potamogeton,* and/or *Sparganium*. Found along slow-moving streams, still ponds, lakes, or on ground surfaces after water levels have dropped.

Fine Scale Map Class: Western North American Freshwater Aquatic Vegetation Macrogroup
Member Groups, Alliances and Associations:
North American Temperate Ruderal Aquatic Vegetation Group
***Eichhornia crassipes – Ludwigia* (*hexapetala*, *peploides*) Provisional Semi-Natural Alliance**
Ludwigia (*hexapetala*, *peploides*) Provisional Semi-Natural Association
Western North American Temperate Freshwater Aquatic Group
Azolla* (*filiculoides, microphylla*) Alliance
Azolla (filiculoides, microphylla) Association*
Ceratophyllum demersum* Aquatic Provisional Alliance
Ceratophyllum demersum Western Provisional Association
Nuphar lutea* Freshwater Aquatic Provisional Alliance
Nuphar lutea ssp. *polysepala* Provisional Association*
Hydrocotyle (ranunculoides, umbellata)* Alliance
Hydrocotyle ranunculoides Association*
***Sparganium (angustifolium)* Alliance**
Sparganium eurycarpum Provisional Association
***Stuckenia (pectinata) – Potamogeton spp.* Alliance**
Potamogeton spp. Association
Stuckenia pectinata Association

22. Salt and brackish marshes and estuaries dominated or co-dominated by *Atriplex prostrata*, *Bolboschoenus*, *Cotula coronopifolia, Distichlis*, *Lilaeopsis occidentalis*, *Ruppia, Sarcocornia* (=*Salicornia*), *Spartina,* and/or *Zostera*. *Argentina egedii* may also be dominant in high tidal salt marsh. May appear as sparsely vegetated mudflats at low tide, or during restoration (as along San Pablo Bay) Mudflats with trace amounts of cover by herbs are included here. Mudflats with trace amounts of cover by herbs are included here (see 23b5).

    22a. *Bolboschoenus maritimus, Distichlis spicata, Frankenia salina, Grindelia stricta, Sarcocornia (=Salicornia), Spartina, Suaeda calceoliformis,* and/or *Triglochin* spp. dominate or co-dominate tidal salt marshes to brackish marshes. *Argentina egedii* may also be dominant in high tidal salt marsh.

North American Pacific Coastal Salt Marsh Macrogroup

Temperate Pacific Salt Marsh Group

22a1. *Bolboschoenus maritimus* or *B. robustus* dominates or co-dominates with S*arcocornia (=Salicornia) pacifica*.

Fine Scale Map Class: *Bolboschoenus maritimus* Alliance
Member Associations:
Bolboschoenus maritimus Association
Bolboschoenus maritimus – Sarcocornia pacifica Association

22a2. *Argentina egedii* dominates in high tidal salt marsh with *Distichlis spicata* and other salt-tolerant plants such as *Atriplex prostrata* or *Frankenia salina.*

Fine Scale Map Class: *Distichlis spicata* – *Frankenia salina* Coastal Alliance
Member Associations:
Argentina egedii – Distichlis spicata Provisional Association

22a3. *Distichlis spicata* dominates in alkali seeps or other salty habitats, or codominates with *Frankenia salina* and/or *Jaumea carnosa*. Non-native grasses including *Avena spp*. and *Bromus hordeaceus* may have high cover and *Sarcocornia pacifica* may be present as a sub-dominant.

Fine Scale Map Class: *Distichlis spicata* – *Frankenia salina* Coastal Alliance
Member Associations:
Distichlis spicata Association*
Distichlis spicata – annual grasses Association*
Distichlis spicata – Frankenia salina – Jaumea carnosa Association
Distichlis spicata – (Sarcocornia pacifica) Association

22a4. *Sarcocornia pacifica* dominates or co-dominates with *Atriplex prostrata, Cotula coronopifolia, Distichlis spicata*, *Jaumea carnosa*, and/or *Lepidium latifolium*. Stands found in coastal salt marshes, alkali flats, and wetland mudflats.

Fine Scale Map Class: *Sarcocornia pacifica (Salicornia depressa) Alliance*
Member Associations:
Sarcocornia pacifica – Atriplex prostrata Association
Sarcocornia pacifica – Cotula coronopifolia Association
Sarcocornia pacifica – Jaumea carnosa – Distichlis spicata Association
Sarcocornia pacifica – Schoenoplectus americanus Association
Sarcocornia pacifica Tidal Association

22a5. *Spartina foliosa* dominates on mudflats, banks, berms, and margins of bays and deltas.

Spartina foliosa* Alliance

Fine Scale Map Class: *Spartina foliosa* Association*

22a6. *Grindelia stricta* dominates or co-dominates with natives such as *Sarcocornia pacifica, Distichlis spicata,* and/or *Frankenia salina* or non-native herbs such as *Polypogon monspeliensis, Rumex crispus,* and *Bromus diandrus.* Stands may be found on slightly elevated or drier ground adjacent to salt or alkaline marshes, tidal flats, levees, and road margins.

***Distichlis spicata* – *Frankenia salina* Coastal Alliance**

Fine Scale Map Class: *Grindelia stricta* Provisional Association

22b. Non-native species such as *Atriplex prostrata, Cotula coronopifolia, Crypsis* spp., *Cynodon dactylon, Cyperus eragrostis, Mollugo verticillata, Panicum millaceum,* and/or *Paspalum* spp. dominate in low-lying sloughs and other disturbed alkaline or saline wetlands.

Western North American Ruderal Marsh, Wet Meadow & Shrubland Macrogroup

Western North American Ruderal Marsh, Wet Meadow & Shrubland Group

22b1. *Atriplex prostrata* and/or *Cotula coronopifolia* dominates or co-dominates.

Fine Scale Map Class: *Atriplex prostrata – Cotula coronopifolia* Semi-Natural Alliance

Member Associations:

Atriplex prostrata Semi-Natural Association

Cotula coronopifolia Semi-Natural Association*

22b2. *Crypsis* spp., *Cynodon dactylon, Cyperus eragrostis, Mollugo verticillata, Panicum millaceum, Paspalum* spp., and/or other non-native plants > 80% relative cover individually or collectively in the herbaceous layer.

Fine Scale Map Class: *Cynodon dactylon – Crypsis* spp. – *Paspalum* spp. Semi-Natural Alliance*

Member Associations:

Crypsis (schoenoides, vaginiflora Semi-Natural Association

22b3. *Ruppia* spp. dominant submersed in brackish to fresh water. Stands are likely in the County.

Ditchgrass Saline Aquatic Vegetation Macrogroup

Widgeongrass Bed Group

Fine Scale Map Class: *Ruppia (cirrhosa, maritima)* Alliance*

22b4. *Zostera marina* and/or *Z. pacifica* dominate in subtidal and aquatic settings.

Temperate Seagrass Aquatic Vegetation Macrogroup

Temperate Pacific Seagrass Bed Group

Fine Scale Map Class: *Zostera (marina, pacifica)* Pacific Aquatic Alliance*
Zostera marina Association*

22b5. Mudflats or dry pond bottoms (sometimes in sites undergoing restoration) with trace amounts of cover by herbs.

Fine Scale Map Class: Mudflat/Dry Pond Bottom Mapping Unit

23. Freshwater or brackish stands dominated by *Argentina*, *Carex pansa*, *C. obnupta*, *C. praegracilis*, *Juncus effusus*, *J. lescurii*, *J. patens*, *Oenanthe*, *Schoenoplectus*, *Scirpus microcarpus*, and/or *Typha,* where water is present throughout all or most of the growing season. Soils have high organic content and may be poorly aerated.

23a. *Schoenoplectus* and/or *Typha* dominate in the herbaceous. Stands are found along streams, ditches, shores, bars, and channels of river mouth estuaries; around ponds and lakes; and in sloughs, swamps, and freshwater to brackish marshes.

Arid West Interior Freshwater Marsh Macrogroup

Fine Scale Map Class: Arid West Interior Freshwater Marsh Group
Member Alliances and Associations:
***Schoenoplectus* (*acutus, californicus*) Alliance**
Schoenoplectus acutus Association
Schoenoplectus californicus Association
Schoenoplectus californicus – Schoenoplectus acutus Association
***Schoenoplectus americanus* Alliance**
Schoenoplectus americanus Association
***Typha* (*angustifolia*, *domingensis*, *latifolia*) Alliance**
Typha (latifolia, angustifolia) Association
Typha domingensis Association*

23b. *Argentina egedii*, *Bolboschoenus maritimus*, *B. robustus, Carex nudata*, *C. obnupta*, *C. praegracilis*, *C. pansa*, *C. subbracteata, Eleocharis macrostachya, Juncus covillei, J. effusus*, *J. hesperius, J. lescurii*, *J. patens*, *J. occidentalis*, *J. phaeocephalus*, *J. xiphiodes, Oenanthe*, and/or *Scirpus microcarpus* dominate or co-dominate in mesic or wetland settings. *Holcus*, *Hypochaeris*, *Leontodon*, *Rumex* and *Vulpia bromoides* may intermix with similar cover. Stands may be found along seasonally flooded brackish marshes, coastal sand dunes, swales and plains, shallowly inundated woods, meadows, roadside ditches, mudflats, coastal swamps, lakeshores, marshes, and riverbanks.

Vancouverian Lowland Marsh, Wet Meadow & Shrubland Macrogroup

Fine Scale Map Class: Vancouverian Lowland Marsh, Wet Meadow & Shrubland Group

Member Groups, Alliances and Associations:

Juncus* (*effusus*, *patens*) – *Carex* (*pansa*, *praegracilis*) Alliance

Carex pansa Provisional Association*

Carex praegracilis Lowland Provisional Association*

Carex serratodens Association

Carex tumulicola Provisional Association*

Juncus covillei Provisional Association*

Juncus effusus Association

Juncus patens Association*

Juncus patens – Holcus lanatus Provisional Association*

Juncus patens – Juncus occidentalis Provisional Association*

Juncus phaeocephalus Association

Juncus xiphioides Association

***Carex obnupta – Oenanthe sarmentosa – Scirpus microcarpus* Alliance**

Carex obnupta Association

Carex obnupta – Juncus patens Association*

Scirpus microcarpus Pacific Coast Association

Juncus lescurii Association

Argentina egedii – (Juncus lescurii) Association

Carex obnupta – Argentina egedii Provisional Association*

Oenanthe sarmentosa Association*

24. Wetland herbaceous vegetation dominated or characterized by *Alisma* spp., *Bidens frondosa, Baccharis douglasii (= B. glutinosa), Bolboschoenus glaucus, Carex barbarae*, *C. densa, C*. *nudata*, *C*. *serratodens*, *Cirsium fontinale, Euthamia occidentalis, Grindelia* spp., *Heterotheca oregona, Hoita orbicularis, Juncus arcticus*, *Lepidium latifolium*, *Leymus triticoides, Mimulus guttatus, Persicaria (= Polygonum) lapathifolia,* or *Xanthium strumarium*. Stands occupy settings where saturated soil or standing water throughout the growing season are key characteristics. Map this macrogroup only where found in the field.

    24a. Native species dominate stands

Fine Scale Map Class: Vancouverian Lowland Marsh, Wet Meadow & Shrubland Macrogroup

Member Groups, Alliances and Associations:

Temperate Pacific Freshwater Wet Mudflat Group

***Bidens cernua – Euthamia occidentalis – Ludwigia palustris* Provisional Alliance**

Baccharis douglasii (= B. glutinosa) Provisional Association

Bidens frondosa Provisional Association*

Euthamia occidentalis Association

Lilaeopsis occidentalis Provisional Alliance

***Polygonum lapathifolium – Xanthium strumarium* Alliance**

Alisma (triviale) Provisional Association*

Cyperus erythrorhizos – Gnaphalium palustre Provisional Association

Polygonum (amphibium, lapathifolium) Association

Xanthium strumarium Association

Vancouverian Freshwater Wet Meadow & Marsh Group

Carex barbarae* Alliance

Carex barbarae Association*

***Carex nudata* Alliance**

Carex nudata Association
Juncus arcticus* (var. *balticus*, *mexicanus*) Alliance
Juncus arcticus var. balticus – (var. mexicanus) Association*
***Juncus* (*effusus*, *patens*) – *Carex* (*pansa*, *praegracilis*) Alliance**
Carex densa Provisional Association*
Carex serratodens Provisional Association
***Leymus cinereus – Leymus triticoides* Alliance**
Leymus triticoides Association
***Mimulus* (*guttatus*) – *Cirsium* spp. – *Stachys* spp. Alliance**
Cirsium fontinales Association
Mimulus guttatus Association

24b. Non-native *Lepidium latifolium* dominates stands.

Western North American Ruderal Marsh, Wet Meadow & Shrubland Group

Fine Scale Map Class: *Lepidium latifolium – Lactuca serriola* Semi-Natural Alliance*
Dittrichia graveolens – Pseudognaphalium luteoalbum Provisional Semi-Natural Association
Lepidium latifolium Association*

24c. *Heterotheca oregona* dominates or co-dominates along gravel bars in floodplains, riparian terraces, and stream banks. Stands not sampled but likely to occur in the project area.

Temperate Pacific Freshwater Wet Mudflat Group

Fine Scale Map Class: Heterotheca (oregona, sessiliflora) Alliance*
Member Associations:
Heterotheca oregona Association*

25. Herbaceous stands dominated or characterized by *Centromadia pungens, Cressa truxillensis, Distichlis spicata, Eleocharis macrostachya*, *E. acicularis, Eryngium aristulatum, Lasthenia glaberrima*, *L. fremontii, Limnanthes douglasii, Navarretia leucocephala, Pleuropogon californicus* or *Trifolium variegatum*. In the *Manual of California Vegetation* (Sawyer et al. 2009), these stands are recognized in a macrogroup associated with vernal pools, even though they do not always occur in vernal pool settings. Future versions of the hierarchy will likely split vernal pool and non–vernal pool stands into different alliances, groups, and macrogroups based on ecological and environmental differences. However, few true vernal pool types occur in Santa Cruz and Santa Clara Counties.

Western North America Vernal Pool Macrogroup

Fine Scale Map Class: Californian Vernal Pool / Swale Bottomland Group
Member Alliances and Associations:
Eryngium aristulatum* Alliance
Hemizonia congesta Association*
***Lasthenia glaberrima* Alliance**
Lasthenia glaberrima – Pleuropogon californicus Association
***Eleocharis* (*acicularis*, *macrostachya*) Provisional Alliance**
Eleocharis macrostachya Association
Trifolium variegatum* Alliance

Trifolium variegatum Association*
***Centromadia (pungens)* Alliance**
***Cressa truxillensis – Distichlis spicata* Alliance**

Section VII. Vegetation dominated or characterized by herbaceous species that occupy dry, seasonally moist, and usually well-drained sites that range from interior dry ridges and cliffs to ocean bluffs, dunes, and terraces with cooling summer fog and salty breezes. Stands are not wet or inundated as in Section VI above. This group includes native and non-native annual and perennial grasslands, seral herbaceous stands, dry cliff and canyon vegetation, and coastal dune/ bluff vegetation. Dominant, co-dominant, and characteristic taxa include: *Abronia*, *Agrostis gigantea*, *A. stolonifera*, *Allium falcifolium*, *Ambrosia*, *Ammophila*, *Anthoxanthum*, *Avena*, *Brachypodium*, *Brassica*, *Briza*, *Bromus*, *Calamagrostis*, *Carpobrotus*, *Centaurea*, *Cynosurus*, *Danthonia*, *Deschampsia*, *Dudleya, Elymus elymoides*, *E. glaucus*, *E. multisetus*, *E. luteolum*, *E. nudum*, *Erodium*, *Eryngium armatum*, *Eschscholzia*, *Festuca arundinacea*, *F. californica*, *F. idahoensis*, *Hesperolinon, Heterotheca*, *Holcus*, *Hordeum*, *Lasthenia californica*, *Leymus mollis*, *Lolium*, *Melica*, *Mesembryanthemum*, *Nassella*, *Phalaris*, *Plagiobothrys nothofulvus*, *Plantago erecta*, *Pteridium*, *Raphanus*, *Sedum,* and/or *Vulpia*.

26. *Allium falcifolium*, *Dudleya* spp., *Eriogonum luteolum*, *E. nudum*, *Polypodium californicum, Sedum spathulifolium, Selaginella bigelovii, Streptanthus glandulosus* and/or moss and lichen characterize or dominate stands on exposed rock. Sparsely vegetated stands (generally less than 2% absolute cover) on steep serpentine barrens with exposed gravel and bedrock. Serpentine substrate will be the key to mapping these sparse herbaceous communities.

    Western North American Cliff, Scree & Rock Vegetation Macrogroup

    Fine Scale Map Class: Californian Cliff, Scree & Rock Vegetation Group
    Member Alliances and Associations:
    Allium* spp. –*Streptanthus* spp. – *Hesperolinon* spp. Serpentinite Alliance
    Allium falcifolium – Eriogonum luteolum – Streptanthus (batrachopus, morrisonii) Association*
    Streptanthus glandulosus – Dudleya abramsii / Lichen – Moss Association
    ***Sedum spathulifolium* Provisional Alliance**
    Sedum spathulifolium – Polypodium californicum / Lichen – Moss Provisional Association
    ***Selaginella (bigelovii, wallacei)* Alliance**
    Selaginella bigelovii / Eriogonum fasciculatum Association

    26a. The native *Dudleya farinosa* or other *Dudleya* spp. is characteristic, dominant or co-dominant with herbs such as *Eriogonum latifolium, Vulpia bromoides*, and others. Lichen is characteristic and often dominant with *Dudleya* sometimes lacking. Often on rocky coastal bluffs, cliffs, headlands, and bedrock outcrops.

    Californian Cliff, Scree & Rock Vegetation Group

    Dudleya cymosa – Dudleya lanceolata* / Lichen – Moss Sparse Rock Alliance
    Fine Scale Map Class: *Dudleya farinosa* / Lichen – Moss Provisional Association*

27. Native and non-native annual forb/grass vegetation AND native perennial grasslands growing within the California Mediterranean climate. Stands are generally found in

relatively drier sites than those in the Vancouverian Macrogroups, which is more common near the coast. Includes vegetation characterized by, but not limited to *Amsinckia, Avena, Brassica, Bromus, Centaurea*, *Cynosurus*, *Elymus glaucus, Eschscholzia, Lasthenia californica, Lolium, Lupinus, Melica, Nassella, Plagiobothrys nothofulvus, Plantago erecta, Pteridium aquilinum* and *Vulpia microstachys.*

Fine Scale Map Class: Californian Annual & Perennial Grassland Macrogroup

Member Groups, Alliances, and Associations:

California Annual Grassland & Forb Meadow Group

Amsinckia (menziesii, tessellata) – Phacelia* spp. Alliance

Amsinckia (intermedia, menziesii) Association

Eschscholzia* (*californica*) – *Lupinus* (*nanus*) Alliance

Bromus hordeaceus – Lupinus nanus – Trifolium spp. Association*

Eschscholzia californica Association*

Lupinus bicolor Provisional Association*

Plagiobothrys nothofulvus* Alliance

Plagiobothrys nothofulvus – Castilleja exserta – Lupinus nanus Provisional Association*

***Lasthenia californica – Plantago erecta – Vulpia microstachys* Alliance**

Erigeron glaucus – Lasthenia californica Association

Hemizonia congesta – Lolium perenne Association

Lasthenia (californica, gracilis) sparsiflora Association

Lasthenia californica – Plantago erecta – Hesperevax sparsiflora Association

Lotus humistratus – Plantago erecta – Lomatium spp. Provisional Association*

Micropus californicus Provisional Association*

Plantago erecta – Lolium perenne lichen-rocky Association

Vulpia microstachys – Plantago erecta Association

Vulpia microstachys – Plantago erecta – Calycadenia (*truncata*, *multiglandulosa*) Association

***Holocarpha (hermannii, virgata)* Alliance**

Holocarpha virgata Association

Californian Perennial Grassland Group

Corethrogyne filaginifolia - Eriogonum* (*elongatum*, *nudum*) Alliance

Chorizanthe pungens – Eriogonum nudum var. decurrens – Heterotheca sessiliflora Association

Eriogonum nudum Association*

Viola pedunculata – (Eschscholzia californica – Nassella pulchra) Provisional Association

***Nassella* spp. – *Melica* spp. Alliance**

Elymus multisetus – (Eschscholzia californica – Plantago erecta) Association

Melica californica Association

Melica torreyana Association*

Nassella lepida Provisional Association

Nassella pulchra Association*

Nassella pulchra – Avena spp. – *Bromus* spp. Association

Nassella pulchra – Hemizonia congesta Association

Nassella pulchra – Lolium perenne – (Trifolium spp.) Association

Nassella pulchra – Lolium perenne – Plantago erecta Serpentine Association

Nassella pulchra – Melica californica – annual grass Association

Californian Ruderal Grassland, Meadow & Scrub Group

***Avena* spp. – *Bromus* spp. Semi-Natural Alliance**

Avena barbata – Avena fatua Semi-Natural Association

Avena barbata – Bromus hordeaceus Semi-Natural Association

Brachypodium distachyon Semi-Natural Association

Briza maxima Provisional Semi-Natural Association*

Bromus diandrus Semi-Natural Association*

Bromus hordeaceus – Erodium botrys Semi-Natural Association
***Brassica nigra – Centaurea* (*solstitialis*, *melitensis*) Semi-Natural Alliance**
Brassica nigra Semi-Natural Association*
Carduus pycnocephalus – Silybum marianum Provisional Semi-Natural Association
Centaurea solstitialis Semi-Natural Association
Raphanus sativus Semi-Natural Association
Cynosurus echinatus– Arrhenatherum elatius* Semi-Natural Alliance
Cynosurus echinatus – (*Danthonia pilosa – Nassella manicata*) Provisional Semi-Natural Association*
***Lolium perenne* Semi-Natural Alliance**
Lolium perenne Semi-Natural Association
Lolium perenne – Bromus hordeaceus Semi-Natural Association
Lolium perenne – Hordeum marinum – Ranunculus californicus Semi-Natural Association*
Lolium perenne – Lotus corniculatus Semi-Natural Association
Aegilops triuncialis – Hemizonia congesta Provisional Semi-Natural Association*
Western North American Ruderal Marsh, Wet Meadow & Shrubland Macrogroup
Western North American Ruderal Marsh, Wet Meadow & Shrubland Group
Poa pratensis – Agrostis gigantea – Agrostis stolonifera* Semi-Natural Alliance
Festuca arundinacea Provisional Semi-Natural Association*
***Phalaris aquatica – Phalaris arundinacea* Semi-Natural Alliance**
Phalaris aquatica Provisional Semi-Natural Association
Phalaris aquatica – Avena barbata Provisional Semi-Natural Association*
Western North American Ruderal Grassland & Shrubland Macrogroup
Southern Vancouverian Lowland Ruderal Grassland & Shrubland Group
***Holcus lanatus – Anthoxanthum odoratum* Semi-Natural Alliance**
Holcus lanatus Semi-Natural Association
Holcus lanatus – Anthoxanthum odoratum Semi-Natural Association*
Southern Vancouverian Lowland Grassland & Shrubland Macrogroup
Southern Vancouverian Shrub & Herbaceous Bald, Bluff & Prairie Group
***Bromus carinatus – Elymus glaucus* Alliance**
Bromus carinatus Association
Elymus glaucus Association
Pteridium aquilinum – Grass Association
Thermopsis californica – Bromus carinatus – Annual Brome Association*
***Festuca idahoensis – Danthonia californica* Alliance**
Danthonia californica – Nassella pulchra Association
Perideridia kelloggii – Danthonia californica Provisional Association
Danthonia californica Coastal Association
Festuca californica Association
Festuca idahoensis – (Danthonia californica – Koeleria macrantha) Association
Festuca idahoensis – Nassella pulchra Provisional Association
Festuca idahoensis Ultramafic Provisional Association
Festuca rubra Association
*Heterotheca sessiliflora – Danthonia californica Provisional Association**
Vancouverian Lowland Marsh, Wet Meadow & Shrubland Macrogroup
Vancouverian Freshwater Wet Meadow & Marsh Group
***Deschampsia cespitosa – Hordeum brachyantherum – Danthonia californica*Alliance**
Deschampsia cespitosa – Danthonia californica Association
Deschampsia cespitosa – Eryngium armatum Association
Deschampsia cespitosa – Iris douglasiana Association*
Deschampsia (cespitosa, holciformis) Association
Hordeum brachyantherum Lowland Association

28. Herbaceous vegetation dominated, co-dominated, or characterized by native or non-native perennial grasses. Stands are generally found in moister settings than those in the California Annual and Perennial Grassland Macrogroup (see step 24) and are often coastal. The grasses included are: *Agrostis gigantea*, *A. stolonifera*, *Anthoxanthum*, *Cortaderia, Danthonia californica*, *Deschampsia cespitosa*, *Elymus elymoides*, *E. multisetus*, *Festuca arundinacea*, *F. idahoensis*, *Holcus*, *Hordeum brachyantherum* and/or *Phalaris aquatica.* Note: stands dominated by *Lolium perenne* key out in step 28 above. This type will be mapped with a physiographic mask – mappers will not attempt to idenfify these stands using photointerpretation.

Western North American Ruderal Grassland & Shrubland Macrogroup

Southern Vancouverian Lowland Ruderal Grassland & Shrubland Group

28a. *Conium maculatum*, *Ageratina Adenophora, Dipsacus* spp., or *Foeniculum vulgare* dominates herbaceous stands, though various other taxa are likely present.

Fine Scale Map Class: *Conium maculatum* – *Foeniculum vulgare* Semi-Natural Alliance*
Member Associations:
Conium maculatum Semi-Natural Association*
Foeniculum vulgare Semi-Natural Association*
Dipsacus (fullonum, sativus) Provisional Semi-Natural Association*

28b. *Cortaderia jubata* or *selloana* dominates in naturalized stands, sometimes in dense clumps; or other non-native herbs such as *Echium candicans* dominant or co-dominant with *Cortaderia jubata.*

Fine Scale Map Class: *Cortaderia (jubata, selloana)* Semi-Natural Alliance
Member Associations:
Cortaderia (jubata, selloana) Provisional *Semi-Natural* Association
Echium candicans Semi-Natural Association*

29. *Calamagrostis nutkaensis* dominates or co-dominates with *Baccharis pilularis*. Other species such as *Carex obnupta, Heracleum maximum*, *Holcus lanatus*, *Juncus* spp., *Pteridium aquilinum,* and/or *Rubus ursinus* often intermix in stands.

Southern Vancouverian Lowland Grassland & Shrubland Macrogroup

Southern Vancouverian Shrub & Herbaceous Bald, Bluff & Prairie Group

Fine Scale Map Class: *Calamagrostis nutkaensis* Alliance
Member Associations:
Calamagrostis nutkaensis Association
Calamagrostis nutkaensis – Carex (obnupta) – Juncus (patens) Association*
Calamagrostis nutkaensis / Baccharis pilularis Association

30. Coastal dune, bluff, meadow, cliffs, and other vegetation dominated or co-dominated by herbaceous species such as *Abronia*, *Ambrosia*, *Ammophila*, *Artemisia pycnocephala, Carpobrotus*, *Dudleya, Erigeron glaucus, Eriogonum latifolium, Eriophyllum staechadifolium, Fragaria chiloensis, Leymus mollis*, and *Mesembryanthemum*.

30a. Native species, including *Abronia latifolia*, *Ambrosia chamissonis*, *Artemisia pycnocephala*, *Lathyrus littoralis,* and/or *Leymus mollis* dominate or co-dominate on dunes or bluffs. Plants are adapted to salt spray, wind and shifting sands and are thus capable of colonizing relatively unstable and sterile substrates.

Pacific Coastal Beach & Dune Macrogroup

30a1. Stands on open dunes and dune flats with active and unstable sand with *Abronia latifolia, Ambrosia chamissonis, Calystegia soldanella, Camissonia cheiranthifolia, Leymus mollis, Poa douglasii,* among others, characteristically present to dominant.

Fine Scale Map Class: Pacific Coastal Beach & Dune Mapping Unit
Californian Coastal Beach & Dune Group
Member Alliances and Assocations:
***Abronia latifolia – Ambrosia chamissonis* Alliance**
Ambrosia chamissonis Association
Abronia latifolia – Calystegia soldanella – Lathyrus littoralis Association
North Pacific Maritime Dune & Coastal Beach Group
***Leymus mollis* Alliance**
Leymus mollis – Abronia latifolia – (*Cakile* spp.) Association

30a2. Stands on uplifted coastal bluffs, terraces, and coastal cliff slopes with *Eriophyllum staechadifolium, Erigeron glaucus, Eriogonum latifolium,* and/or *Fragaria chiloensis* dominant.

California Coastal Beach & Dune Group

Fine Scale Map Class: *Eriophyllum staechadifolium – Erigeron glaucus – Eriogonum latifolium* Alliance
Member Associations:
Erigeron glaucus – Distichlis spicata Provisional Association
Erigeron glaucus – Fragaria chiloensis Association
Eriogonum parvifolium Association
Eriophyllum staechadifolium – Eriogonum latifolium Association

30a3. Stands on more stabilized sand dunes such as back dunes, dune ridges, and steep dune hills with *Artemisia pycnocephala* and/or *Cardionema ramosissimum* dominant while shrubs such as *Baccharis pilularis* and *Lupinus arboreus* may be present at lower cover.

***Eriophyllum staechadifolium – Erigeron glaucus – Eriogonum latifolium* Alliance**
Fine Scale Map Class: *Artemisia pycnocephala* Association

30b. Non-natives, including *Ammophila*, *Cakile, Carpobrotus*, and/or *Mesembryanthemum* strongly dominate at >80% relative cover on dunes, bluffs, or disturbed lands. Emergent shrubs such as *Baccharis pilularis* or *Lupinus arboreus* may be present.

North Pacific Coastal Ruderal Grassland & Shrubland Macrogroup

North Pacific Maritime Coastal Ruderal Dune Group

30b1. *Ammophila arenaria* is strongly dominant in the herbaceous layer.

Fine Scale Map Class: *Ammophila arenaria* Semi-Natural Alliance
Member Associations:
Ammophila arenaria Semi-Natural Association
Baccharis pilularis / Ammophila arenaria Semi-Natural Association*

30b2. *Carpobrotus* and/or *Mesembryanthemum* dominate on bluffs, dunes, or disturbed lands, often forming impenetrable mats that prevent natives from establishing.

Fine Scale Map Class: *Mesembryanthemum* spp. – *Carpobrotus* spp. Semi-Natural Alliance
Member Associations:
Carpobrotus (*edulis*) Semi-Natural Association

30b3. *Cakile edentula* and/or *C. maritima* are strongly dominant along active beaches at the debris line.

Fine Scale Map Class: *Cakile (edentula, maritima)* Provisional Semi-Natural Alliance
Cakile (edentula, maritima) Provisional Semi-Natural Association

Section VIII. Vegetation strongly dominated by invasive weedy species important to land managers in Santa Cruz and Santa Clara Counties.

Western North American Ruderal Grassland & Shrubland and Californian Ruderal Grassland, Meadow & Scrub Macrogroup

Southern Vancouverian Lowland Ruderal Grassland & Shrubland Group and

Californian Ruderal Grassland, Meadow & Scrub Group

31. Area dominated by *Carthamus lanatus* (Distaff thistle).

Fine Scale Map Class: *Carthamus lanatus* Invasive Mapping Unit*

32. Area dominated by *Aegilops triuncialis (*barbed goatgrass).

Fine Scale Map Class: *Aegilops triuncialis* Invasive Mapping Unit*

33. Area dominated by *Taeniatherum caput-medusae* (medusahead).

Fine Scale Map Class: *Taeniatherum caput-medusae* Invasive Mapping Unit*