

# **Classification of Vegetation Associations from the Mount Tamalpais Watershed, Nicasio Reservoir, and Soulajule Reservoir in Marin County, California**



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## INTRODUCTION

The Vegetation Program of the California Native Plant Society (CNPS) has worked collaboratively with the Marin Municipal Water District (MMWD) and Aerial Information Systems (AIS) to produce a fine-scale vegetation classification and map on MMWD lands. At least 55 different plant communities, described floristically at the alliance level of the National Vegetation Classification (Grossman et al. 1998), are discussed in this report.

Two main project goals are 1) to provide detailed, floristic classification of the vegetation with a report defining the different vegetation types, 2) to provide a detailed vegetation map of the region. Field data are being collected using standard CNPS protocols (e.g., Vegetation Rapid Assessment and Relevé protocols). The field-based classification depicts vegetation types that were sampled in 419 CNPS Vegetation Rapid Assessments and Relevés by MMWD staff.

The classification has been produced by CNPS using the National Vegetation Classification System's hierarchy of alliances and associations. These are floristically and environmentally defined plant communities, such as those described in the CNPS publication of *A Manual of California Vegetation* (Sawyer and Keeler Wolf 1995). In this project, the vegetation types are depicted in standard descriptions and a field key to concisely differentiate 59 alliances and habitats, of which 88 associations are determined.

With these and other data, aerial photography is being analyzed to create a vegetation map by AIS at a fine-scale resolution (with minimum mapping units of 1-2.2 acres). The map is being created by interpreting detailed, digital color aerial photography and delineating boundaries around the individual stands of vegetation in the study area. This detailed map is being produced in a Geographic Information System (GIS) digital format, through a "head's-up" digitizing process. With the field data collected and classified, the mapping is guided by plot sampling and reconnaissance points. The final map will include digitization of polygons and attribution of the vegetation type, overstory cover, and tree size.

This report mainly represents the results of the vegetation classification from the field sampling effort. This approach allows for baseline information on floristics, vegetation structure, site environment and impacts to be represented in a consistent and accurate manner. As each vegetation type is mapped with the field reference data, the vegetation types can be represented and compared quantitatively. By representing vegetation in this manner, the MMWD is better equipped to manage the vegetation for long-term ecological sustenance. In the future, agencies can compare areas based on vegetation diversity and habitat quality to identify best management regimes for such things as fire hazards, proper trail/road placement, restoration, and other management considerations.

## BACKGROUND AND STANDARDS

Because the vegetation and management efforts in the Marin watersheds and reservoirs are complexly interrelated with human development, MMWD determined that a complete classification and map of their administrative areas were necessary to properly deal with integrated management issues. Results from this report and the associated vegetation map are expected to inform a variety of resource management tasks including wildfire risk reduction and fuelbreak management, trail and road maintenance, sensitive species and habitat protection, Sudden Oak Death mitigation, and compliance with federal, state and local environmental regulations. The classification and associated vegetation map will facilitate collaborative natural resource planning and management with bordering communities and land management agencies including the National Park Service, California Department of Parks and Recreation, Marin County Open Space District, and Audubon Canyon Ranch.

The vegetation classification within this report is based on the U.S. National Vegetation Classification (USNVC). In California, the classification has been developed by The Nature Conservancy and

NatureServe in partnership with the State Natural Heritage Program of the Department of Fish and Game (CDFG) and the California Native Plant Society (CNPS). A first edition of the national classification provides a thorough introduction to the classification, its structure, and the list of vegetation units known in the United States (Grossman et al. 1998). Refinements to the classification have occurred during its application, and these refinements are best seen using the NatureServe Web site at <http://www.natureserve.org/explorer/>.

Vegetation mapping has been done regionally in adjacent National Park units under the auspices of the National Park Service (NPS) Inventory and Monitoring program, in cooperation with the US Geological Survey (USGS) Biological Resources Division. The mapping has been done in accordance with standards established by the Federal Geographic Data Committee (FGDC) for vegetation mapping on federal lands. The FGDC website (<http://www.fgdc.gov/standards/projects/FGDC-standards-projects/vegetation/vegclass.pdf>) explains the development of the classification standards currently used for mapping and classifying vegetation in national parks. The USGS Biological Resources Division - NPS Vegetation Mapping project's website (<http://biology.usgs.gov/npsveg/standards.html>) has additional information on vegetation mapping in national parks. The mapping project associated with this project is being done in the same contexts as the adjacent NPS lands of Point Reyes National Seashore and Golden Gate National Recreation Area.

The development of a floristic vegetation classification and concomitant map is a complex project. Not all vegetation types can be equally represented on a map of a certain set scale. Coordination is needed among the vegetation classification team, local ecologists, and the aerial photo-interpreters to resolve the best way to map the types, whether directly at the finest classification level (association), at a higher level (such as at the alliance), or as a mosaic or complex (i.e., mapping unit of similar vegetation associations). Thus, not all types described in this report are necessarily mapped directly. A separate report documents the link between the mapping and the field-based vegetation classification (AIS 2006, *In preparation*).

The principal needs for this project were the following:

- To implement a GIS-based method for mapping and sampling the vegetation in a consistent and accurate manner.
- To integrate the vegetation sampling process with the mapping process, so that the field crews and classification team could provide sufficient information to the mapping team.
- To integrate existing or ongoing vegetation data with the necessary field data during this project into a unified vegetation classification. This classification would be used for final vegetation descriptions and vegetation mapping products.
- To work with the unique characteristics of broad-leaf hardwood and mixed hardwood and conifer types in the study area, and to develop the best methods for detailed classification and mapping of this vegetation matrix.

Further, the scientific purpose of developing a detailed classification for the mapping area is to integrate a large amount of new information with existing information from California's vegetation classification and the USNVC. This report provides the basis to achieve that goal, while defining the local variation of the region.

## **METHODS**

### **Study Area**

The study area is situated within the northern portion of the Central California in Marin County. It covers approximately 21,685 acres of watershed lands that are owned and administered by the Marin Municipal



Water District. Three non-contiguous administrative units are included within the study area: Nicasio Reservoir (approximately 1,600 acres), Soulajule Reservoir (approximately 1,100 acres), and the Mt. Tamalpais Watershed (18,985 acres). Both Nicasio and Soulajule Reservoirs are situated in the rural western portion of Marin County and are completely surrounded by agricultural lands.

The Mt. Tamalpais Watershed is located in southern Marin County's urban-wildland interface. It is bounded to the south and east by the urban communities of Mill Valley, Kentfield, Ross, San Anselmo, and Fairfax. It is bounded to the south, west, and north by public wildlands that are owned and administered by the National Park Service, California Department of Parks and Recreation, Marin County Open Space, and Audubon Canyon Ranch (Figure 1).

MMWD's primary purpose in holding these watershed lands is providing and protecting the major source of domestic water for approximately 110,000 residential and commercial customers. Additionally, these lands are held in trust as natural wildlands of great biological diversity, as scenic open space, and as areas for passive outdoor recreation for residents of Marin County and much of the rest of the Bay Area.

### **Field Sampling**

Field crews sampled from April to July 2005, and Janet Klein (MMWD Vegetation Ecologist) was the primary supervisor for the field effort, providing overall direction to field sampling crews. The crews usually consisted of teams of two people, including the following MMWD staff: Shannon Fiala, Annie French, Robert Goldstein, Ro LoBianco, Robin Kent, and Karin Korda. Moreover, Kent was the field crew leader who provided additional organization and oversight for the field crews. Volunteers also assisted in vegetation sampling and/or plant identification, including Tanya Baxter (from the National Park Service, Golden Gate National Recreation Area), Jessica Olson (CNPS Conservation staff), Joel Perleman (from the CNPS Yerba Buena (San Francisco) Chapter), Stacey Pogorzelski (from the CNPS Marin Chapter), and Doreen Smith (from the CNPS Marin Chapter).

The vegetation sampling occurred across the spring and summer when the different MMWD vegetation types had peak phenological activity. Sampling was implemented using two different methods: the CNPS Vegetation Rapid Assessment (RA) method and the CNPS Relevé method. See the CNPS website for more information on these methods (from the Vegetation link on [www.cnps.org](http://www.cnps.org)) and Appendix 1 for the field forms.

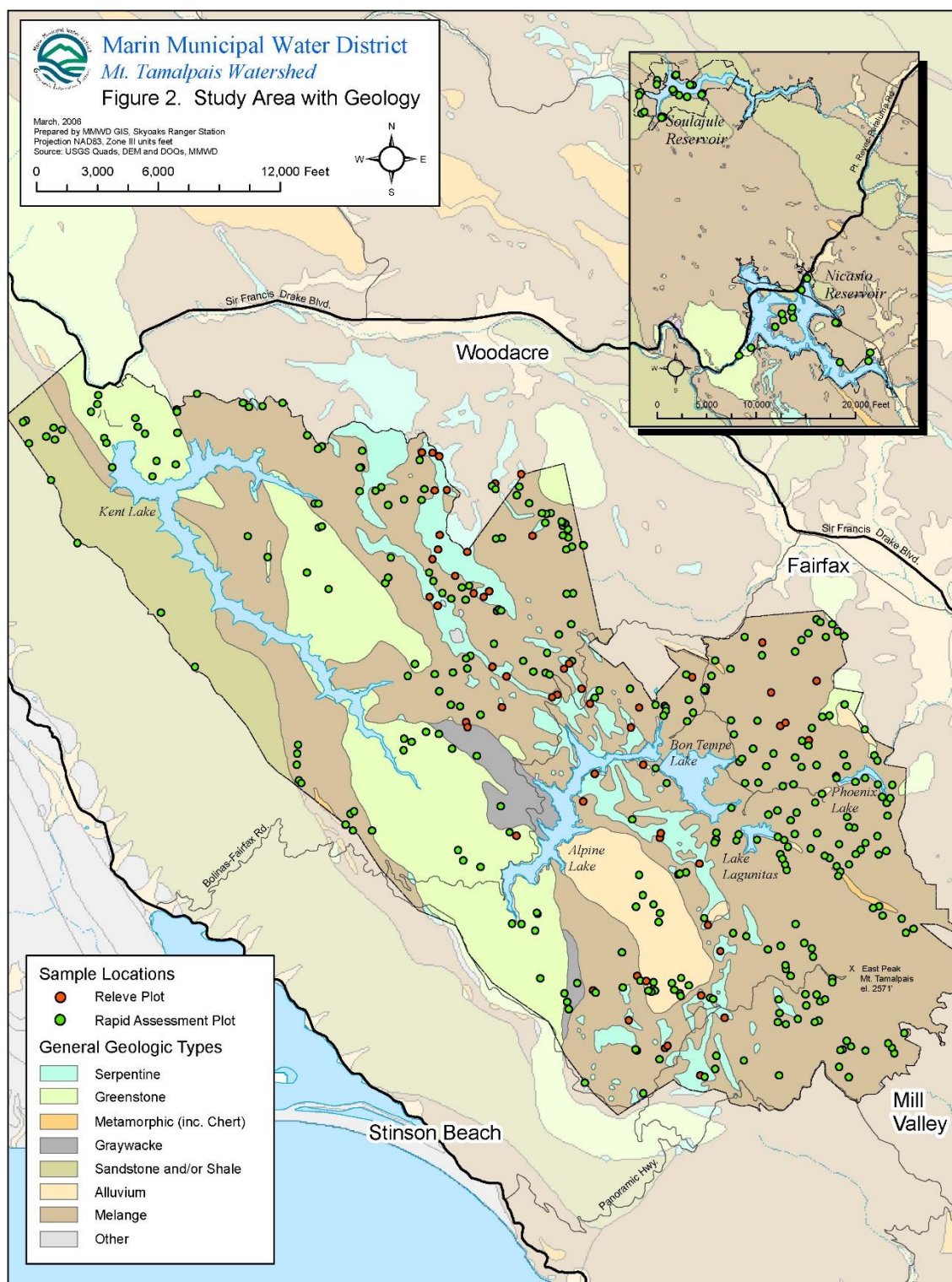
MMWD staff implemented both methods using plots, which had variable sizes depending on the vegetation (100 m<sup>2</sup> for herbaceous vegetation, 400 m<sup>2</sup> for shrublands, and 1000 m<sup>2</sup> for woodlands and forests). While a similar set of environmental field data are collected using both methods (including elevation, slope, aspect, soil texture, geology, etc.), the CNPS RA method is a shortened version of the Relevé method with fewer environmental and floristic variables recorded. Vegetation found on serpentine was mainly sampled using the more thorough relevé method because this vegetation/substrate supports the greatest number of special status species, and it had the least amount of information readily available to define and describe its variation.

When implementing the sampling methods, the MMWD ecologist differentiated distinct vegetation signatures on aerial photography to identify different stands for sampling. Also, a preliminary classification of vegetation was developed to guide field crews in representing the main variation within the landscape. Field crews focused on a particular set of vegetation signatures each week, so that they would amply divide their efforts between RA's and Relevés and would characterize the main vegetation types recognized in the aerial photography and preliminary classification.

In total, 419 vegetation surveys were completed on MMWD lands in 2005. A majority of the surveys (371 plots) were conducted using the CNPS RA protocol, while the more detailed Relevé method was used to sample an additional 48 plots of serpentine vegetation on Mt. Tamalpais (Figure 2).



**Figure 1.** Study area map of the Marin Municipal Water District lands (in dark green) for the 2005-2006 vegetation project.



**Figure 2.** Sample locations in the Marin Municipal Water District from 2005 in the study area with general geologic types.

## **Vegetation Classification and Key**

### *Existing Literature Review*

Beginning in early January 2005, existing information was reviewed to obtain a current view of the local vegetation. The literature reviewed included past studies at MMWD (e.g., Leonard Charles & Associates 1995, Paterson 1993), the state vegetation classification of California (CDFG 2003), and recent classifications of adjacent National Park Service lands (NatureServe et al. 2003a). This information was compiled by the MMWD ecologist into a preliminary vegetation classification at the habitat, alliance, and association levels, and this classification was reviewed and refined by the CNPS state ecologist.

### *Data analysis process*

Following the 2005 field sampling effort by MMWD staff and volunteers, the Vegetation Rapid Assessment and Relevé data were analyzed by CNPS vegetation staff. The PC-ORD software suite of classification and ordination tools was used to generate multivariate analyses such as Cluster Analysis and TWINSpan (McCune and Mefford 1997). These analyses were employed to order vegetation plots into groups related by their species composition and abundance, so that a formalized classification of community types would be created.

Since plant community datasets are inherently complex and multiple environmental variables may determine the heterogeneity in the patterns, Cluster Analysis with a hierarchical agglomerative technique was employed using Sorensen distance and flexible beta linkage method at -0.25. This agglomerative technique was used instead of the TWINSpan's divisive technique, which would be employed when a dataset has one main underlying environmental determinant (McCune and Grace 2002). The cluster analysis technique was based on species abundance (cover) values converted to 7 different classes using the following modified Braun-Blanquet (1932/1951) cover categories: 1=<1%, 2=1-5%, 3=>5-15%, 4=>15-25%, 5=>25-50%, 6=>50-75%, 7=>75%. The majority of the species values fell within the first four cover classes.

The Vegetation RA and Relevé datasets were analyzed separately because the complete species lists recorded with the Relevé method are not directly comparable to the more streamlined species lists (of 10-20 main species) collected using the RA method. Further, the complete RA dataset consisting of 373 plots was subjected to an initial round of cluster analysis. After the main "groups" of plots from the first-order cluster analysis outputs (or "dendrograms") were reviewed, the RA dataset was broken up into three, more manageable data subsets containing around 60-150 plots. These three subsets represented distinctly different groups of plots based on species composition (e.g., groups of forest, herbaceous, and shrubland plots), and subsequent cluster analyses were produced for these subsets of the RA data. For the second-order RA datasets and the one Relevé dataset, the cluster analysis groupings were displayed in dendrogram outputs. The dendrograms were interpreted by a team of two ecologists at 2 to 15 cluster group levels. The intent was to display and interpret the groups generated by the cluster analyses at generic levels (to classify alliances) and finer levels (to classify associations).

Prior to the cluster analysis runs, outlier analysis was performed on the one Relevé dataset and on each of the three RA data subsets using PC-ORD. A total of four plots with Sorensen distances more than three standard deviations away from the mean were identified and removed from the analysis. The removed plots included two Relevés, one Rapid Assessment woodland plot and one Rapid Assessment herbaceous plot. To further reduce heterogeneity within each data set, rare species occurring in less than 3 plots were removed from the forest/woodland and herbaceous RA subsets, and species occurring in less than 2 plots were removed from the Relevé dataset and the shrub-overstory RA subset.

After groups were generated in the cluster analyses, Indicator Species Analysis (ISA) was employed to objectively decide what number of "group" or cut levels to explicitly interpret the cluster dendrograms (McCune and Grace 2002). Further, ISA was used to determine which species were characteristic indicators for the different groups. ISA produced indicator values for each species in each of the group

levels within the dendrogram, and the statistical significance of the indicator species was evaluated using a Monte Carlo test with 1000 randomizations (Dufrene and Legendre 1997). For the four data subsets, ISA was repeated from group level 2 to above 15. All analyses were evaluated to determine the total number of significant indicator species ( $p\text{-value} \leq 0.5$ ) and the mean  $p$ -value for all species within each group level. For each dendrograms, the group level that had the highest number of significant indicators and lowest overall mean  $p$ -value was selected for the final evaluations of the community classification (McCune and Grace 2002). At this grouping level, plant community names within floristic classes (e.g., association names) were applied to the samples of the different groups.

Further, each plot was reviewed within the context of the cluster to which it had been assigned to quantitatively define the “membership rules” for each association. The membership rules were defined by species composition, degree of constancy, indicator species, and species cover values. Upon revisiting each sample, some samples were misclassified in earlier fusions of the cluster analysis, and these samples were reclassified based on the membership rules. The set of data collected throughout the study area was used as the principal means for defining the association and alliance composition and membership rules. However, pre-existing classifications and floras were consulted to locate analogous/similar classifications or descriptions of vegetation. A summary of the analysis process is provided in the following steps:

1. Run presence-absence Cluster Analysis to determine general arrangement of plots.
2. Run cover category Cluster Analysis to display a more specific arrangement of plots based on species abundance as well as presence.
3. Break up the dataset into smaller, sizeable units for subsequent Cluster Analysis runs.
4. Run Indicator Species Analysis (ISA) at each of the successive group levels for each of the Cluster Analysis dendrograms from 2 groups up to the maximum number of groups (all groups have at least 2 samples).
5. Settle on the final representative grouping level of each Cluster Analysis to use in the preliminary labeling.
6. Preliminarily label alliance and association for each of the samples, and denote indicator species from the ISA.
7. Develop decision rules for each association and alliance based on most conservative group membership possibilities based on review of species cover on a sample-by-sample basis.
8. Re-label final alliance labels for each sample and arrange in table of database.
9. Use decision rules developed in the new data to assign alliance and association names to all analyzed data and all outlier samples removed from dataset.

Because the study area encompassed a relatively small region with rare edaphic factors (e.g., rare geology, soil, and groundwater conditions), the sampling and subsequent data analyses contain singular plots of under-represented or rare vegetation types. Inherently, the sampling effort included previously undescribed and rare vegetation types known only from within the study area. It also included unique plots that were the only representatives of common alliances known more broadly from other areas in California. Additionally, the sampling effort was not able to survey the full spectrum of vegetation because of difficulties with accessibility. For these reasons, adequate data may not be available in this report for all vegetation types. Nevertheless, relatively unique samples were considered important and described separately in the results. In some cases, they represented unusual species groupings of heretofore un-described plant communities, and they were described to afford perspective into unusual vegetation types that deserve additional sampling. They may be described generically as habitats, unique stands, or alliances without any association designations.

#### *Definitions for Classification and Key*

The classification and key were produced to substantiate the vegetation types identified in the fieldwork of this project. They are based on the two floristic hierarchy levels of the U.S. National Vegetation Classification System (NVCS) per NatureServe (2006) and Grossman et al. (1998). These levels are characterized by species composition, abundance, and habitat/environment as described below.



Plots were classified to the association level, which is the finest unit in vegetation classification per the NVCS and the California Native Plant Society (Sawyer and Keeler-Wolf 1995). An association is characterized by multiple stands of vegetation that repeat in the landscape with definite floristic and environmental features. An association is defined by the presence of character and dominant species in the overstory and other important and indicator species in the understory, which are distinctively assembled in a particular environmental setting. Thus, significant indicator species were drawn from the analyses and applied to the determinations of associations by the classification analysis team. Correlates to certain environmental variables or lack thereof helped in determining whether or not a particular cluster grouping should be ranked as at the association level or higher.

Plots of similar associations or unique plots were classified to the alliance level, which is the next floristic unit of the vegetation classification above association. An alliance is defined as the generic unit and is usually established by the dominant and/or characteristic plant species in the upper layer of vegetation (as long as this layer is at or above 10% cover). For example, different types of coast live oak woodland were classified to the association level depending on characteristic overstory and understory species and on environmental factors (e.g., Coast Live Oak / Grass which was found on more clayey soils as compared to Coast Live Oak / California Sagebrush), while the Coast Live Oak alliance is based on the characteristic presence of coast live oak in the overstory.

To compare and distinguish types in the classification, a key to the alliances and associations was produced. It was written with general choices and information on physiognomies of the vegetation and on different environments including wetland and upland positions. Thus, the key is first broken into major units based on the dominant plant life-form: trees, shrubs and herbs. Within these groups, it is further divided by coniferous/broadleaf evergreen, chaparral/soft-leaved shrubs, wetland/upland distinctions, graminoid/forb distinctions, etc.

The approach of the key was chosen for the following reasons: 1) to reduce the length and redundancy that is common in dichotomous keys, and 2) to be a guide that can be easily used by non-botanists/plant ecologists. The vegetation key can be used as a stand-alone product, allowing anyone with some basic ecology background and knowledge of the main characteristic plant species to identify the vegetation. It is written from two perspectives: 1) a field team attempting to identify vegetation, and 2) an office team attempting to place field samples into the proper category. Thus, heavy reliance is placed on correct identification of characteristic plant species and of estimation of cover (or relative cover) of these species.

## Description Writing

Following the analysis of field data and development of the classification and key, standard association-level descriptions were written. They were based on field data and available literature. Scientific names of plants follow Hickman (1993) and UCB (2004). Common names follow the state classification (CDFG 2003) and USDA-NRCS (2005). The primary compilers and developers of the data queries were Julie Evens and Ed Kentner (California Native Plant Society). CNPS staff wrote the local descriptions, and Todd Keeler-Wolf edited the description text.

The following definitions and conventions were set in developing the descriptions and the keys:

1. **Cover:** The primary metric used to quantify the importance/abundance of a particular species or a particular vegetation layer within a plot. It was measured by estimating the aerial extent of the living plants, or the "bird's-eye view" looking from above for each category. In this vegetation classification and mapping project and other National Park Service projects in California, cover is assessed using the concept of "porosity" or foliar cover rather than "opaque" or crown cover. Thus, field crews were trained to estimate the amount of shade produced by the canopy of a plant or a stratum by taking into account the amount of shade it casts, whereby the cover estimates exclude 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 cover cast by the individual or stratum, which, in turn relates to the actual amount of light available to individual species or strata beneath it.

2. **Relative cover:** Refers to the amount of the surface of the plot or stand sampled that is covered by one species (or physiognomic group) as compared to (relative to) the amount of surface of the plot or stand covered by all species (in that group). Thus, 50 percent relative cover means that half of the total cover of all species or physiognomic groups is composed of the single species or group in question.

Relative cover values are proportional numbers and, if added, total 100 percent for each stand (sample).

3. **Absolute cover:** Refers to the actual percentage of the ground (surface of the plot or stand) that is covered by a species or group of species. For example, *Pinus sabiniana* covers between 5 percent and 10 percent of the stand. Absolute cover of all species or groups if added in a stand or plot may total greater or less than 100 percent because it is not a proportional number.

4. **Dominant:** Must be in at least 75 percent of the samples, with at least 50 percent relative cover in all samples.

5. **Co-dominant:** Must be in at least 75 percent of the samples, with at least 30 percent relative cover in all samples.

6. **Consistent/Characteristic/Diagnostic species:** Must be present in at least 75 percent of the samples, with no restriction on cover.

7. **Abundant species:** Must be present in at least 50 percent of the samples, with an average of at least 30 percent relative cover in all samples.

8. **Frequently occurring species or Often/Usually occurring species:** Must be present in at least 75 percent or at least 50 percent of the samples, respectively, with no restriction on cover.

9. **Sometimes/Occasionally or Infrequently occurring:** Present 25 to 50 percent of the samples or in less than 25 percent of the samples, respectively, with no restriction on cover.

10. **Sparse:** Used to describe individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where the cover is less than 10 percent absolute cover

11. **Open:** Used to describe individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where the cover is less than 33 percent absolute cover.

12. **Intermittent:** Used to describe individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where there is 33-66 percent absolute cover.

13. **Dense/Continuous:** Used to describe individual layers of vegetation (tree, shrub, herb, or subdivisions of them) where there is greater than 66 percent absolute cover.

14. **Emergent:** A plant (or vegetation layer) is considered emergent if it includes a sparse cover of the plant, which rises above a predominant vegetation layer, and it is considered as a member of the next tallest layer, but has an absolute cover < 10%. For example, individual *Quercus agrifolia* trees may comprise an emergent tree layer of 5% over a dense layer of *Artemisia californica* shrubs; the stand would be considered within the *Artemisia californica* shrubland alliance because the total tree cover is < 10% and the shrub cover is >10%. Further, medium to tall shrubs are not considered emergent over shorter shrubs, but short trees are considered emergent over tall shrubs.

15. **Stand:** Is the basic physical unit of vegetation in a landscape. It has no set size. Some vegetation stands are very small such as wetland seeps, and some may be several square kilometers in size such as desert or forest types. A stand is defined by two main unifying characteristics:

a. It has *compositional* integrity. Throughout the site, the combination of species is similar. The stand is differentiated from adjacent stands by a discernable boundary that may be abrupt or gradual.

b. It has *structural* integrity. It has a similar history or environmental setting, affording relatively similar horizontal and vertical spacing of plant species. For example, a hillside forest formerly dominated by the same species, but that has burned on the upper part of the slope and not the lower is divided into two stands. Likewise, a sparse woodland occupying a slope with shallow rocky soils is considered a different stand from an adjacent slope of a denser woodland/forest with deep moist soil and the same species.

16. **Woody plant:** Is any species of plant that has noticeably woody stems. It does not include herbaceous species with woody underground portions such as tubers, roots, or rhizomes.

17. **Tree:** Is a one-stemmed woody plant that normally grows to be greater than 5 meters tall. In some cases trees may be multiple-stemmed following ramifying after fire or other disturbance, but size of mature plants is typically greater than 5 m and undisturbed individuals of these species are usually single stemmed.



18. **Overstory or Understory Tree:** If trees are in the overstory layer, they are generally at canopy level (or the tallest emergent trees). If trees are in the understory layer, they are entirely below the general level of the canopy (i.e., younger stature trees with <5 m height) or they are short trees/tall shrubs (i.e., never reach the stature of the taller canopy layer and may be 4-15 m in height).
19. **Shrub:** Is normally a multi-stemmed woody plant that generally has several erect, spreading, or prostrate stems and that is usually between 0.2 meters and 5 meters tall, giving it a bushy appearance. Definitions are blurred at the low and the high ends of the height scales. At the tall end, shrubs may approach trees based on disturbance frequencies (e.g., old-growth re-sprouting chaparral species such as *Cercocarpus betuloides*, *Heteromeles arbutifolia*, *Prunus ilicifolia*, etc., may frequently attain “tree size”). At the low end, woody perennial herbs or sub-shrubs of various species are often difficult to categorize into a consistent life-form; usually sub-shrubs (per USDA-NRCS 2005) were categorized in the “shrub” category.
20. **Herbaceous plant:** Is any vascular plant species that has no main woody stem-development, and includes grasses, forbs, and perennial species that die-back seasonally.
21. **Cryptogam:** Is a nonvascular plant or plant-like organism without specialized water or fluid conductive tissue (xylem and phloem). Includes mosses, lichens, liverworts, hornworts, and algae.
22. **Forest:** In the National Vegetation Classification, a forest is defined as a tree-dominated stand of vegetation with 60 percent or greater cover of trees. Most forest alliances tend to have average cover of trees > 60%, but individual stands under certain conditions may drop lower than 60%. This is reflective of the “modal” concept of the characteristics of a particular alliance.
23. **Woodland or Sparsely Wooded:** In the National Classification of Vegetation, woodland is defined as a tree-dominated stand of vegetation with between 25 percent and 60 percent cover of trees. There are stands with trees generally at least 10% absolute cover or more, which are still considered as woodlands in this report. However, the National Classification considers stands dominated by 10-25 percent cover as sparsely wooded over a shrub or herbaceous dominant canopy (e.g., sparsely wooded shrubland or sparsely wooded herbaceous).
24. **Rare Plant Species:** As listed as per CNPS (2005) Online Inventory of Rare and Endangered Plants. Species were listed in descending order of occurrence within the vegetation type.
25. **Distribution:** Local ecological regions were listed in alphabetical order.
26. **Non-Native Species:** Is any species of plant and animal not native (natural) to an area. Non-native species were listed in descending order of frequency and abundance within the vegetation type. However, a broom species when present in a type was listed first, regardless of its frequency or abundance relative to the other species.
27. **Minimum sample size for classification and description:**  $n = 3$ . Descriptions of associations with fewer than three samples were attempted if (a) the association was sampled and described by previous authors or (b) the vegetation was confirmed as distinctive and repeatable based on field reconnaissance or by photo-interpretation signature.
28. **Sample(s):** Indicated as Vegetation Rapid Assessments or Relevés and listed sequentially by their survey record numbers from the vegetation databases that begin with the alpha-code “MMWD” and are followed by a unique numeric code with leading zeros.
29. **Conservation rank:** Listed by the state NatureServe Natural Heritage Programs. All communities were ranked, though ones without much information were ranked with a “?” after the rank to denote that this rank may change with more information, but that the best knowledge to date (sometimes personal observation) was used in these situations. Ranks were assigned by consulting with the ecologist at the California Natural Heritage Program (T. Keeler-Wolf) and using hard references. These ranks are the “Global” and “State” ranks as seen below:
- a. **G1** and **S1:** Fewer than 6 viable occurrences worldwide and/or less than 2000 acres
  - b. **G2** and **S2:** 6-20 viable occurrences worldwide and/or 2000-10,000 acres
  - c. **G3** and **S3:** 21-100 viable occurrences worldwide and/or 10,000-50,000 acres
  - d. **G4** and **S4:** Greater than 100 viable occurrences worldwide and/or greater than 50,000 acres
30. **Con, Avg, Min, Max:** A species table is provided at the end of each association (or alliance) description. The “Con” column provides the overall constancy value for each species within all rapid assessments and relevés classified as that vegetation type. The constancy values are between 0 and 100. Species that occurred with at least 20% constancy are listed in the table. The “Avg” column provides the average cover value for each species, as calculated across all samples in that vegetation type. The

“Min” and “Max” values denote the minimum and maximum values for estimated cover of species listed in the table.

## RESULTS

### Basic Species and Vegetation Data

In the 419 surveys collected on MMWD lands in 2005, over 500 vascular plant species were identified to the species or subspecies level. Three general names were given to non-vascular taxa (i.e., cryptogamic crust, moss, and lichen). Appendix 2 provides a complete list of scientific and common names for all the taxa identified and analyzed in the rapid assessment surveys. The scientific names of the taxa were converted to alpha-numeric codes for the data analyses, as recorded in the appendix. Appendix 3 provides a list of 22 sensitive plants that were recorded in the 2005 vegetation surveys as listed per CNPS 2005. In addition, global and state rankings and generalized habitat information are provided in this list.

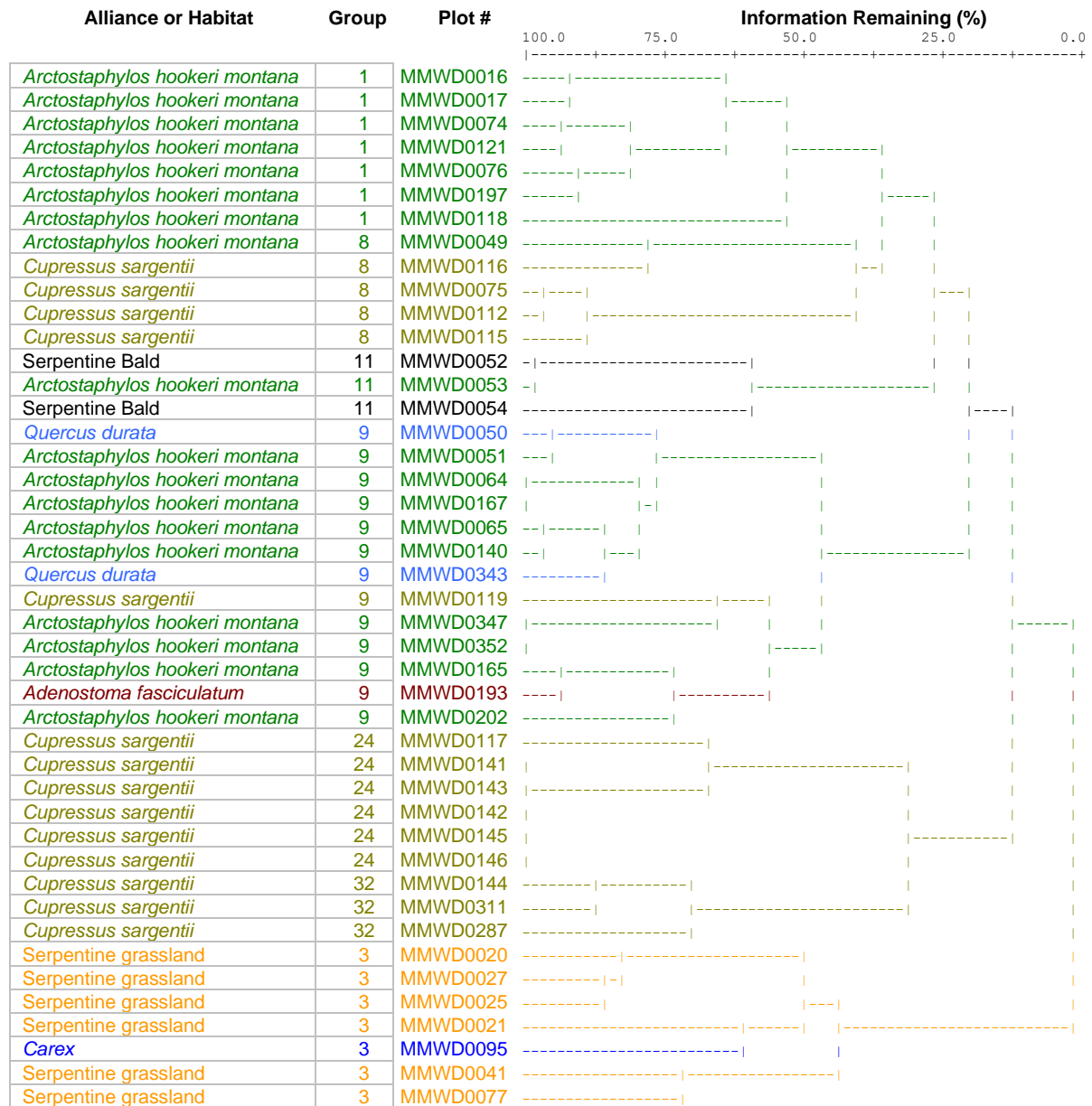
### Classification Analyses

After producing first and second-run Cluster Analyses, the Indicator Species Analysis routine of PC-ORD was applied to each of the three main subsets of the original RA dataset and one main group of the Relevé dataset. The first subset contained 136 plots of herbaceous vegetation and oak savannahs with the significant indicators *Avena barbata*, *Carduus pycnocephalus*, *Bromus hordeaceus*, *Cynosurus echinatus*, *Baccharis pilularis*, and *Nassella pulchra*. A second subset consisted of 175 plots that were mostly forests or woodlands with the significant indicators *Arbutus menziesii*, *Iris douglasiana*, *Polystichum munitum*, *Pseudotsuga menziesii*, *Toxicodendron diversilobum*, and *Umbellularia californica*. A third subset included 60 plots of mainly shrub-overstory vegetation with the significant indicators *Arctostaphylos glandulosa*, *Adenostoma fasciculatum*, “Lichen”, *Quercus wislizeni*, and *Pickeringia montana*. The fourth (relevé) group contained 46 plots of serpentine vegetation with significant indicators *Arctostaphylos hookeri* subsp. *montana*, *Ceanothus cuneatus*, *Cupressus sargentii*, *Linanthus* spp., *Pedicularis densiflora*, *Plantago erecta*, *Streptanthus batrachopus*, and *S. glandulosus*. As a note, Indicator Species Analysis is a statistical process for evaluating the degree of abundance and frequency of species among different groups. Thus, it does not signify that species in the latter group are restricted only to serpentine substrate, yet they were abundant and/or frequent in that group.

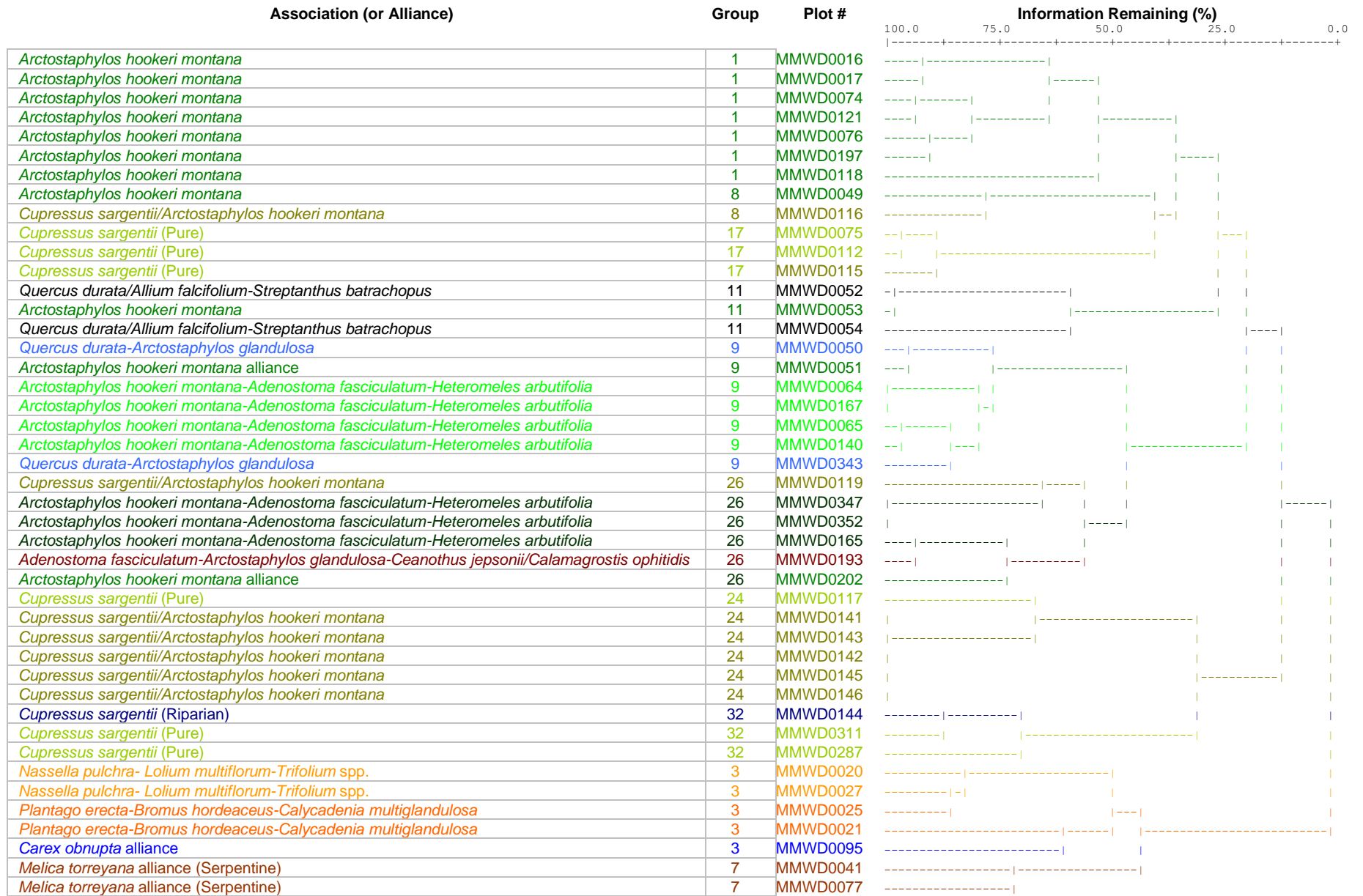
In total, the MMWD samples were interpreted to include 69 herbaceous/grassland plots, 108 shrub-dominated plots, and 242 woodland/forest plots. The four separate cluster analyses were interpreted and classified at the alliance and association levels. See figures 3 and 4 for example cluster dendrograms from the Relevé dataset, and see table 1 for the Indicator Species Analysis results for these dendrograms. After combining all of the separate analyses, the plots were re-labeled with final classification names into 59 different alliances and habitats, within which 88 associations were defined. See table 2 for a summary of the classification.

### Invasive Broom Species

Invasive broom species (*Cytisus scoparium* or *Genista monspessulana*) were observed in certain plant communities. Table 3 provides a summary of the plant communities in which broom was recorded, including the frequency and abundance of the broom. Tree communities with the highest abundance of broom included oak woodlands with Oregon oak (*Quercus garryana*), coast live oak (*Quercus agrifolia*), and California bay (*Umbellularia californica*). French broom (*Genista monspessulana*) was the most common of the invasive broom species encountered, in which it aggressively dominates as a shrubland in some areas.



**Figure 3.** Example of the cluster analysis output for the Relevé dataset with 7 group levels showing (from right to left) the arrangement and relationship of plots in the cluster dendrogram and the derived alliance classification. In the diagram, splits closest to left are ecologically more closely related than splits to right, and the different colors indicate the alliance names.



**Figure 4.** Example of the cluster analysis output for the Relevé dataset with 10 group levels showing (from right to left) the arrangement and relationship of plots in the cluster dendrogram and the derived association classification.

**Table 1.** Significant indicator species (with p-values <0.05) from the Indicator Species Analyses for the Relevé dendrograms at the cluster group levels of 7 and 10. Species that are bolded were used in the classification names at the alliance or association levels.

Group Level 7			Group Level 10		
Scientific Name	Group	IV	Scientific Name	Group	IV
<i>Satureja douglasii</i>	1	42.9	<i>Satureja douglasii</i>	1	42.9
<b><i>Arctostaphylos hookeri montana</i></b>	1	26	<b><i>Arctostaphylos hookeri montana</i></b>	1	18.8
<i>Silene gallica</i>	3	42.9	<i>Eriogonum nudum</i>	3	60
<i>Eschscholzia californica</i>	3	42.9	<i>Linanthus</i>	3	60
<i>Poa secunda</i>	3	42.9	<i>Lotus micranthus</i>	3	60
<i>Lotus micranthus</i>	3	42.9	<b><i>Trifolium barbigerum</i></b>	3	60
<b><i>Trifolium barbigerum</i></b>	3	42.9	<b><i>Plantago erecta</i></b>	3	51.2
<i>Eriogonum nudum</i>	3	42.9	<i>Bromus hordeaceus</i>	3	48.1
<i>Linanthus</i>	3	42.9	<i>Anagallis arvensis</i>	3	48
<i>Daucus pusillus</i>	3	47.6	<i>Avena barbata</i>	3	46.8
<i>Lotus humistratus</i>	3	49.7	<i>Hypochaeris glabra</i>	3	45
<b><i>Nassella pulchra</i></b>	3	49.5	<i>Elymus elymoides</i>	3	40
<i>Anagallis arvensis</i>	3	65.5	<i>Geranium</i>	3	40
<b><i>Plantago erecta</i></b>	3	60.7	<i>Sanicula bipinnata</i>	3	40
<i>Avena barbata</i>	3	83.9	<b><i>Trifolium bifidum</i></b>	3	40
<i>Bromus hordeaceus</i>	3	58.9	<b><i>Trifolium willdenovii</i></b>	3	40
<b><i>Cupressus sargentii</i></b>	8	64.7	<i>Streptanthus glandulosus</i>	7	60.9
<i>Festuca californica</i>	9	38.5	<i>Lotus wrangelianus</i>	7	58.8
<b><i>Arctostaphylos glandulosa</i></b>	9	53.8	<i>Daucus pusillus</i>	7	57.4
<b><i>Adenostoma fasciculatum</i></b>	9	53.5	<i>Eriodictyon californicum</i>	7	53.4
<b><i>Heteromeles arbutifolia</i></b>	9	45.7	<i>Lotus humistratus</i>	7	41.7
<i>Lythrum hyssopifolia</i>	11	44	<b><i>Melica torreyana</i></b>	7	23.9
<b><i>Allium falcifolium</i></b>	11	38.6	<i>Pedicularis densiflora</i>	8	75
<i>Eriogonum luteolum</i>	11	61	<i>Festuca californica</i>	9	71.4
<i>Clarkia</i>	11	100	<i>Agrostis</i>	9	42.9
<i>Claytonia exigua</i>	11	63.6	<b><i>Quercus durata</i></b>	9	42.9
<b><i>Streptanthus batrachopus</i></b>	11	100	<i>Toxicodendron diversilobum</i>	9	39
<i>Zigadenus fremontii</i>	24	33.7	<i>Chlorogalum pomeridianum</i>	9	20.8
<i>Eriophyllum lanatum</i>	24	33.3	<i>Clarkia</i>	11	100
<b><i>Cupressus sargentii</i></b>	24	50.6	<b><i>Streptanthus batrachopus</i></b>	11	100
<i>Achillea millefolium</i>	32	33.2	<i>Claytonia exigua</i>	11	51.9
<i>Garrya elliptica</i>	32	39.4	<b><i>Cupressus sargentii</i></b>	17	61.2
<i>Pseudotsuga menziesii</i>	32	43.3	<b><i>Cupressus sargentii</i></b>	24	47.9
<i>Polygala californica</i>	32	37.4	<b><i>Ceanothus cuneatus</i></b>	26	49.1
<i>Umbellularia californica</i>	32	48.6	<b><i>Adenostoma fasciculatum</i></b>	26	32.4
<i>Festuca idahoensis</i>	32	46.4	<i>Polypodium</i>	32	66.7
<i>Elymus glaucus</i>	32	46.1	<i>Symphoricarpos mollis</i>	32	66.7
<i>Quercus wislizeni</i>	32	52.7	<i>Pentagramma triangularis</i>	32	59.7
<i>Quercus agrifolia</i>	32	57.2	<i>Quercus agrifolia</i>	32	53
<i>Lonicera hispidula</i>	32	51	<i>Quercus wislizeni</i>	32	45
<i>Polypodium</i>	32	66.7	<i>Umbellularia californica</i>	32	42.4
<i>Symphoricarpos mollis</i>	32	66.7	<i>Lonicera hispidula</i>	32	41.8
<i>Pentagramma triangularis</i>	32	67.3	<i>Festuca idahoensis</i>	32	41.1
<i>Moss</i>	32	50.7	<i>Moss</i>	32	41.1
<i>Iris</i>	32	47.6	<i>Elymus glaucus</i>	32	40.6
			<i>Iris</i>	32	34.2
			<i>Polygala californica</i>	32	29.4

**Table 2.** Final vegetation classification from the Marin Municipal Water District, California, with alliances and associations nested within a higher-level hierarchy of divisions per the International Vegetation Classification System (IVCS). Other columns include number of plots (from classification), region and geologic substrate (provided by MMWD), and mapping codes (per AIS and MMWD). Codes are used for regions (MT=Mount Tamalpais, NR=Nicasio Reservoir, SR=Soulajule Reservoir) and for geologic substrate (ALV=Alluvium, CHT=Chert, FM=Franciscan Mélange, GRN=Greenstone, GRW=Graywacke, SRP=Serpentine, SS=Sandstone and Shale). Alliances (highlighted in light gray) currently existing in the IVCS were categorized to divisions, and types not currently defined in the IVCS were designated conservatively by relating them to similar types.

**Lifeform, Division, and Alliance**

Association	N-plots	Regions	Substrate	Map Code
<b>Herb-Grassland</b>				
North American Mediterranean Grasslands and Meadows / Calif. Upland Annual Grassland and Herbland				
California Annual Grassland				
Annual grassland - Native - Non-native	4	MT	ALV,FM,GRN	4310
<i>Briza maxima</i> - <i>Trifolium depauperatum</i> - <i>Lupinus</i> spp.	6	MT	FM,SRP	4310
<i>Cynosurus echinatus</i> - <i>Linum bienne</i> - <i>Brodiaea elegans</i>	2	SR	FM,SS	4310
<i>Plantago erecta</i>				
<i>Plantago erecta</i> - <i>Calycadenia multiglandulosa</i> -Annual Grass	3	MT	FM,SRP	4610mu
<i>Trifolium variegatum</i>				
(alliance only)	1	MT	GRN	4211/4310
North American Mediterranean Grasslands and Meadows / Calif. Upland Perennial Grassland				
<i>Melica torreyana</i> (Serpentine)				4610mu
(alliance only)	2	MT	FM,SRP	4610mu
<i>Nassella pulchra</i> (Serpentine and Non-serpentine)				
<i>Nassella pulchra</i> - <i>Lolium multiflorum</i> - <i>Trifolium</i> spp.	2	MT	SRP	4610mu
<i>Nassella pulchra</i> (Mixed herbaceous)	3	MT,NR,SR	FM	4520
<i>Nassella pulchra</i> - <i>Melica californica</i> -Annual grass	7	MT,SR	ALV,FM,GRN	4520
North American Temperate Sparse Scrub and Herbland				
Serpentine Bald				
<i>Quercus durata</i> / <i>Allium falcifolium</i> - <i>Streptanthus batrachopus</i> (Serpentine bald)	2	MT	SRP	9401
North American Temperate Grassland and Meadow				
<i>Festuca idahoensis</i>				
<i>Festuca idahoensis</i> - <i>Bromus carinatus</i>	3	MT,NR	ALV,FM	4510
<i>Festuca idahoensis</i> - <i>Festuca rubra</i>	1	MT	FM	4510
<i>Festuca californica</i>				
(alliance only)	3	MT	FM	4510
Upland Perennial Grassland/Prairie				
<i>Thermopsis californica</i> - <i>Bromus carinatus</i> -Annual Brome	4	MT	FM	4313/4510
<i>Iris douglasiana</i> - <i>Holcus lanatus</i>	1	NR	FM	4500
Temperate Grassland and Meadow (Introduced)				
<i>Anthoxanthum odoratum</i> - <i>Festuca arundinacea</i> - <i>Holcus lanatus</i>				
<i>Festuca arundinacea</i> - <i>Carex densa</i>	2	MT	ALV,FM	4430
<i>Phalaris aquatica</i>				
(alliance only)	1	SR	FM	4410

Association	N-plots	Regions	Substrate	Map Code
Upland Perennial Grassland/Prairie				
<i>Dipsacus sativus</i>	2	NR	ALV,FM	4420
North American Temperate and Boreal Freshwater Marsh and Meadow				
<i>Carex</i>				
<i>Carex barbarae</i> (alliance only)	1	MT	ALV	4210
<i>Carex obnupta</i> (alliance only)	2	MT	GRW,SRP	4210
<i>Carex serratodens</i> (alliance only)	1	MT	FM	4210
<i>Carex subfusca</i> - <i>Carex amplifolia</i>	2	MT	ALV	4210
<i>Carex</i> - <i>Juncus</i> ( <i>Carex densa</i> Alliance)				
<i>Carex densa</i> - <i>Lolium perenne</i> - <i>Juncus</i> spp.	2	MT,NR	FM	4210
<i>Carex densa</i> - <i>Juncus xiphioides</i>	3	MT,NR	FM	4210
<i>Hordeum brachyantherum</i>				
(alliance only)	2	MT	FM	4620/4210
<i>Juncus</i> spp. ( <i>J. articulatus</i> - <i>J. covillei</i> )				
(habitat only)	1	MT	ALV	4210
<i>Juncus effusus</i>				
(alliance only)	2	MT	ALV	4210
<i>Scirpus microcarpus</i>				
(alliance only)	1	MT	ALV	4120
<i>Typha</i>				
<i>Typha angustifolia</i> (alliance only)	2	MT	FM	4110
<i>Typha latifolia</i> (alliance only)	1	MT	ALV	4110
<b>Shrubland</b>				
Southwestern North American Chaparral (Sclerophyll) Scrub				
<i>Adenostoma fasciculatum</i>				
(alliance only)	2	MT	FM	3110
<i>Adenostoma fasciculatum</i> /Annual grass-forb	1	MT	FM	3110/3115
<i>Adenostoma fasciculatum</i> - <i>Arctostaphylos glandulosa</i> - <i>Ceanothus jepsonii</i> / <i>Calamagrostis ophitidis</i>	3	MT	FM,SRP	3112
<i>Adenostoma fasciculatum</i> - <i>Mimulus aurantiacus</i>	6	MT	FM,GRN	3115/3114mu
<i>Adenostoma fasciculatum</i> - <i>Arctostaphylos glandulosa</i>				
(alliance only)	1	MT	FM	3190
<i>Adenostoma fasciculatum</i> - <i>Arctostaphylos glandulosa</i>	3	MT	FM,SRP	3190
<i>Adenostoma fasciculatum</i> - <i>Arctostaphylos glandulosa</i> - <i>Quercus wislizeni</i>	6	MT	FM	3190
<i>Adenostoma fasciculatum</i> - <i>Ceanothus cuneatus</i>				
(alliance only)	2	MT	FM,GRN	3114mu
<i>Arctostaphylos canescens</i>				
<i>Arctostaphylos canescens</i> - <i>Arctostaphylos glandulosa</i> - <i>Adenostoma fasciculatum</i>	4	MT	FM	3140
<i>Arctostaphylos glandulosa</i>				
(alliance only)	1	MT	SRP	3150
<i>Arctostaphylos glandulosa</i>	4	MT	FM,GRN,GRW	3150
<i>Arctostaphylos hookeri</i> subsp. <i>montana</i>				
(alliance only)	2	MT	ALV,SRP	3120
<i>Arctostaphylos hookeri</i> subsp. <i>montana</i>	11	MT	ALV,FM, SRP	3120
<i>Arctostaphylos hookeri</i> subsp. <i>montana</i> - <i>Adenostoma fasciculatum</i>	7	MT	FM,SRP	3121
<i>Arctostaphylos nummularia</i>				

Association	N-plots	Regions	Substrate	Map Code
(alliance only)	1	MT	GRW	3130
<i>Arctostaphylos nummularia</i> - <i>Arctostaphylos glandulosa</i>	2	MT	FM	3130
<i>Arctostaphylos nummularia</i> - <i>Vaccinium ovatum</i> (- <i>Chrysolepis chrysophylla</i> )	4	MT	FM	3130
<i>Quercus durata</i>				
(alliance only)	1	MT	SRP	3180
<i>Quercus durata</i> - <i>Adenostoma fasciculatum</i> (undifferentiated)	0	MT	SRP	3180
<i>Quercus durata</i> - <i>Arctostaphylos glandulosa</i>	2	MT	SRP	3180
<i>Quercus wislizeni</i> (Shrubland)				
<i>Quercus wislizeni</i> (Shrubland)	3	MT	FM	3160
<i>Arctostaphylos glandulosa</i> - <i>Quercus wislizeni</i> (Shrubland)	6	MT	FM	3161
Southwestern North American Facultatively Drought-deciduous Scrub				
<i>Artemisia californica</i>				3310
<i>Artemisia californica</i> - <i>Mimulus aurantiacus</i>	5	MT	FM	3311
<i>Baccharis pilularis</i>				
(alliance only)	1	MT	FM	3220
<i>Baccharis pilularis</i> /Native Grass (Mixed)	6	MT,NR,SR	FM,SS	3222mu
<i>Baccharis pilularis</i> /Native Grass ( <i>Nassella pulchra</i> )	5	MT,NR,SR	FM	3222mu
<i>Baccharis pilularis</i> - <i>Artemisia californica</i> - <i>Toxicodendron diversilobum</i> / <i>Monardella villosa</i>	3	MT,SR	FM	3221
<i>Baccharis pilularis</i> - <i>Ceanothus thyrsiflorus</i>	1	SR	FM	3223mu/3170
<i>Baccharis pilularis</i> - <i>Toxicodendron diversilobum</i>	3	MT,SR	FM,SS	3223mu
<i>Ceanothus thyrsiflorus</i>				
<i>Ceanothus thyrsiflorus</i> - <i>Rubus ursinus</i>	2	MT,SR	FM,SS	3170
<i>Ceanothus thyrsiflorus</i> - <i>Vaccinium ovatum</i> - <i>Rubus parviflorus</i>	1	MT	FM	3170
Broom ( <i>Cytisus</i> , <i>Genista</i> , <i>Spartium</i> , <i>Ulex</i> spp.)				
<i>Genista monspessulana</i>	4	MT,SR	ALV,FM,GRN	3210
North American Temperate Freshwater Shrub-Swamp				
<i>Rhododendron occidentale</i>				
(alliance only)	1	MT	ALV	3420
Woodland/Forest				
North American Temperate Flooded/Swamp Broadleaf Forest				
<i>Alnus rubra</i>				
(alliance only)	1	NR	GRN	1330
<i>Salix laevigata</i>				
<i>Salix laevigata</i> - <i>Cornus sericea</i> / <i>Scirpus microcarpus</i>	2	MT	ALV	1310mu
<i>Salix lasiolepis</i>				1
<i>Salix lasiolepis</i> / <i>Baccharis pilularis</i> - <i>Rubus ursinus</i>	3	MT,NR,SR	ALV,FM	1310mu
<i>Salix lucida</i>				
(alliance only)	1	SR	FM	1310mu
North American Temperate Montane and Boreal Deciduous Broadleaf and Mixed Conifer Forest				
<i>Quercus garryana</i>				
(alliance only)	2	MT	FM	2210
North American Temperate Warm Deciduous Broadleaf and Mixed Conifer Forest				
<i>Aesculus californica</i>				
(alliance only)	1	MT	FM	2220



Association	N-plots	Regions	Substrate	Map Code
<i>Aesculus californica</i> - <i>Umbellularia californica</i> / <i>Mimulus aurantiacus</i>	3	MT	FM	2220/1112
<i>Quercus kelloggii</i>				1410
<i>Quercus kelloggii</i> - <i>Arbutus menziesii</i> - <i>Quercus agrifolia</i>	3	MT	FM	1410/1101mu
<i>Quercus lobata</i>				2230
<i>Quercus lobata</i> /Grass	1	MT	FM	2230
North American Temperate Evergreen Broadleaf and Mixed Forest				
<i>Arbutus menziesii</i>				1160
<i>Arbutus menziesii</i> - <i>Quercus agrifolia</i>	7	MT	FM	1160/1101mu
<i>Arbutus menziesii</i> - <i>Umbellularia californica</i> - ( <i>Lithocarpus densiflorus</i> )	12	MT	FM,GRN	1160/1104mu
<i>Arbutus menziesii</i> - <i>Umbellularia californica</i> - <i>Quercus kelloggii</i>	7	MT	CHT,FM	1160/1104mu
<i>Chrysolepis chrysophylla</i>				
(alliance only)	1	MT	FM	1180
<i>Chrysolepis chrysophylla</i> / <i>Vaccinium ovatum</i>	3	MT	CHT,FM	1180
<i>Chrysolepis chrysophylla</i> - <i>Arctostaphylos glandulosa</i>	5	MT	FM,GRW	1180
<i>Lithocarpus densiflorus</i>				
(alliance only)	1	MT	FM	1140
<i>Lithocarpus densiflorus</i> - <i>Arbutus menziesii</i>	6	MT	ALV,GRN	1104mu
<i>Lithocarpus densiflorus</i> - <i>Umbellularia californica</i>	2	MT	FM	1116/1104mu
<i>Quercus agrifolia</i>				
(alliance only)	1	MT	FM	2110
<i>Quercus agrifolia</i> /Grass (annual)	2	MT	FM	2111mu
<i>Quercus agrifolia</i> /Grass (perennial native)	4	MT	ALV,FM	2111mu
<i>Quercus agrifolia</i> / <i>Toxicodendron diversilobum</i> /Grass	5	MT,SR	FM	2110/2111mu
<i>Quercus agrifolia</i> - <i>Arbutus menziesii</i> - <i>Umbellularia californica</i>	7	MT	FM,GRN	1104mu
<i>Quercus chrysolepis</i>				
<i>Quercus chrysolepis</i> - <i>Arbutus menziesii</i> - <i>Lithocarpus densiflorus</i>	2	MT	FM	1170
<i>Quercus wislizeni</i>				3160
<i>Quercus wislizeni</i> / <i>Arctostaphylos glandulosa</i> (Woodland)	7	MT	CHT,FM	3161
<i>Quercus wislizeni</i> / <i>Heteromeles arbutifolia</i>	3	MT	FM	3160
<i>Quercus wislizeni</i> - <i>Quercus chrysolepis</i>				
<i>Quercus wislizeni</i> - <i>Quercus chrysolepis</i>	2	MT	FM	3160/1170
<i>Pseudotsuga menziesii</i>				
(alliance only)	2	MT	FM,GRN	1220
<i>Pseudotsuga menziesii</i> (Pure)	4	MT	ALV,FM,SS	1226
<i>Pseudotsuga menziesii</i> - <i>Chrysolepis chrysophylla</i> - <i>Lithocarpus densiflorus</i>	1	MT	FM	1221mu
<i>Pseudotsuga menziesii</i> - <i>Quercus agrifolia</i>	1	MT	SS	1221mu
<i>Pseudotsuga menziesii</i> - <i>Quercus chrysolepis</i>	4	MT	FM	1222mu
<i>Pseudotsuga menziesii</i> - <i>Umbellularia californica</i> / <i>Polystichum munitum</i>	5	MT	FM,GRN,SS	1222mu/1223
<i>Pseudotsuga menziesii</i> - <i>Umbellularia californica</i> / <i>Toxicodendron diversilobum</i>	7	MT	FM,GRN,SRP	1222mu/1223
<i>Pseudotsuga menziesii</i> - <i>Lithocarpus densiflorus</i> (alliance only)	5	MT	FM,GRN	1224

Association	N-plots	Regions	Substrate	Map Code
<b><i>Umbellularia californica</i></b>				
(alliance only)	2	MT	FM	1110
<i>Umbellularia californica</i> (Pure - Coastal)	7	MT	FM,GRN,SS	1111
<i>Umbellularia californica</i> / <i>Polystichum munitum</i>	3	MT,NR,SR	FM,GRN,SS	1111
<i>Umbellularia californica</i> - <i>Acer macrophyllum</i> (Riparian)	5	MT	FM	2321/1103mu
<i>Umbellularia californica</i> - <i>Aesculus californica</i> / <i>Holodiscus discolor</i>	6	MT	FM	1112/1103mu
<i>Umbellularia californica</i> - <i>Alnus rhombifolia</i>	3	MT	FM,GRN	1321/1103mu
<i>Umbellularia californica</i> - <i>Lithocarpus densiflorus</i>	2	MT	FM,GRN	1116/1102mu
<i>Umbellularia californica</i> - <i>Pseudotsuga menziesii</i> / <i>Rhododendron occidentale</i>	6	MT	ALV,FM,SRP	1123mu
<i>Umbellularia californica</i> - <i>Quercus agrifolia</i>	4	MT	ALV,FM	1115
<i>Umbellularia californica</i> - <i>Quercus agrifolia</i> / <i>Genista monspessulana</i>	3	MT	FM	1115
<i>Umbellularia californica</i> - <i>Quercus agrifolia</i> / <i>Toxicodendron diversilobum</i> ( <i>Corylus cornuta</i> )	5	MT,SR	FM,SS	1115
<i>Umbellularia californica</i> - <i>Quercus chrysolepis</i>	7	MT	ALV,FM,GRN	1114/1102mu
<b>North American Warm Conifer Forest and Woodland</b>				
<b><i>Cupressus macrocarpa</i></b>				
(alliance only)	1	NR	FM	1201mu
<b><i>Cupressus sargentii</i></b>				
<i>Cupressus sargentii</i> (Pure)	6	MT	FM,SRP	1242
<i>Cupressus sargentii</i> (Riparian)	1	MT	FM	1243
<i>Cupressus sargentii</i> / <i>Arctostaphylos hookeri</i> subsp. <i>montana</i>	7	MT	FM,SRP	1241
<b><i>Pinus muricata</i></b>				
(alliance only)	1	MT	GRN	1230/1201mu
<i>Pinus muricata</i> / <i>Arctostaphylos glandulosa</i>	3	MT	FM,GRN	1231
<i>Pinus muricata</i> / <i>Vaccinium ovatum</i>	1	MT	FM	1230
<b><i>Sequoia sempervirens</i></b>				
(alliance only)	1	MT	FM	1210
<i>Sequoia sempervirens</i> - <i>Acer macrophyllum</i> - <i>Umbellularia californica</i> (Riparian)	7	MT	FM,GRN	1217
<i>Sequoia sempervirens</i> - <i>Arbutus menziesii</i> / <i>Vaccinium ovatum</i>	7	MT	FM	1216mu
<i>Sequoia sempervirens</i> - <i>Chrysolepis chrysophylla</i> / <i>Arctostaphylos glandulosa</i>	3	MT	FM	1213
<i>Sequoia sempervirens</i> - <i>Lithocarpus densiflorus</i> / <i>Vaccinium ovatum</i>	9	MT	FM,GRN,SS	1211
<i>Sequoia sempervirens</i> / <i>Woodwardia fimbriata</i> (Riparian)	7	MT	FM	1217
<i>Sequoia sempervirens</i> - <i>Pseudotsuga menziesii</i> - <i>Umbellularia californica</i>	4	MT	FM,SS	1212
<i>Sequoia sempervirens</i> - <i>Umbellularia californica</i>	7	MT	FM,GRN	1214

**Table 3.** Plant communities containing invasive broom species (*Cytisus scoparius* or *Genista monspessulana*), with average cover and frequency of the broom species provided.

Plant Community (Alliance or Association)	n-Veg Type	<i>Cytisus scoparius</i>		<i>Genista monspessulana</i>	
		Avg Cover	n-Species	Avg Cover	n-Species
<b>Tree Overstory</b>					
<i>Arbutus menziesii</i> - <i>Umbellularia californica</i> (- <i>Lithocarpus densiflorus</i> ) Association	12	-	-	0.1	1
<i>Arbutus menziesii</i> - <i>Umbellularia californica</i> - <i>Quercus kelloggii</i> Association	7	-	-	0.2	1
<i>Quercus agrifolia</i> /Grass (annual) Association	2	-	-	3.0	1
<i>Quercus agrifolia</i> /Grass (perennial native) Association	4	0.2	1	0.2	1
<i>Quercus agrifolia</i> / <i>Toxicodendron diversilobum</i> Association	5	0.2	1	2.0	1
<i>Quercus agrifolia</i> - <i>Arbutus menziesii</i> - <i>Umbellularia californica</i>	7	0.2	2	1.5	2
<i>Quercus garryana</i> Alliance	2	-	-	4.2	1
<i>Quercus kelloggii</i> - <i>Arbutus menziesii</i> - <i>Quercus agrifolia</i> Association	3	0.2	1	-	-
<i>Quercus lobata</i> /Grass Association	1	-	-	1.0	1
<i>Umbellularia californica</i> - <i>Aesculus californica</i> / <i>Holodiscus discolor</i> Association	6	-	-	3.0	2
<i>Umbellularia californica</i> - <i>Quercus agrifolia</i> Association	4	15.0	1	2.0	1
<i>Umbellularia californica</i> - <i>Quercus agrifolia</i> / <i>Genista monspessulana</i> Association	3	-	-	20.7	3
<b>Shrubland</b>					
<i>Genista monspessulana</i> Association	4	11.0	1	36.3	4

## KEY TO VEGETATION

A key to distinguish vegetation types is provided in Table 4, which is not strictly dichotomous. Due to the diversity of vegetation in the mapping area, and to avoid an excessively long document, a series of paired statements (or couplets) was not developed for each option. Instead, sets of characteristics with choices beneath them are provided. The key will first provide the user with general options, and individual selections for the vegetation associations or alliances will be listed beneath these options. Simply work through the ordered list of types from the more general to the most specific options until the best fit is reached.

Choices in the key are identified by a combination of alphanumeric codes using capital letters, numerals, upper- and lowercase letters, and decimal points to distinguish the different key levels. The most basic, general levels in the key are on the left side of the alphanumeric code, and the most specific are on the right side. This coding system in the key relates to a series of left indentations. Thus, down the left-hand side of the pages are the major groupings; nested within them are the sub-groupings. Mapping units (defined as an informal visually distinct structural assemblage of plants, used by the photo interpreters, that does not correlate directly with a floristically defined alliance, association, or phase) are also defined where appropriate herein.

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

**Table 4.** Field key to the main groups and vegetation associations of Mount Tamalpais, Nicasio Reservoir, and Soulajule Reservoir.

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

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

**Class C.** Vegetation characterized by non-woody, herbaceous species in the canopy including grass, graminoid, and broad-leaved herbaceous species. Shrubs, if present, compose <10% of the vegetation. Trees, if present, compose <10% cover: = **Herbaceous Vegetation**

### **Class A. Tree Overstory Vegetation**

**Group I. Stands dominated by deciduous broad - leaved trees including riparian and upland forests and woodlands with willows (*Salix*), alder (*Alnus*), deciduous oaks (*Quercus*), etc.**

**I.A.** Vegetation dominated by willow in the overstory. Mainly riparian stands with seasonal flooding and alluvial soils ...

**I.A.1.** Arroyo willow (*Salix lasiolepis*) is the main overstory canopy as a tall shrub or low tree, which may be over shorter shrub species and herbs ...

***Salix lasiolepis* Alliance (1310mu)**

**I.A.1.a.** Blackberry and coyote brush occur in the understory shrub canopy with arroyo willow ...

***Salix lasiolepis/Baccharis pilularis-Rubus ursinus* Association**

**I.A.2.** Red willow (*Salix laevigata*) is the main overstory canopy as a low to tall tree ...

***Salix laevigata* Alliance (1310mu)**

**I.A.2.a.** Redosier dogwood occurs in the shrub understory, and various herbs occur in the understory including *Carex* and *Scirpus* ...

***Salix laevigata-Cornus sericea/Scirpus microcarpus* Association**

**I.A.3.** Yellow Willow (*Salix lucida*) occurs in the main overstory canopy, though sometimes other hardwoods may be co-dominant. No associations defined ...

***Salix lucida* Alliance (1310mu)**

**I.B.** Vegetation dominated by red alder (*Alnus rubra*) in the overstory. Mainly riparian with wetland soils. No associations defined ...

***Alnus rubra* Alliance (1330)**

**I.C.** Vegetation dominated by valley oak (*Quercus lobata*) in the overstory. In riparian or upland settings with usually clayey soil that holds water late into the summer ...

***Quercus lobata* Alliance (2230)**

**I.C.1.** Tree cover is intermittent to open, and the understory is diverse and abundant with native and non-native grasses and forbs ...

***Quercus lobata*/Grass Association**

**I.D.** Stands dominated by other species in non-riparian upland and mesic species of hills and slopes ...

**I.D.1.** California Buckeye (*Aesculus californica*) dominates in relatively small and local stands ...  
***Aesculus californica* Alliance (2220)**

**I.D.1.a.** California bay occurs as a sub-dominant to buckeye. Various shrubs occur in the understory, including bush monkeyflower and oceanspray ...  
***Aesculus californica-Umbellularia californica/Mimulus aurantiacus* Association**

**I.D.2.** Stands dominated by a deciduous oak species ...

**I.D.2.a.** Oregon oak occurs as a dominant in the overstory. Sometimes other trees may approach the Oregon oak cover. No associations defined ...  
***Quercus garryana* Alliance (2210)**

**I.D.2.b.** Black oak occurs as a dominant in the overstory. . Sometimes other trees may approach the black oak cover ...  
***Quercus kelloggii* Alliance (1410)**

**I.D.2.b.i.** Evergreen species coast live oak and pacific madrone occur with black oak. Usually on north-facing slopes ...  
***Quercus kelloggii-Arbutus menziesii-Quercus agrifolia* Association (1410/1101mu)**

**Group II. Stands dominated by evergreen broad-leaved trees alone or mixed with deciduous broad-leaved trees. Dominated by one or more of several species including: Pacific Madrone (*Arbutus menziesii*), California Bay (*Umbellularia californica*), Tanoak (*Lithocarpus densiflorus*), Giant Chinquapin (*Chrysolepis chrysophylla*), and / or Live Oak (*Quercus* spp).**

**II. A.** Forests dominated or co-dominated by tanoak (*Lithocarpus densiflorus*), which is usually regenerating in the understory as well as in the overstory. Stands are mostly declining because of Sudden Oak Death Syndrome, and they are converting to other evergreen vegetation ...  
***Lithocarpus densiflorus* Alliance (1140)**

**II.A.1.** Pacific madrone (*Arbutus menziesii*) is sub-dominant to co-dominant with tanoak in the overstory. Other trees may also be present and sub-dominant, including canyon live oak (*Quercus chrysolepis*) and Douglas-fir (*Pseudotsuga menziesii*) ...  
***Lithocarpus densiflorus-Arbutus menziesii* Association (1104mu)**

**II.A.2.** California bay (*Umbellularia californica*) is sub-dominant to co-dominant with tanoak in the overstory. Other trees may also be present and sub-dominant including interior live oak (*Quercus wislizeni*) and Douglas-fir ...  
***Lithocarpus densiflorus-Umbellularia californica* Association (1116/1104mu)**

**II.B.** Forests dominated or co-dominated by Pacific madrone. May have other species of broad-leaved trees (*Lithocarpus densiflorus*, *Quercus kelloggii*) up to 50% relative cover in the canopy ...  
***Arbutus menziesii* Alliance (1160)**

**II.B.1.** Coast live oak (*Quercus agrifolia*) is sub-dominant to co-dominant with Pacific madrone ...  
***Arbutus menziesii-Quercus agrifolia* Association (1160/1104mu)**

**II.B.2.** California bay is sub-dominant to co-dominant with Pacific madrone. Other broad-leaved evergreen species may also be present and similar in cover ...

**II.B.2.a.** Black oak is characteristically present as a sub-dominant in the overstory ...  
***Arbutus menziesii-Umbellularia californica-Quercus kelloggii* Association**

**II.B.2.a.** Other hardwoods may be present at low cover with Tan oak most characteristic and sometimes sub-dominant in the overstory or regenerating as trees in the understory (black oak much lower in cover if present)...

***Arbutus menziesii-Umbellularia californica (-Lithocarpus densiflorus) Association***

**II.C.** Forests dominated by California bay (*Umbellularia californica*) or co-dominated by bay and oak. Oak species (*Quercus agrifolia*, *Q. chrysolepis*, *Q. wislizeni*) may have up to 50% relative cover in the canopy ...

***Umbellularia californica Alliance (1110)***

**II.C.1.** Bay strongly dominant in the tree canopy with relatively low cover of understory species. With graminoids (including *Carex globosa* and *Hierochloe occidentalis*), forbs (including *Satureja douglasii* and *Whipplea modesta*), and ferns (including *Dryopteris arguta* and *Polystichum munitum*) ...

***Umbellularia californica (Pure - Coastal) Association (1111)***

**II.C.2.** Bay strongly dominant in the canopy with a relatively dense understory (>5% cover) containing sword fern (*Polystichum munitum*). O small deciduous trees (*Sambucus racemosa*, *Aesculus californica*) may be common in sub-canopy. If *Quercus agrifolia* is > 30% relative cover in canopy, go to the next section of key ...

***Umbellularia californica/Polystichum munitum Association (1111)***

**II.C.3.** California bay shares the canopy with coast live oak. Both species usually co-dominate (30 - 60% relative cover), but California bay usually more dominant. Other broad-leaved trees may be present but lower in cover. Note: if bay is greater than 60% relative cover and sword fern is common in understory go to the above association. If coast live oak is > 60% relative cover go to Coast Live Oak Alliance ...

***Umbellularia californica-Quercus agrifolia Sub-Alliance (1115)***

**II.C.3.a.** Poison oak (*Toxicodendron diversilobum*) and hazelnut (*Corylus cornuta*) are common understory species ...

***Umbellularia californica-Quercus agrifolia/Toxicodendron diversilobum (Corylus cornuta) Association (1115)***

**II.C.3.b.** French Broom is the main understory species ...

***Umbellularia californica-Quercus agrifolia/Genista monspessulana Association (1115)***

**II.C.4.** California bay shares the canopy with up to equal or slightly higher cover of canyon live oak (*Quercus chrysolepis*).

***Umbellularia californica-Quercus chrysolepis Association (1114/1102mu)***

**II.C.5.** California bay is dominant while tanoak is sub-dominant and usually regenerated in multiple layers ...

***Umbellularia californica-Lithocarpus densiflorus Association (1116/1102mu)***

**II.C.6.** California bay occurs with other canopy trees and understory shrubs in riparian settings ...

**II.C.6.a.** Douglas-fir (*Pseudotsuga menziesii*) occurs with bay in the overstory. Western azalea characteristically occurs in the understory ...

***Umbellularia californica-Pseudotsuga menziesii/Rhododendron occidentale Association (1123)***

**II.C.6.b.** White alder (*Alnus rhombifolia*) and redwood (*Sequoia sempervirens*) occur with bay in the overstory. Bigleaf maple, if present, is relatively low in cover. Understory is variable and diverse ...

***Umbellularia californica-Alnus rhombifolia Association (1103 mu/1321)***

**II.C.6.d.** Bigleaf maple is sub-dominant to co-dominant with bay in the overstory. Understory is variable and diverse ...

***Umbellularia californica*-*Acer macrophyllum* Association (1103 mu/2321)**

**II.C.6.c.** California buckeye is characteristically present as an understory tree with bay in the overstory. Bigleaf maple may be present but low in cover. Oceanspray (*Holodiscus discolor*) is characteristically present as an understory shrub and usually has the highest cover.

***Umbellularia californica*-*Aesculus californica*/*Holodiscus discolor* Association (1103mu/1112)**

**II.D.** Woodlands and forests dominated by coast live oak as the dominant overstory tree ...

***Quercus agrifolia* Alliance (2110)**

**II.D.1.** Coast live oak in woodland situations with an abundant understory of grasses and forbs. Shrubs, if present in the understory, are much less cover than the herbaceous layer ...

**II.D.1.a.** Understory primarily with annual grasses and forbs, including bromes (*Bromus hordeaceus*), wild oats (*Avena*), dogtail (*Cynosurus echinatus*), blue-eyed grass (*Sisyrinchium bellum*) etc ...

***Quercus agrifolia*/Grass (Annual) Association (2111mu)**

**II.D.1.b.** Understory with a strong component of perennial species, including wildrye (*Elymus glaucus*), Douglas iris (*Iris douglasii*), sedges (*Carex*), along with annual grasses ...

***Quercus agrifolia*/Grass (Perennial Native) Association (2111mu)**

**II.D.2.** Coast live oak in woodland and forest situations with shrub understory cover similar to herbaceous cover ...

**II.D.2.a.** Coast live oak dominates as the primary overstory tree, though California bay, Douglas-fir, and other trees are sometimes present at low cover. Poison oak (*Toxicodendron diversilobum*) is characteristically present and other shrubs such as bush monkeyflower (*Mimulus aurantiacus*), pink honeysuckle (*Lonicera hispidula*) present. Herbaceous cover is similar to shrub cover ...

***Quercus agrifolia*/*Toxicodendron diversilobum*/Grass Association (2110/2111mu)**

**II.D.2.b.** California bay and Pacific madrone are characteristic and sub-dominant in the overstory with coast live oak. Shrub understory is variable and may contain low cover by bush monkeyflower, pink honeysuckle, poison oak, broom, etc. ...

***Quercus agrifolia*-*Arbutus menziesii*-*Umbellularia californica* Association (1104mu)**

**II.E.** Woodlands and forests dominated by canyon live oak ...

***Quercus chrysolepis* Alliance (1170)**

**II.E.1.** Pacific madrone, tanoak, and California bay are sub-dominant with canyon live oak ...

***Quercus chrysolepis*-*Arbutus menziesii*-*Lithocarpus densiflorus* Association (1170)**

**II.F.** Woodlands and forests dominated or co-dominated by interior live oak ...

**II.F.1.** Canyon live oak and interior live oak are co-dominant in the overstory ...

***Quercus wislizeni*-*Quercus chrysolepis* Alliance and Association (3160, 1170)**

**II.F.2.** Interior live oak is the dominant in the overstory ...

***Quercus wislizeni* Alliance (3160)**

**II.F.2.a.** Toyon is a main shrub component. Other shrubs, if present, are similar or lower in cover ...

***Quercus wislizeni*/*Heteromeles arbutifolia* Association**



**II.F.2.b.** Eastwood manzanita (*Arctostaphylos glandulosa*) is the main shrub component ...  
***Quercus wislizeni/Arctostaphylos glandulosa* (Woodland) Association**

**II.G.** Woodlands and forests dominated by chinquapin (*Chrysolepis chrysophylla*)...  
***Chrysolepis chrysophylla* Alliance (1180)**

**II.G.1.** Black huckleberry (*Vaccinium ovatum*) provides an abundant understory with chinquapin. Other shrubs, if present, are lower in cover ...  
***Chrysolepis chrysophylla/Vaccinium ovatum* Association**

**II.G.2.** Eastwood manzanita provides an abundant understory with chinquapin. Other shrubs may be present though at lower cover, including interior live oak, chamise and black huckleberry ...  
***Chrysolepis chrysophylla-Arctostaphylos glandulosa* Association**

**Group III. Stands dominated by evergreen needle-leaved trees alone or mixed with broad-leaved trees. Dominated by one or more of several species including: Pine (*Pinus* sp.), Cypress (*Cupressus* sp.), redwood (*Sequoia sempervirens*) and Douglas-fir (*Pseudotsuga menziesii*) ...**

**III.A.** Forests and woodland in which redwood occurs as the dominant overstory tree species, or it is co-dominant with shorter stature broad-leaved evergreen trees ...  
***Sequoia sempervirens* Alliance (1210)**

**III.A.1.** Redwood occurring in riparian settings ...

**III.A.1.a.** Bigleaf maple and California bay occur with redwood, usually as co-dominants. The understory is variable with regenerating trees as well as ferns, forbs, and shrubs ...  
***Sequoia sempervirens-Acer macrophyllum-Umbellularia californica* Riparian Association (1217)**

**III.A.1.b.** Tanoak and California bay occur with redwood. The understory usually contains chain fern (*Woodwardia fimbriata*), spikenard (*Aralia californica*), and various other mesic and riparian species ...  
***Sequoia sempervirens/Woodwardia fimbriata* Riparian Association (1217)**

**III.A.2.** Redwood occurring in upland or mesic settings, usually on north-facing or neutral slopes ...

**III.A.2.a.** Douglas-fir and California bay occur with redwood. Understory is variable and usually sparse ...  
***Sequoia sempervirens-Pseudotsuga menziesii-Umbellularia californica* Association (1212)**

**III.A.2.b.** Tanoak and California bay occur with redwood. Pacific madrone is lacking. Understory is open to intermittent, usually containing black huckleberry and other shrubs ...  
***Sequoia sempervirens-Lithocarpus densiflorus/Vaccinium ovatum* Association (1211)**

**III.A.2.c.** Pacific madrone and tanoak occur with redwood. California bay is lacking. Understory is usually intermittent containing black huckleberry and other shrubs ...  
***Sequoia sempervirens-Arbutus menziesii/Vaccinium ovatum* Association (1216mu)**

**III.A.2.d.** Chinquapin occurs with redwood usually in small stands within a larger shrubland matrix. Understory is intermittent to dense with Eastwood manzanita, black huckleberry, interior live oak and other shrubs ...  
***Sequoia sempervirens-Chrysolepis chrysophylla/Arctostaphylos glandulosa* Association (1213)**

**III.A.3.e.** California bay occurs with redwood usually as a co-dominant. Understory is usually sparse ...

***Sequoia sempervirens-Umbellularia californica* Association (1214)**

**III.B.** Forests in which Douglas-fir occurs alone or co-dominant with broad-leaved evergreen species in the overstory ...

**III.B.1.** Tanoak occurs as a co-dominant with Douglas-fir in the overstory, or tanoak occurs as the dominant regenerating shrub in the understory with Douglas-fir in the overstory. No associations defined ...

***Pseudotsuga menziesii-Lithocarpus densiflorus* Alliance (1224)**

**III.B.2.** Other species of broad-leaved evergreen trees occur with Douglas-fir in the overstory, or they are very low in cover ...

***Pseudotsuga menziesii* Alliance (1220)**

**III.B.2.a.** Chinquapin occurs in the overstory and understory with Douglas-fir ...

***Pseudotsuga menziesii-Chrysolepis chrysophylla-Lithocarpus densiflorus* Association (1221mu)**

**III.B.2.b.** Coast live oak occurs as a co-dominant with Douglas-fir in the overstory, and California bay may also be present ...

***Pseudotsuga menziesii-Quercus agrifolia* Association (1221mu)**

**III.B.2.c.** Canyon live oak occurs as a co-dominant with Douglas-fir in the overstory ...

***Pseudotsuga menziesii-Quercus chrysolepis* Association (1222mu)**

**III.B.2.d.** California bay occurs as a co-dominant with Douglas-fir in the overstory ...

**III.B.3.b.i.** Understory characteristically contains sword fern and many other herbs ...

***Pseudotsuga menziesii-Umbellularia californica/Polystichum munitum* Association (1222mu/1223)**

**III.B.3.b.ii.** Understory characteristically contains poison oak and honeysuckle, and also has a varied herb layer ...

***Pseudotsuga menziesii-Umbellularia californica/Toxicodendron diversilobum* Association (1222mu/1223)**

**III.B.2.e.** Broad-leaved trees are relatively low in cover, and the understory is varied with sparse to intermittent cover ...

***Pseudotsuga menziesii* (Pure) Association (1226)**

**III.C.** Woodlands in which cypress is the primary dominant in the overstory ...

**III.C.1.** Monterey cypress occurs as the primary tree in the overstory, as planted stands. No associations defined ...

***Cupressus macrocarpa* Alliance (1201mu)**

**III.C.2.** Sargent cypress occurs as the primary tree in the overstory, as serpentine stands ...

***Cupressus sargentii* Alliance (1240)**

**III.C.2.a.** Sargent cypress occurs in riparian settings in tree stature, usually with wetland-specific shrubs and herbs such as willow, western azalea, and sedges ...

***Cupressus sargentii* (Riparian) Association (1243)**

**III.C.2.b.** Sargent cypress occurs in upland settings in tree or shrub stature ...

**III.C.2.b.i.** Mt. Tamalpais manzanita occurs in similar cover to Sargent cypress ...  
***Cupressus sargentii*/Arctostaphylos hookeri subsp. montana Association (1241)**

**III.C.2.b.ii.** Sargent cypress occurs as the primary dominant. Shrubs and herbs are low in cover ...

***Cupressus sargentii* (Pure) Association (1242)**

**III.D.** Woodlands with Bishop Pine as the primary dominant in the overstory, as natural occurring or planted stands ...

***Pinus muricata* Alliance (1230/1201mu)**

**III.D.1.** Eastwood manzanita occurs as the dominant shrub in the understory ...

***Pinus muricata*/Arctostaphylos glandulosa Association (1231)**

**III.D.2.** Black huckleberry occurs as the dominant shrub in the understory ...

***Pinus muricata*/Vaccinium ovatum Association (1230)**

## **Class B. Shrubland Vegetation**

**Group I. Shrublands dominated by sclerophyllous temperate broad-leaved shrubs (with leaves hardened by a waxy cuticle). They are dominated by typical chaparral shrub genera; including chamise (*Adenostoma fasciculatum*), manzanita (*Arctostaphylos*), scrub oaks (*Quercus*), etc.**

**I.A.** Vegetation dominated by the needle-leaved chaparral shrub, chamise (*Adenostoma fasciculatum*). Chamise is often mixed with other shrub species, but is always greater than 60% cover relative to all other shrub species in a stand ...

***Adenostoma fasciculatum* Alliance (3110)**

**I.A.1.** Chamise is the strongly dominant in the shrub overstory with no other large shrub species having significant cover. Annual grasses and forbs are abundantly present in the understory, especially non-native species. Found on sedimentary rocks ...

***Adenostoma fasciculatum*/Annual Grass-Forb Association (3110, 3114mu)**

**I.A.2.** Chamise is primarily dominant and bush monkeyflower (*Mimulus aurantiacus*) is characteristically present. Known from sedimentary rocks on convex, middle to upper slopes ...

***Adenostoma fasciculatum*-*Mimulus aurantiacus* Association (3115, 3114mu)**

**I.A.3.** Chamise is primarily dominant while Eastwood manzanita (*Arctostaphylos glandulosa*), buckbrush (*Ceanothus cuneatus*) and/or Jepson's ceanothus (*Ceanothus jepsonii*) are present at low cover in the shrub overstory. Annual and perennial herbs are characteristic, especially native species. Found on sedimentary and slightly serpentinized rocks ...

***Adenostoma fasciculatum*-*Arctostaphylos glandulosa*-*Ceanothus jepsonii*/Calamagrostis ophitidis Association (3112)**

**I.B.** Vegetation in which chamise co-dominates with other shrubs (usually chamise at least 30 to 60% relative cover with other shrubs) ...

**I.B.1.** Buckbrush is co-dominant with chamise on sedimentary rocks, while other shrubs may also be present in the stand ...

***Adenostoma fasciculatum*-*Ceanothus cuneatus* Alliance (3114mu)**

**I.B.2.** Eastwood manzanita is co-dominant with chamise alone or with scrub oak in the shrub overstory on sedimentary rocks ...

***Adenostoma fasciculatum*-*Arctostaphylos glandulosa* Alliance (3190)**

**I.B.2.a.** Interior live oak is characteristically present and usually sub-dominant with Eastwood manzanita and chamise ...

***Adenostoma fasciculatum-Arctostaphylos glandulosa-Quercus wislizeni* Association**

**I.B.2.b.** Shrub overstory mainly defined by chamise and Eastwood manzanita, while toyon, ceanothus, poison oak and/or other shrubs may be present at low cover ...

***Adenostoma fasciculatum-Arctostaphylos glandulosa* Association**

**I.B.3.** Chamise is co-dominant with another shrub usually on serpentine ...

**II.B.3.a.** Leather oak is co-dominant with chamise. Other shrubs may be present, such as chaparral-pea (*Pickeringia montana*), ceanothus, etc. ...

***Quercus durata-Adenostoma fasciculatum* Association (undifferentiated, not enough samples for description of association)**

**II.B.3.b.** Mt. Tamalpais Manzanita is co-dominant with chamise and other shrubs including toyon and/or leather oak ...

***Arctostaphylos hookeri* subsp. *montana-Adenostoma fasciculatum* Association (3121)**

**I.C.** Vegetation dominated or co-dominated by one or more manzanita species ...

**I.C.1.** Silverleaf manzanita (*Arctostaphylos canescens*) occurs as the dominant or co-dominant with other manzanita. Usually on convex, middle to upper slopes on sedimentary rock ...

***Arctostaphylos canescens* Alliance (3140)**

**I.C.1.a.** Eastwood manzanita and chamise are sub-dominant to co-dominant with silverleaf manzanita. ...

***Arctostaphylos canescens-Arctostaphylos glandulosa-Adenostoma fasciculatum* Association**

**I.C.2.** Sensitive manzanita (*Arctostaphylos nummularia*) occurs as the dominant or co-dominant with other manzanita and shrubs. Restricted to sedimentary outcrops adjacent to forests on Mt. Tamalpais ...

***Arctostaphylos nummularia* Alliance (3130)**

**I.C.2.a.** Black huckleberry and Eastwood manzanita are characteristically present while sensitive manzanita is usually dominant. Chinquapin is usually present ...

***Arctostaphylos nummularia-Vaccinium ovatum (-Chrysolepis chrysophylla)* Association**

**I.C.2.b.** Eastwood manzanita is co-dominant with sensitive manzanita ...

***Arctostaphylos nummularia-Arctostaphylos glandulosa* Association**

**I.C.3.** Eastwood manzanita is dominant in the overstory, and chamise is usually present in low cover. Found generally on igneous and sedimentary rock types ...

***Arctostaphylos glandulosa* Alliance and Association (3150)**

**I.C.4.** Interior live oak is co-dominant with Eastwood manzanita (both with at least 30% relative cover) ...

***Arctostaphylos glandulosa-Quercus wislizeni* (Shrubland) Association (3161)**

**I.C.5.** Eastwood manzanita is sub-dominant to co-dominant with chinquapin. Other shrubs may be present, including interior live oak and chamise, though usually at lower cover ...

***Chrysolepis chrysophylla-Arctostaphylos glandulosa* Association (1180)**

**I.C.6.** Mt. Tamalpais Manzanita is dominant to co-dominant with other shrub species. Restricted to the Mt. Tamalpais area on serpentine outcrops or moderately serpentinized rocks. Understory is usually diverse with native grasses and forbs ...

***Arctostaphylos hookeri* subsp. *montana* Alliance (3120)**

**I.C.6.a.** Mt. Tamalpais Manzanita is primarily dominant. Chamise and toyon, if present, are relatively low in cover ...

***Arctostaphylos hookeri* subsp. *montana* Association (3120)**

**I.C.6.b.** Mt. Tamalpais Manzanita is co-dominant with chamise and other shrubs including toyon, Jepson's ceanothus, and/or leather oak ...

***Arctostaphylos hookeri* subsp. *montana*-*Adenostoma fasciculatum* Association (3121)**

**I.D.** Vegetation dominated or co-dominated by leather oak (*Quercus durata*). Found primarily on serpentine outcrops ...

***Quercus durata* Alliance (3180)**

**I.D.1.** Chamise is the principal secondary shrub in stands with leather oak. Jepson's ceanothus and chaparral pea may also be present and similar in cover to chamise ...

***Quercus durata*-*Adenostoma fasciculatum* Association (undifferentiated, not enough samples for description of association)**

**I.D.2.** Eastwood manzanita is co-dominant with leather oak. Other shrubs may be present and variable in cover ...

***Quercus durata*-*Arctostaphylos glandulosa* Association**

**I.E.** Vegetation dominated or co-dominated by interior live oak (*Quercus wislizeni*) in the overstory shrub layer. Found primarily on sedimentary rocks adjacent to forests ...

***Quercus wislizeni* Alliance (3160)**

**I.E.1.** Interior live oak is the primary dominant shrub in the stands ...

***Quercus wislizeni* (Shrubland) Association**

**I.E.2.** Interior live oak is co-dominant with Eastwood manzanita (both with at least 30% relative cover) ...

***Arctostaphylos glandulosa*-*Quercus wislizeni* (Shrubland) Association (3161)**

**I.F.** Vegetation dominated by chinquapin or co-dominated by chinquapin with other shrubs ...

***Chrysolepis chrysophylla* Alliance (1180)**

**I.F.1.** Eastwood manzanita is sub-dominant to co-dominant with chinquapin. Other shrubs may be present, including interior live oak and chamise, though usually at lower cover ...

***Chrysolepis chrysophylla*-*Arctostaphylos glandulosa* Association**

**Group II.** Shrublands dominated by microphyllous or broad - leaved species. These are generally considered to be part of coastal sage scrub or other more soft-leaved shrub habitats; including Coyote brush (*Baccharis pilularis*), California sagebrush (*Artemisia californica*), blue-blossom (*Ceanothus*), as well as azalea (*Rhododendron occidentale*) and the introduced gorse and broom species.

**II.A.** Vegetation dominated by riparian species such as willow (*Salix*) or western azalea (*Rhododendron occidentale*) ...

**II.A.1.** Vegetation dominated primarily by western azalea in the overstory. The understory is variable, though it usually contains graminoids such as *Carex* and *Juncus* ...

***Rhododendron occidentale* Alliance (3420)**

**II.A.2.** Vegetation dominated by arroyo willow (*Salix lasiolepis*) as an overstory canopy over shorter shrub species and herbs ...

***Salix lasiolepis* Alliance (1310mu)**

**II.A.2.a.** Coyote brush and blackberry occur in the understory shrub canopy with arroyo willow in the overstory as a tall shrub or low tree ...

***Salix lasiolepis/Baccharis pilularis-Rubus ursinus* Association**

**II.B.** Vegetation dominated by coyote brush (*Baccharis pilularis*). These vary from low diversity, open stands that are early seral or transitioning from various grassland alliances to tall, dense multi-species stands that may or may not be seral to other scrub or forest types ...

***Baccharis pilularis* Alliance (3220)**

**II.B.1.** Coyote brush is the main shrub species in the overstory; if poison oak is present, its cover is relatively low (less than 5%). The understory has significant cover of herbs, both native and non-native species ...

**II.B.1.a.** Purple needlegrass is a main component of the understory, though other native and non-native herbs are present in the stands ...

***Baccharis pilularis/Native Grass (Nassella pulchra)* Association (3222mu)**

**II.B.1.b.** Other native grass is a strong component of the understory such as blue wildrye (*Elymus glaucus*), Idaho Fescue (*Festuca idahoensis*), California melicgrass (*Melica californica*), etc., though other natives and non-natives also are present ...

***Baccharis pilularis/Native Grass (Mixed)* Association (3222mu)**

**II.B.2.** Coyote brush mixes with other shrubs in the overstory such as (*Toxicodendron diversilobum*), bush monkeyflower (*Mimulus aurantiacus*), blue blossom (*Ceanothus thyrsiflorus*), etc. The understory usually has a low cover of herbs ...

**II.B.2.a.** Poison oak is a major component (at least 5% cover), sometimes approaching coyote brush in cover. No other shrub species exceeds poison oak and coyote brush in cover ...

***Baccharis pilularis-Toxicodendron diversilobum* Association (3223mu)**

**II.B.2.b.** Blue blossom is co-dominant with coyote brush. No other shrub exceeds their cover.

***Baccharis pilularis- Ceanothus thyrsiflorus* Association (3223mu)**

**II.C.** Vegetation co-dominated by California Sagebrush (*Artemisia californica*) and coyote brush ...

***Baccharis pilularis* Alliance with *Artemisia californica* (3221)**

**II.C.1.** California sagebrush (*Artemisia californica*) associated with coyote brush, and poison oak is usually present. Understory is varied and usually contains a mixture of native and non-native species. Relatively xerophytic scrub of southeast and southwest facing slopes.

***Baccharis pilularis-Artemisia californica-Toxicodendron/Monardella villosa* Association**

**II.D.** Vegetation dominated by California Sagebrush (*Artemisia californica*) with more than three times the cover of sagebrush than coyote brush ...

***Artemisia californica* Alliance (3310)**

**II.D.1.** Bush monkeyflower sub-dominant with California sagebrush in stands...

***Artemisia californica-Mimulus aurantiacus* Association (3311)**

**II.E.** Vegetation dominated by blue blossom alone or with blackberry (*Rubus*). Stands originating from burned forests and shrublands ...

***Ceanothus thyrsiflorus* Alliance (3710)**

**II.E.1.** Blue blossom associated with black huckleberry (*Vaccinium ovatum*), thimbleberry (*Rubus parviflorus*), and other blackberry (*Rubus*) ...

***Ceanothus thyrsiflorus-Vaccinium ovatum-Rubus parviflorus* Association**

**II.E.2.** Blue blossom associated with California blackberry (*Rubus ursinus*). Coyote brush and poison oak also present ...

***Ceanothus thyrsiflorus-Rubus ursinus* Association**

**II.F.** Vegetation dominated by one or more noxious broom species. The most widespread and invasive species is *Genista monspessulana* ...

**Broom (*Cytisus-Genista-Spartium-Ulex* spp.) Alliance and  
*Genista monspessulana* Association (3210)**

**Class C. Herbaceous Vegetation**

**Group I.** Vegetation is dominated by mainly wetland and riparian species, including cattail (*Typha* spp.), rushes (*Juncus* spp.), and sedges (*Carex* spp.). If woody species are present, they cover <10% of the ground surface.

**I.A.** Herbaceous vegetation dominated by graminoid species including cattail, grasses, rushes, and sedges ...

**I.A.1.** Vegetation is primarily dominated by cattail species. Found on non-serpentine soils that are permanently saturated and with mucky or clayey texture ...

**Cattail Mapping Unit (4110)**

**I.A.1.a.** Vegetation is dominated by narrow-leaved cattail (*Typha angustifolia*). Other wetland graminoid species may be present and sometimes co-dominant. Usually in brackish wetlands ...

***Typha angustifolia* Alliance**

**I.A.1.b.** Vegetation is dominated by broad-leaved cattail (*Typha latifolia*). Other wetland graminoid species may be present and sometimes co-dominant. Usually in freshwater wetlands ...

***Typha latifolia* Alliance**

**IA.2.** Herbaceous vegetation is dominated sedges and/or rushes in wetland or riparian settings ...

**I.A.2.a.** Vegetation is primarily dominated by rushes or bulrushes (one or more *Juncus* or *Scirpus* species in the stands) ...

**I.A.2.a.i.** Vegetation is primarily dominated by small-fruited bulrush (*Scirpus microcarpus*) or other bulrush species. Other graminoids, if present, are sub-dominant (<30% relative cover) ...

***Scirpus microcarpus* Alliance and other *Scirpus* spp. (4120)**

**I.A.2.a.ii.** Vegetation is primarily dominated by rushes (one or more *Juncus* species in the stands), including jointleaf rush and Coville's rush. Other graminoids, if present, contribute a minor amount of cover (<30% relative cover) ...

***Juncus* spp. (*J. articulatus-J. covillei*) Riparian Habitat (4210)**

**I.A.2.a.iii.** Common rush (*Juncus effusus*) dominates. Other graminoids, if present, are low in cover or they co-dominate with common rush ...

***Juncus effusus* Alliance**

**I.A.2.b.** Vegetation is primarily dominated by sedges (one or more *Carex* species in the stands). Other graminoids, if present, contribute a minor amount of cover (<20% relative cover) ...

***Carex* spp. Riparian Habitat (4210)**

**I.A.2.b.i.** Vegetation is dominated by Santa Barbara Sedge (*Carex barbarae*). Found usually on sedimentary soils with mucky texture ...

***Carex barbarae* Alliance**

**I.A.2.b.ii.** Vegetation is dominated by twotoothed sedge (*Carex serratodens*). Found on both serpentine and adjacent non-serpentine (Franciscan) soils with silty or clayey texture ...

***Carex serratodens* Alliance**

**I.A.2.b.iii.** Vegetation is dominated by slough sedge (*Carex obnupta*). Found on both serpentine and adjacent non-serpentine (Franciscan) soils with sandy loam texture ...

***Carex obnupta* Alliance**

**I.A.2.b.iv.** Vegetation dominated by either serrate sedge (*Carex subfusca*) or leafy sedge (*Carex amplifolia*), or they both co-dominate. Found on non-serpentine (Franciscan) soils with silty / silty loam texture ...

***Carex subfusca*-*Carex amplifolia* Association**

**I.A.2.c.** Vegetation is co-dominated by sedges and rushes...

***Carex* - *Juncus* Habitat (4210)**

**I.A.2.c.1.** Irisleaf rush (*Juncus xiphioides*) or dense sedge (*Carex densa*) dominates or they both co-dominate with other graminoids and wetland species. Usually found on mucky textured that are serpentine or non-serpentine ...

**I.A.2.c.1.i.** Dense sedge (*Carex densa*) and other sedges occur with irisleaf rush, in which the sedge and/or rush may be dominant ...

***Carex densa*-*Juncus xiphioides* Association**

**I.A.2.c.2.** Dense sedge occurs with other rush species, and the sedge and rushes co-dominate in stands. Italian Ryegrass (*Lolium perenne multiflorum*) usually is present. Found on non-serpentine (Franciscan) soils with sandy or clayey loam texture...

***Carex densa*-*Lolium perenne*-*Juncus* spp. Association**

**I.A.2.d.** Common rush (*Juncus effusus*) dominates or co-dominates with other graminoids and wetland species. Found on non-serpentine (Franciscan) soils with silty or clay loam texture ...

***Juncus effusus* Alliance**

**I.A.3.** Vegetation is dominated by tall fescue in uplands or mesic soils. Other species exhibit minor overall cover (<10% relative to the fescue) ...

**Introduced Coastal Grassland Alliance  
(*Anthoxanthum odoratum*-*Festuca arundinacea*-*Holcus lanatus*) (4430)**

**I.A.3.1.** Dense sedge and other perennial graminoids occurs at low cover with tall fescue. Found on non-serpentine (Franciscan) soils with silty or clayey texture ...

***Festuca arundinacea*-*Carex densa* Association**

**I.A.4.** Vegetation dominated by harding grass (*Phalaris aquatica*) in upland or mesic soils. Sometimes other non-native grasses may be similar in abundance to harding grass ...

***Phalaris aquatica* Alliance (4410)**



**I.A.5.** Vegetation is dominated by meadow barley (*Hordeum brachyantherum*) in mesic to wetland soils. Sometimes non-native grasses may be co-dominant with the barley, especially in disturbed soils (including sites with air pollution) that are derived from serpentine or non-serpentine (Franciscan) alluvium ...

***Hordeum brachyantherum* Alliance (4210/4620)**

**I.B.** Herbaceous vegetation dominated by forb species, including clovers (*Trifolium* spp.), thistles (*Cirsium* spp.), and teasel (*Dipsacus* spp.) ...

**I.B.1.** Vegetation is dominated or co-dominated by white-tip clover (*Trifolium variegatum*). White-tip clover may co-dominate with other clover and forb species (including non-native species) ...

***Trifolium variegatum* Alliance (4211/4310)**

**I.B.2.** Vegetation is dominated by Indian teasel (*Dipsacus sativus*). Other forbs or graminoids may be present but at low relative cover ...

***Dipsacus sativus* Association (4420)**

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

**II.A.** Herbaceous vegetation is significantly dominated by exotic grass species including harding grass (*Phalaris aquatica*), wild oats (*Avena* spp.), etc., whereby the relative cover of non-natives is usually > 90%. Native species may be present, but relative cover < 10%. Usually on non-serpentine soils ...

**II.A.1.** Harding grass primarily dominates in the stands, or other graminoids when their cover is combined is similar in abundance to the harding grass ...

***Phalaris aquatica* Alliance (4410)**

**II.A.2.** Annual herbs including non-native grasses such as bromes, wild oats, big quaking grass (*Briza maxima*), etc., are prevalently abundant. Native forbs and grasses are also present with low to moderate abundance ...

**California Annual Grassland – Native - Non-native Habitat (4310)**

**II.A.2.i.** Big quaking grass is abundantly present with or without non-native bromes (e.g., *Bromus diandrus*, *B. hordeaceus*), while other herbs such as balloon sack clover (*Trifolium depauperatum*), lupines, (*Lupinus*), smooth cat's-ear (*Hypochaeris glabra*), bowltube iris (*Iris macrosiphon*) are also present at low to abundant cover ...

***Briza maxima*-*Trifolium depauperatum*-*Lupinus* spp. Association**

**II.A.2.ii.** Bristly dogtail (*Cynosurus echinatus*) is abundantly present with or without non-native wild oats (*Avena* spp.), while other herbs such as pale flax (*Linum bienne*), harvest brodiaea (*Brodiaea elegans*), small tarweed (*Madia exigua*), bindweed (*Calystegia*), and others are also present at low to abundant cover ...

***Cynosurus echinatus*-(*Linum bienne*-*Brodiaea elegans*) Association**

**II.A.2.iii.** Wild oats primarily dominate the stands ...

***Avena barbata*-*Avena fatua* Alliance**

**II.B.** Herbaceous vegetation dominated by a mixture of grasses and forbs, both native and non-native, including annual dwarf plantain (*Plantago erecta*), purple needlegrass (*Nassella pulchra*), Torrey's melicgrass (*Melica torreyana*), Italian ryegrass (*Lolium multiflorum*), native fescues (e.g., *Festuca californica*) native bromes (e.g., *Bromus carinatus*, *B. laevipes*), non-native bromes (e.g., *Bromus hordeaceus*), etc. The native species usually have a relative cover at least 10% and usually higher abundance ...

**II.B.1.** Vegetation in which perennial native meadow barley is dominant. Sometimes barley is co-dominant with non-native grasses, especially in disturbed soils (including sites with air pollution). In sites that are serpentine or non-serpentine (Franciscan) alluvium ...

***Hordeum brachyantherum* Alliance (4210/4620)**

**II.B.2.** Vegetation in which perennial native purple needlegrass is dominant, or needlegrass is characteristically present with at least 10% relative cover as compared to other usually annual non-native grasses. In sites that are serpentine or non-serpentine (Franciscan) with fine-textured soil surface ...

***Nassella pulchra* Alliance (4520/4610)**

**II.B.2.a.** Purple needlegrass dominant or characteristically present with non-native grasses Italian ryegrass and soft brome (*Bromus hordeaceus*). Usually on serpentine soils without high litter/thatch buildup. Other herbs may include dwarf pliantain, native clovers (e.g., *Trifolium barbigerum*, *T. bifidum*, *T. fucatum*, *T. macraei*, *T. willdenovii*), cottonrose (*Filago*), etc. ...

***Nassella pulchra*-*Lolium multiflorum*-*Trifolium* spp. Association (4610)**

**II.B.2.b.** Purple needlegrass dominant or characteristically present with perennial native California Melicgrass (*Melica californica*) and with annual non-native bromes, wild oats, and/or quaking grass. Usually on non-serpentine soils without high litter/thatch buildup. Other herbs may include California poppy (*Eschscholzia californica*), Italian thistle (*Carduus pycnocephalus*), miniature lupine (*Lupinus bicolor*), smooth cat's-ear, etc. ...

***Nassella pulchra*-*Melica californica*-Annual grass Association (4520)**

**II.B.2.c.** Purple dominant or characteristically present with non-native annual wild oats, Italian ryegrass, and/or quaking grass. Usually on non-serpentine soils with litter/thatch buildup. Other herbs may include longbeak stork's bill (*Erodium botrys*), yarrow (*Achillea millefolium*), California poppy, smooth cat's-ear, etc. ...

***Nassella pulchra* (Mixed herbaceous) Association (4520)**

**II.B.3.** Vegetation in which perennial native Torrey's melicgrass is dominant, or melicgrass is characteristically present with at least 10% relative cover as compared to other usually non-native grasses. In sites that are usually serpentine with mixed rocky and fine-textured soil surface. Other herbs may include wildoats, wild carrot (*Daucus pusillus*), bristly jewelflower (*Streptanthus glandulosus*), etc. ...

***Melica torreyana* Alliance (4610)**

**II.B.4.** Vegetation in which annual and perennial native herbs are characteristically present including scytheleaf onion (*Allium falcifolium*), serpentine springbeauty (*Claytonia exigua*), Tiburon buckwheat (*Eriogonum luteolum* var. *caninum*), Mt. Tamalpais jewelflower (*Streptanthus batrachopus*), Clarkia, Torrey's melicgrass, and/or seep monkeyflower (*Mimulus guttatus*). On serpentine soils with especially rocky surfaces, considered as serpentine balds. A sparse overstory of shrub species also usually present with leather oak, chamise, etc. ...

**Serpentine Bald Habitat,  
*Quercus durata*/*Allium falcifolium*-*Streptanthus batrachopus* Association (9401)**

**II.B.5.** Vegetation in which annual native herbs are abundant in spring and summer, including sticky western rosinweed (*Calycadenia multiglandulosa*), dwarf pliantain, annual agoseris (*Agoseris heterophylla*), foothill deervetch (*Lotus humistratus*), etc., while non-natives also may be co-dominant including annual bromes and wildoats. On serpentine soils with mixed rocky and fine-textured soil surface ...

***Plantago erecta* Alliance,  
*Plantago erecta*-*Calycadenia multiglandulosa*-Annual Grass Association (4610)**

**II.B.6.** Vegetation in which perennial native fescue grasses are characteristically present and usually dominant. Annual non-native grasses may also be present and abundant. On non-serpentine soils usually with fine-textured soils with litter/thatch buildup. ...

**II.B.6.a.** Idaho fescue is characteristically present and usually dominant or co-dominant with other perennial grasses.

***Festuca idahoensis* Alliance (4510)**

**II.B.6.a.i.** California brome is co-dominant with Idaho fescue. Other native and non-native grasses or forbs may also be abundant, including Chinook brome (*Bromus laevipes*), soft brome, winter vetch (*Vicia villosa*), etc. ...

***Festuca idahoensis-Bromus carinatus* Association**

**II.B.6.a.ii.** Red fescue is co-dominant with Idaho fescue. Other native and non-native grasses or forbs may also be abundant, including annual bromes, Junegrass (*Koeleria macrantha*), etc. ...

***Festuca idahoensis-Festuca rubra* Association**

**II.B.6.b.** California fescue is dominant or co-dominant with other usually annual grasses such as wildoats, Italian ryegrass, bromes, etc. Sometimes poison oak may be abundant in the shrub layer ...

***Festuca californica* Alliance (4510)**

**II.B.7.** Vegetation in which other perennial grasses or forbs are dominant ...

**Perennial Grassland / Prairie Habitat (4400/4500/4600)**

**II.B.7.a.** Vegetation in which perennial natives California brome (*Bromus carinatus*) and California goldenbanner (*Thermopsis californica*) are characteristically present and one or both may be dominant, while annual bromes and/or wildoats are also present and usually abundant. Bracken fern (*Pteridium aquilinum*) may also be present and sometimes dominant (and other native species sub-dominant). On non-serpentine soils with variable texture. ...

***Thermopsis californica* Alliance (Provisional)**

***Thermopsis californica-Bromus carinatus*-Annual Brome Association (4313, 4510)**

**II.B.7.b.** Vegetation in which Douglas iris (*Iris douglasiana*) is dominant or co-dominant with annual and perennial grasses or forbs including common velvetgrass (*Holcus lanatus*), soaproot (*Chlorogalum pomeridianum*), teasel, etc. Usually on mixed rocky and fine-textured soil surfaces that are non-serpentine ...

***Iris douglasiana-Holcus lanatus* Association (4500)**

**II.B.7.c.** Vegetation is dominated by Indian teasel (*Dipsacus sativus*). Other forbs or graminoids may be present but at low relative cover ...

***Dipsacus sativus* Association (4420)**

## TREE OVERSTORY VEGETATION DESCRIPTIONS

### ***Aesculus californica* Alliance or Habitat**

This alliance is represented by one association in the study area, as a relatively open woodland tree layer dominated by *Aesculus californica* and open understory including *Mimulus aurantiacus*. Additional variation is seen in one plot, in which the shrub layer was well-developed with *Adenostoma fasciculatum* and *Mimulus aurantiacus* (MMWD0128).

### ***Aesculus californica*-*Umbellularia californica*/*Mimulus aurantiacus* Association California Buckeye - California Bay / Bush Monkeyflower Association**

**Mapping Code: 2220/1112**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Aesculus californica*-*Umbellularia californica*/*Mimulus aurantiacus* Woodland form an open to intermittent tree layer (17-34%, mean 26.3%) with hardwoods at 5-10m tall. The shrub layer is open (2-13%, mean 6.3%) with low shrubs at 0.5-1m and tall shrubs at 0.5-5m tall. The herbaceous layer is open (7-9%, mean 7.7%) at 0-0.5m tall. Total vegetation cover is 25-48%, mean 40%.

In this association, *Aesculus californica* dominates the tree layer at intermittent to open cover. *Umbellularia californica* is characteristically present in the tree overstory, and various trees may be regenerating in the understory. The shrub layer is characterized by *Mimulus aurantiacus* at low cover. The herbaceous layer is characterized by a variety of annual and perennial herbs, including *Avena barbata*, *Adiantum jordanii*, and *Cynosurus echinatus*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 567-606 ft., mean 585 ft.

Aspect: variable

Slope: steep, range 39-44 degrees, mean 41 degrees

Topography: lower to upper slope, usually convex or rounded, sometimes undulating

Small Rock Cover: range 0.2-1%, mean 0.6%

Large Rock Cover: range 0.2-1%, mean 0.6%

Litter Cover: range 61-90%, mean 75.5%

Bare Ground: range 8-35%, mean 21.5%

Parent Material: Franciscan melange

Soil Texture: moderately coarse sandy loam, or moderately fine silty clay loam.

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands are usually small (around 1 acre or less) and on steep and rocky convex slopes, adjacent to grasslands or mixed evergreen woodlands. Stands in Point Reyes National Seashore were similar, yet *Prunus ilicifolia* and *Heteromeles arbutifolia* were in the understory.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 7.6%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Avena barbata*, *Cynosurus echinatus*, and *Torilis nodosa*. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** MMWD0147, MMWD0322, MMWD0337 **Releve(s):** none

**Rank:** G3 S3?

## GLOBAL DISTRIBUTION

Northern outer Central Coast (including the Mt. Tamalpais area); though full distribution is not known

## REFERENCES

NatureServe et al. 2003

### *Aesculus californica*-*Umbellularia californica*/*Mimulus aurantiacus* Association

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	<b>UMCA-T</b>	<b><i>Umbellularia californica</i></b>	<b>100</b>	<b>2.3</b>	<b>2</b>	<b>3</b>
	QUAG-T	<i>Quercus agrifolia</i>	67	4.7	7	7
	ARME-T	<i>Arbutus menziesii</i>	33	1.3	4	4
<b>Tree Understory</b>						
	<b>AECA</b>	<b><i>Aesculus californica</i></b>	<b>100</b>	<b>18.0</b>	<b>14</b>	<b>25</b>
	PSME-L	<i>Pseudotsuga menziesii</i>	33	0.3	1	1
<b>Shrub</b>						
	<b>MIAU</b>	<b><i>Mimulus aurantiacus</i></b>	<b>100</b>	<b>1.4</b>	<b>0.2</b>	<b>3</b>
	HODI	<i>Holodiscus discolor</i>	67	1.3	2	2
	TODI	<i>Toxicodendron diversilobum</i>	67	1.0	1	2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	67	0.1	0.2	0.2
	GAEL	<i>Garrya elliptica</i>	33	1.7	5	5
	HEAR5	<i>Heteromeles arbutifolia</i>	33	1.0	3	3
	ADFA	<i>Adenostoma fasciculatum</i>	33	0.1	0.2	0.2
	ARCA11	<i>Artemisia californica</i>	33	0.1	0.2	0.2
	BAPI	<i>Baccharis pilularis</i>	33	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	33	0.1	0.2	0.2
<b>Herb</b>						
	AVBA	<i>Avena barbata</i>	67	1.3	1	3
	ADJO	<i>Adiantum jordanii</i>	67	0.4	0.2	1
	CYEC	<i>Cynosurus echinatus</i>	67	0.4	0.2	1
	ELGL	<i>Elymus glaucus</i>	67	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	67	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	67	0.1	0.2	0.2
	VIAM	<i>Vicia americana</i>	67	0.1	0.2	0.2
	TONO	<i>Torilis nodosa</i>	33	0.3	1	1
	BRDI2	<i>Brachypodium distachyon</i>	33	0.1	0.2	0.2
	BRMA	<i>Briza maxima</i>	33	0.1	0.2	0.2
	BREL	<i>Brodiaea elegans</i>	33	0.1	0.2	0.2
	CAPY2	<i>Carduus pycnocephalus</i>	33	0.1	0.2	0.2
	CENTA	<i>Centaurea</i>	33	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	33	0.1	0.2	0.2
	KOMA	<i>Koeleria macrantha</i>	33	0.1	0.2	0.2
	LOPE	<i>Lolium perenne</i>	33	0.1	0.2	0.2
	NEPA	<i>Nemophila parviflora</i>	33	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	33	0.1	0.2	0.2
	STAJ	<i>Stachys ajugoides</i>	33	0.1	0.2	0.2
	STRI	<i>Stachys rigida</i>	33	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	33	0.7	2	2

### ***Alnus rubra* Alliance or Habitat**

This alliance is sampled once in the study area at Nicasio Reservoir with *Alnus rubra* dominant in the overstory. No associations were defined.

### ***Alnus rubra* Alliance Red Alder Alliance**

**Mapping Code: 1330**

#### **LOCAL VEGETATION DESCRIPTION**

One stand of *Alnus rubra* Woodland forms an intermittent tree layer (52%), with hardwoods at 15-20m tall (50%) and conifers at 15-20m tall (2%). The shrub layer is open (29%) with low shrubs at 0-0.5m and tall shrubs at 1-2m tall. The herbaceous layer is open (10%) at 0-0.5m tall. Total vegetation cover is 52%.

In one stand of this alliance, *Alnus rubra* dominates in the overstory tree layer, and *Umbellularia californica* and *Sequoia sempervirens* occur at low cover. The shrub layer contains *Rubus ursinus* and *Garrya elliptica* as the most abundant species, and the herbaceous layer contains *Equisetum* as the most abundant species.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 140 ft.

Aspect: Variable

Slope: somewhat steep, 20 degrees

Topography: bottom, undulating pattern

Small Rock Cover: 12%

Large Rock Cover: 2%

Litter Cover: range 22%

Bare Ground: range 62%

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam

One stand of this alliance was sampled at Nicasio Reservoir just below the spillway, with flowing water. Stands typically occur along steep slopes with seeps and in drainages, especially in areas with mixed colluvium and alluvium (usually with seasonal, fluvial disturbance).

#### **SITE IMPACTS**

The stand representing this alliance has no non-native plant cover. Additional site impacts include heavy dam/inundation, moderate erosion/runoff and rip-rap, and light vandalism/dumping/litter.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0244 **Releve(s):** none

**Rank:** G4 S4?

#### **GLOBAL DISTRIBUTION**

Central Coast (including the San Francisco Bay area), outer North Coast, to southern coastal Alaska

#### **REFERENCES**

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

***Alnus rubra* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	ALRU2	<i>Alnus rubra</i>	100	40.0	40	40
	UMCA-T	<i>Umbellularia californica</i>	100	10.0	10	10
	SESE3	<i>Sequoia sempervirens</i>	100	2.0	2	2
<b>Shrub</b>						
	RUUR	<i>Rubus ursinus</i>	100	15.0	15	15
	GAEL	<i>Garrya elliptica</i>	100	10.0	10	10
	TODI	<i>Toxicodendron diversilobum</i>	100	2.0	2	2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	100	0.2	0.2	0.2
	QUWI2-L	<i>Quercus wislizeni</i>	100	0.2	0.2	0.2
	SYAL	<i>Symphoricarpos albus</i>	100	0.2	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	100	0.2	0.2	0.2
<b>Herb</b>						
	EQUIS	<i>Equisetum</i>	100	7.0	7	7
	POMU	<i>Polystichum munitum</i>	100	1.0	1	1
	SADO5	<i>Satureja douglasii</i>	100	1.0	1	1
	CLPE	<i>Claytonia perfoliata</i>	100	0.2	0.2	0.2
	CYER	<i>Cyperus eragrostis</i>	100	0.2	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	100	0.2	0.2	0.2
	GAAP2	<i>Galium aparine</i>	100	0.2	0.2	0.2
	MAFA3	<i>Marah fabaceus</i>	100	0.2	0.2	0.2
	STRI	<i>Stachys rigida</i>	100	0.2	0.2	0.2
	URDI	<i>Urtica dioica</i>	100	0.2	0.2	0.2

### ***Arbutus menziesii* Alliance or Habitat**

This alliance is represented by three associations in the study area. *Arbutus menziesii* occurs in mixed evergreen stands with other broadleaf tree species, while *A. menziesii* is usually highest in cover. Stands are commonly seen in the Mt. Tamalpais Watershed and surrounding areas in Marin County, especially on upland, rounded northerly and neutral slopes.

### ***Arbutus menziesii*-*Quercus agrifolia* Association**

#### **Pacific Madrone - Coast Live Oak Association**

**Mapping Code: 1160/1101mu**

### **LOCAL VEGETATION DESCRIPTION**

Stands of *Arbutus menziesii*-*Quercus agrifolia* Woodland/Forest form an intermittent tree layer (25-62%, mean 46.6%), with hardwoods at 5-15m tall (25-61%, mean 43.7%) and conifers at 5-20m tall (0-16%, mean 2.9%). The shrub layer is open to intermittent (2-38%, mean 14%) with low shrubs at 0-2m and tall shrubs at 0-5m tall. The herbaceous layer is open (4-21%, mean 10.7%) at 0-0.5m tall. Total vegetation cover is 42-86%, mean 59.3%.

In this association, *Arbutus menziesii* and *Quercus agrifolia* co-dominate in the overstory tree layer, while *Arbutus* is usually higher in cover. *Lithocarpus densiflorus* may be regenerating in the understory. The shrub layer often has *Heteromeles arbutifolia* and usually has *Toxicodendron diversilobum* as the most abundant species. The herbaceous layer is characterized by *Iris douglasiana* at low cover.

### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 272-1047 ft., mean 677 ft.

Aspect: usually NE or NW, occasionally SW

Slope: gentle to steep, range 2-40 degrees, mean 24 degrees

Topography: lower to middle slope, infrequently upper slope; often undulating or convex, but variable

Small Rock Cover: range 0.2-24%, mean 6.6%

Large Rock Cover: range 0-5%, mean 1.5%

Litter Cover: range 43-88%, mean 74.8%

Bare Ground: range 8-26%, mean 14.8%

Parent Material: Franciscan melange

Soil Texture: Usually moderately fine sandy clay loam or moderately coarse sandy loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands are similar to the *Quercus agrifolia*-*Arbutus menziesii*-*Umbellularia californica* Association; however, they are usually lower on slope, have much less *Umbellularia californica*, and have intact, native herbaceous species layer.

### **SITE IMPACTS**

This association has low non-native plant cover (average 0.5%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Torilis arvensis*, *Vicia sativa*, and *Torilis nodosa*. There are no additional site impacts.

### **SENSITIVE SPECIES**

*Arctostaphylos virgata* was found in 1 of 7 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 2-2-3. Global rank is G2, and State rank is S2.2. Federal and state listing is None (CNPS 2005).

*Elymus californicus* was found in 1 of 7 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-1-3. Global rank is G3, and State rank is S3.3. Federal and state listing is None (CNPS 2005).



**SAMPLES USED TO DESCRIBE ASSOCIATION (n=7)**

**Rapid Assessment(s):** MMWD0114, MMWD0129, MMWD0282, MMWD0320, MMWD0321, MMWD0326, MMWD0342 **Releve(s):** none

**Rank:** G3 S3?

**GLOBAL DISTRIBUTION**

Northern outer Central Coast (including from Mt. Tamalpais and other areas in Marin County); though full distribution is not known

**REFERENCES**

None

***Arbutus menziesii*-*Quercus agrifolia* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	ARME-T	<i>Arbutus menziesii</i>	100	24.0	8	40
	QUAG-T	<i>Quercus agrifolia</i>	100	18.7	8	29
	UMCA-T	<i>Umbellularia californica</i>	57	3.3	3	8
	PSME-T	<i>Pseudotsuga menziesii</i>	43	2.4	2	12
<b>Tree Understory</b>						
	LIDE3-L	<i>Lithocarpus densiflorus</i>	43	0.4	1	1
	AECA	<i>Aesculus californica</i>	29	0.7	2	3
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	100	2.9	0.2	10
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	71	0.1	0.2	0.2
	MIAU	<i>Mimulus aurantiacus</i>	71	0.1	0.2	0.2
	HEAR5	<i>Heteromeles arbutifolia</i>	57	4.6	1	25
	ROCA2	<i>Rosa californica</i>	57	0.2	0.2	1
	ADFA	<i>Adenostoma fasciculatum</i>	43	0.9	0.2	4
	ARGL3	<i>Arctostaphylos glandulosa</i>	43	0.3	0.2	2
	RUUR	<i>Rubus ursinus</i>	43	0.3	0.2	1
	SYMO	<i>Symphoricarpos mollis</i>	43	0.1	0.2	0.2
	QUWI2-M	<i>Quercus wislizeni</i>	29	0.2	0.2	1
<b>Herb</b>						
	IRDO	<i>Iris douglasiana</i>	100	1.6	0.2	8
	FECA	<i>Festuca californica</i>	57	0.2	0.2	1
	DRAR3	<i>Dryopteris arguta</i>	43	0.1	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	43	0.1	0.2	0.2
	VISA	<i>Vicia sativa</i>	43	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	29	0.4	1	2
	PTAQ	<i>Pteridium aquilinum</i>	29	0.2	0.2	1
	CAREX	<i>Carex</i>	29	0.1	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	29	0.1	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	29	0.1	0.2	0.2
	GAAP2	<i>Galium aparine</i>	29	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	29	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	29	0.1	0.2	0.2
	POMU	<i>Polystichum munitum</i>	29	0.1	0.2	0.2

***Arbutus menziesii*-*Quercus agrifolia* Association**

STAJ	<i>Stachys ajugoides</i>	29	0.1	0.2	0.2
STRI	<i>Stachys rigida</i>	29	0.1	0.2	0.2
TONO	<i>Torilis nodosa</i>	29	0.1	0.2	0.2
TRLA6	<i>Trientalis latifolia</i>	29	0.1	0.2	0.2
ZIFR	<i>Zigadenus fremontii</i>	29	0.1	0.2	0.2
<b>Cryptogam</b>					
MOSS	<i>Moss</i>	43	0.4	1	1

***Arbutus menziesii*-*Umbellularia californica* (-*Lithocarpus densiflorus*) Association**  
**Pacific Madrone - California Bay (- Tanoak) Association**

**Mapping Code: 1160/1104mu**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Arbutus menziesii*-*Umbellularia californica*(-*Lithocarpus densiflorus*) Woodland form an open to intermittent tree layer (20-62%, mean 42.3%), with hardwoods at 5-15m tall (20-62%, mean 40.3%) and conifers at 2-5m tall (0-10%, mean 2%). The shrub layer is open (3-24%, mean 12.6%) with low shrubs at 0.5-2m and tall shrubs at 0.5-10m tall. The herbaceous layer is open (2-20%, mean 7.5%) at 0-0.5m tall. Total vegetation cover is 37-73%, mean 55.4%.

In this association, *Arbutus menziesii* is characteristic and highest in cover in the overstory tree layer, though *Umbellularia californica* is co-dominant to sub-dominant. However, these two species sometimes co-dominate as regenerating understory trees. *Lithocarpus densiflorus* is often present and sub-dominant as an overstory or understory tree. *Pseudotsuga menziesii* may be present and regenerating at low cover. The shrub layer is characterized by *Toxicodendron diversilobum* and *Lonicera hispidula* var. *vacillans* at low cover. The herbaceous layer is variable with *Iris douglasiana*, *Carex globosa*, *Pentagramma triangularis*, and *Whipplea modesta* most common at low cover.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 238-2278 ft., mean 1052.6 ft.

Aspect: variable

Slope: moderate to steep, range 7-45 degrees, mean 30.9 degrees

Topography: often mid slope, though sometimes lower or upper slope; usually an undulating pattern, sometimes convex or rounded.

Small Rock Cover: range 0.2-32%, mean 7.7%

Large Rock Cover: range 0-7%, mean 0.9%

Litter Cover: range 26-93%, mean 71.4%

Bare Ground: range 2-40%, mean 18.5%

Parent Material: Franciscan melange

Soil Texture: medium to moderately fine silty clay loam or sandy clay loam, medium to very fine sandy loam, or moderately coarse sandy loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. This is a common mixed evergreen association in the study area, which usually occurs on somewhat steep, mid slopes. This association is similar to the one plot of the *Arbutus menziesii* Alliance described for this area and Golden Gate Natural Recreation Area (NatureServe et al. 2003a).

**SITE IMPACTS**

This association has low non-native plant cover (average 1.0%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Torilis arvensis*, *Vicia americana*, and *Genista monspessulana*. Additional site impacts include light to heavy Sudden Oak Death Syndrome in 13 stands, and light vandalism/dumping/litter in one stand.

**SENSITIVE SPECIES**

*Amorpha californica* var. *napensis* was found in 1 of 17 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 2-2-3. Global rank is G4T2, and State rank is S2.2. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=17)**

**Rapid Assessment(s):** MMWD0071, MMWD0098, MMWD0099, MMWD0105, MMWD0106, MMWD0124, MMWD0125, MMWD0210, MMWD0220, MMWD0265, MMWD0297, MMWD0319, MMWD0324, MMWD0328, MMWD0359, MMWD0361, MMWD0401 **Releve(s):** none

**Rank:** G3 S3?

## GLOBAL DISTRIBUTION

Northern outer Central Coast (including Mt. Tamalpais, Golden Gate Natural Recreation Area, and other areas in Marin County); though full distribution is not known

## REFERENCES

NatureServe et al. 2003a

### *Arbutus menziesii*-*Umbellularia californica* (-*Lithocarpus densiflorus*) Association

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	ARME-T	<i>Arbutus menziesii</i>	94	20.1	10	38
	UMCA-T	<i>Umbellularia californica</i>	76	10.8	3	22
	LIDE3-T	<i>Lithocarpus densiflorus</i>	29	4.5	5	23
	QUAG-T	<i>Quercus agrifolia</i>	29	1.6	2	14
	QUWI2-T	<i>Quercus wislizeni</i>	29	1.4	0.2	15
	PSME-T	<i>Pseudotsuga menziesii</i>	24	0.7	0.2	5
<b>Tree Understory</b>						
	LIDE3-M	<i>Lithocarpus densiflorus</i>	35	2.6	3	18
	PSME-L	<i>Pseudotsuga menziesii</i>	35	0.4	0.2	2
	COCOC	<i>Corylus cornuta</i> var. <i>californica</i>	29	0.4	0.2	3
	TOCA	<i>Torreya californica</i>	24	1.2	3	7
	UMCA-M	<i>Umbellularia californica</i>	20	0.9	3	7
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	88	0.6	0.2	7
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	71	0.2	0.2	1
	HEAR5	<i>Heteromeles arbutifolia</i>	35	0.7	0.2	4
	MIAU	<i>Mimulus aurantiacus</i>	29	0.4	0.2	5
	SYMO	<i>Symphoricarpos mollis</i>	29	0.1	0.2	0.2
	QUWI2-M	<i>Quercus wislizeni</i>	24	1.0	0.2	8
	ROCA2	<i>Rosa californica</i>	24	0.0	0.2	0.2
<b>Herb</b>						
	IRDO	<i>Iris douglasiana</i>	59	0.4	0.2	1
	CAGL7	<i>Carex globosa</i>	53	0.2	0.2	1
	PETR7	<i>Pentagramma triangularis</i>	47	0.1	0.2	0.2
	WHMO	<i>Whipplea modesta</i>	41	0.5	0.2	5
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	41	0.1	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	41	0.1	0.2	0.2
	STRI	<i>Stachys rigida</i>	35	0.3	0.2	3
	POCA5	<i>Polygala californica</i>	35	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	29	0.3	0.2	3.2
	POLYP	<i>Polypodium</i>	29	0.1	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	29	0.1	0.2	0.2
	VIAM	<i>Vicia americana</i>	24	0.2	0.2	2
	DRAR3	<i>Dryopteris arguta</i>	24	0.0	0.2	0.2
	IRMA	<i>Iris macrosiphon</i>	24	0.0	0.2	0.2
	PITR3	<i>Piperia transversa</i>	24	0.0	0.2	0.2
<b>Cryptogam</b>						
	MOSS	Moss	53	0.4	0.2	2

***Arbutus menziesii*-*Umbellularia californica*-*Quercus kelloggii* Association**  
**Pacific Madrone-California Bay-Black Oak Sub-Association**

**Mapping Code: 1160/1104mu**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Arbutus menziesii*-*Umbellularia californica*-*Quercus kelloggii* Woodland form an open to intermittent tree layer (20-48%, mean 39.9%), with hardwoods at 5-20m tall (20-48%, mean 38%) and conifers at 5-20m tall (0-6%, mean 1.9%). The shrub layer is open (0.2-8%, mean 4.6%) with low shrubs at 0-2m and tall shrubs at 1-10m tall. The herbaceous layer is open to intermittent (3-50%, mean 17.1%) at 0-0.5m tall. Total vegetation cover is 50-70%, mean 59.6%.

In this association, the *Quercus kelloggii* is subdominant to codominant with *Arbutus menziesii* and *Umbellularia californica* in the overstory tree layer. *Pseudotsuga menziesii* is sometimes present and regenerating at low cover. The shrub layer often has *Toxicodendron diversilobum* at low cover. The herbaceous layer has *Iris douglasiana* characteristically present and *Cynoglossum grande* often present at low cover.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 348-810 ft., mean 633 ft.

Aspect: often NE or NW, sometimes variable

Slope: flat to steep, range 0-40 degrees, mean 23.1 degrees

Topography: mid to upper slope; often convex, sometimes concave or undulating

Small Rock Cover: 1% (data from one plot)

Large Rock Cover: none

Litter Cover: range 93% (data from one plot)

Bare Ground: 4% (data from one plot)

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam, moderately coarse sandy loam, medium loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. They typically occur on northerly aspects and often on upper slopes. This association is similar to the *Quercus kelloggii*-*Arbutus menziesii*-*Quercus agrifolia* association, which is another mixed evergreen-deciduous woodland type in the study area. However, this association has a stronger evergreen nature and lower cover understory.

**SITE IMPACTS**

This association has low non-native plant cover (average 2.2%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Torilis arvensis*, *Vicia sativa*, and *Briza maxima*. Additional site impacts include moderate to heavy Sudden Oak Death Syndrome in two stands.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=7)**

**Rapid Assessment(s):** MMWD0103, MMWD0104, MMWD0113, MMWD0137, MMWD0150, MMWD0153, MMWD0223 **Releve(s):** none

**Rank:** G3 S3?

**GLOBAL DISTRIBUTION**

Northern outer Central Coast (known from Mt Tamalpais area); though full distribution is not known

**REFERENCES**

None

***Arbutus menziesii*-*Umbellularia californica*-*Quercus kelloggii* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	UMCA-T	<i>Umbellularia californica</i>	100	15.6	1	35
	ARME-T	<i>Arbutus menziesii</i>	100	14.9	8	30
	QUKE-T	<i>Quercus kelloggii</i>	100	10.0	2	20
	QUAG-T	<i>Quercus agrifolia</i>	57	1.4	1	5
	SESE3	<i>Sequoia sempervirens</i>	29	1.3	3	6
<b>Tree Understory</b>						
	PSME-L	<i>Pseudotsuga menziesii</i>	43	0.2	0.2	1
	LIDE3-L	<i>Lithocarpus densiflorus</i>	29	1.2	0.2	8
	COCOC	<i>Corylus cornuta</i> var. <i>californica</i>	29	0.2	0.2	1
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	71	0.7	0.2	3
	ROCA2	<i>Rosa californica</i>	43	0.2	0.2	1
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	43	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	29	0.5	0.2	3
	HEAR5	<i>Heteromeles arbutifolia</i>	29	0.2	0.2	1
	RHCA	<i>Rhamnus californica</i>	29	0.1	0.2	0.2
<b>Herb</b>						
	IRDO	<i>Iris douglasiana</i>	100	1.5	0.2	6
	CYGR	<i>Cynoglossum grande</i>	71	0.4	0.2	2
	METO	<i>Melica torreyana</i>	57	1.5	0.2	10
	TOAR	<i>Torilis arvensis</i>	57	0.4	0.2	2
	PETR7	<i>Pentagramma triangularis</i>	57	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	57	0.1	0.2	0.2
	FECA	<i>Festuca californica</i>	43	0.6	1	2
	VISA	<i>Vicia sativa</i>	43	0.2	0.2	1
	CHPO3	<i>Chlorogalum pomeridianum</i>	43	0.1	0.2	0.2
	GAAP2	<i>Galium aparine</i>	43	0.1	0.2	0.2
	POLYP	<i>Polypodium</i>	43	0.1	0.2	0.2
	VIAM	<i>Vicia americana</i>	29	0.6	0.2	4
	BRMA	<i>Briza maxima</i>	29	0.6	2	2
	STAJ	<i>Stachys ajugoides</i>	29	0.2	0.2	1
	ADJO	<i>Adiantum jordanii</i>	29	0.1	0.2	0.2
	CAREX	<i>Carex</i>	29	0.1	0.2	0.2
	CAGL7	<i>Carex globosa</i>	29	0.1	0.2	0.2
	MENTH	<i>Mentha</i>	29	0.1	0.2	0.2
	POCA25	<i>Polystichum californicum</i>	29	0.1	0.2	0.2
	POMU	<i>Polystichum munitum</i>	29	0.1	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	29	0.1	0.2	0.2

## ***Chrysolepis chrysophylla* Alliance or Habitat**

This alliance is represented by two associations in the study area, in which *Chrysolepis chrysophylla* occurs in the tree or shrub layer with *Vaccinium ovatum* or *Arctostaphylos glandulosa*. Variation was seen in an additional plot (MMWD0314) without *V. ovatum*. Most of the *Chrysolepis chrysophylla* stands are near the upper level of average summer fog and are intermediate in soil development between chaparral and forest (NatureServe et al 2003a).

### ***Chrysolepis chrysophylla*-*Arctostaphylos glandulosa* Association** **Chinquapin - Eastwood Manzanita Association**

**Mapping Code: 1180**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Chrysolepis chrysophylla*-*Arctostaphylos glandulosa* Shrubland form an intermittent to dense shrub layer (48-75%, mean 63%). Shrubs frequently occur in two different strata, with low shrubs at 0.5-2m tall and tall shrubs at 2-5m tall. The herbaceous layer is open (0-6%, mean 3.2%) at 0-0.5m tall. Trees frequently occur as emergents (0-15%, mean 6.8%) with hardwoods at 5-10m tall (0-14%, mean 3.8%) and conifers at 10-15m tall (0-8%, mean 3%). Total vegetation cover is 52-73%, mean 61.8%.

In this association, *Chrysolepis chrysophylla* and *Arctostaphylos glandulosa* are co-dominant in the overstory shrub layer, though sometimes *Chrysolepis chrysophylla* is in the tree layer. A variety of other shrubs may also occur, including *Quercus wislizeni*, *Adenostoma fasciculatum*, and *Pickeringia montana*. The herbaceous layer is sparse to open with *Pteridium aquilinum* and *Hypericum concinnum* most common. The tree layer is open and variable, with various hardwoods such as *Lithocarpus densiflorus* and *Quercus wislizeni* and conifer *Pseudotsuga menziesii*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1117-1246 ft., mean 1191 ft.

Aspect: variable

Slope: somewhat steep to steep, range 18-31 degrees, mean 25.8 degrees

Topography: lower to upper slope, usually undulating pattern, sometimes convex or rounded

Small Rock Cover: range 3-35%, mean 22.3%

Large Rock Cover: range 0-3%, mean 1%

Litter Cover: range 22-51%, mean 35.3%

Bare Ground: range 30-44%, mean 39%

Parent Material: Franciscan melange

Soil Texture: moderately coarse sandy loam or moderately fine clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. They tend to occur as small stands at the interface between forest and chaparral, or they occur as small copses within a larger chaparral matrix.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 0.2%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Aira caryophyllea*, *Briza maxima*, and *Hypochaeris glabra*. Additional site impacts are light erosion/runoff in one stand and moderate Douglas fir encroachment in one stand.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=5)**

**Rapid Assessment(s):** MMWD0208, MMWD0214, MMWD0278, MMWD0279, MMWD0357 **Releve(s):** none

**Rank:** G3 S3

**GLOBAL DISTRIBUTION**

Northern outer Central Coast (known from Mt. Tamalpais area); though full distribution is not known

**REFERENCES**

none



***Chrysolepis chrysophylla*-*Arctostaphylos glandulosa* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	PSME-T	<i>Pseudotsuga menziesii</i>	60	3.0	1	8
	ARME-T	<i>Arbutus menziesii</i>	20	0.4	2	2
	LIDE3-T	<i>Lithocarpus densiflorus</i>	20	0.4	2	2
	QUWI2-T	<i>Quercus wislizeni</i>	20	0.4	2	2
	QUCH2-T	<i>Quercus chrysolepis</i>	20	0.0	0.2	0.2
<b>Tree Understory</b>						
	LIDE3-M	<i>Lithocarpus densiflorus</i>	40	4.0	0.2	20
	<b>CHCH7-T</b>	<b><i>Chrysolepis chrysophylla</i></b>	<b>20</b>	<b>2.0</b>	<b>10</b>	<b>10</b>
	PSME-M	<i>Pseudotsuga menziesii</i>	20	0.6	3	3
	PSME-L	<i>Pseudotsuga menziesii</i>	20	0.2	1	1
	ARME-M	<i>Arbutus menziesii</i>	20	0.0	0.2	0.2
	UMCA-L	<i>Umbellularia californica</i>	20	0.0	0.2	0.2
<b>Shrub</b>						
	<b>CHCH7-M</b>	<b><i>Chrysolepis chrysophylla</i></b>	<b>100</b>	<b>21.2</b>	<b>2</b>	<b>46</b>
	<b>ARGL3</b>	<b><i>Arctostaphylos glandulosa</i></b>	<b>100</b>	<b>19.4</b>	<b>8</b>	<b>34</b>
	QUWI2-M	<i>Quercus wislizeni</i>	60	8.4	10	20
	ADFA	<i>Adenostoma fasciculatum</i>	60	3.0	1	7
	PIMO5	<i>Pickeringia montana</i>	60	1.6	2	4
	DERI	<i>Dendromecon rigida</i>	60	0.3	0.2	1
	HEAR5	<i>Heteromeles arbutifolia</i>	40	0.6	0.2	3
	MIAU	<i>Mimulus aurantiacus</i>	40	0.4	0.2	2
	ERCA6	<i>Eriodictyon californicum</i>	40	0.1	0.2	0.2
	LOSC2	<i>Lotus scoparius</i>	40	0.1	0.2	0.2
	ARNU3	<i>Arctostaphylos nummularia</i>	20	4.0	20	20
	QUPAS2	<i>Quercus parvula</i> var. <i>shrevei</i>	20	1.0	5	5
	QUWI2-L	<i>Quercus wislizeni</i>	20	0.2	1	1
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	20	0.0	0.2	0.2
	TODI	<i>Toxicodendron diversilobum</i>	20	0.0	0.2	0.2
	VAOV2	<i>Vaccinium ovatum</i>	20	0.0	0.2	0.2
<b>Herb</b>						
	PTAQ	<i>Pteridium aquilinum</i>	80	0.6	0.2	1
	HYCO3	<i>Hypericum concinnum</i>	60	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	40	0.2	0.2	1
	AICA	<i>Aira caryophyllea</i>	40	0.1	0.2	0.2
	BRMA	<i>Briza maxima</i>	20	0.0	0.2	0.2
	CIOC	<i>Cirsium occidentale</i>	20	0.0	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	20	0.0	0.2	0.2
	FICA2	<i>Filago californica</i>	20	0.0	0.2	0.2
	HYGL2	<i>Hypochaeris glabra</i>	20	0.0	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	20	0.0	0.2	0.2
	KOMA	<i>Koeleria macrantha</i>	20	0.0	0.2	0.2
	XETE	<i>Xerophyllum tenax</i>	20	0.0	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	20	0.0	0.2	0.2
<b>Cryptogam</b>						
	LICHEN	<i>Lichen</i>	40	0.1	0.2	0.2
	MOSS	<i>Moss</i>	40	0.1	0.2	0.2

***Chrysolepis chrysophylla/Vaccinium ovatum* Association**  
**Chinquapin - Black Huckleberry Association**

**Mapping Code: 1180**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Chrysolepis chrysophylla/Vaccinium ovatum* Woodland form an open to intermittent tree layer (19-44%, mean 33.3%), with hardwoods at 5-10m tall (19-44%, mean 33.3%). The shrub layer is open to dense (7-85%, mean 46.3%) with low shrubs at 1-2m and tall shrubs at 0.5-5m tall. The herbaceous layer is open (0-4%, mean 1.7%) at 0-0.5m tall. Total vegetation cover is 48-87%, mean 70.7%.

In this association, *Chrysolepis chrysophylla* usually dominates as an overstory tree, though sometimes it is found abundantly as a low tree or tall shrub. *Vaccinium ovatum* and *Arctostaphylos glandulosa* and characteristically present in the shrub layer, though *Vaccinium ovatum* is most abundant. The herbaceous layer often has *Pteridium aquilinum* at low cover.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1200-1521 ft., mean 1357 ft.

Aspect: often NE or NW, sometimes variable

Slope: gentle to steep, range 3-36 degrees, mean 21.7 degrees

Topography: mid to upper slope, convex, undulating, or concave

Small Rock Cover: range 0.2-15%, mean 5.7%

Large Rock Cover: range 0-1%, mean 0.2%

Litter Cover: range 43-86%, mean 70%

Bare Ground: range 8-40%, mean 21%

Parent Material: Franciscan melange

Soil Texture: often moderately fine clay loam, sometimes medium loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. They tend to occur as small stands at the interface between forest and chaparral. It is a more mesic association with taller tree stature than the *C. chrysophylla/Arctostaphylos glandulosa* association that is more chaparral in nature.

**SITE IMPACTS**

This association has low non-native plant cover (average 0.1%) relative to native cover. The non-native species with highest frequency and abundance is *Aira caryophyllea*. Additional site impacts include light erosion/runoff in one stand.

**SENSITIVE SPECIES**

*Ceanothus gloriosus* var. *exaltatus* was found in 1 of 3 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-1-3. Global rank is G3G4T3, and State rank is S3.3. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** MMWD0211, MMWD0264, MMWD0405 **Releve(s):** none

**Rank:** G3 S3?

**GLOBAL DISTRIBUTION**

Outer Central Coast (known from the San Francisco Bay area) and possibly outer North Coast; though full distribution is not known

**REFERENCES**

NatureServe et al. 2003a

***Chrysolepis chrysophylla*/Vaccinium ovatum Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	LIDE3-T	<i>Lithocarpus densiflorus</i>	33	0.7	2	2
<b>Tree Understory</b>						
	<b>CHCH7-T</b>	<b><i>Chrysolepis chrysophylla</i></b>	<b>67</b>	<b>22.3</b>	<b>27</b>	<b>40</b>
	ARME-M	<i>Arbutus menziesii</i>	33	0.7	2	2
	LIDE3-M	<i>Lithocarpus densiflorus</i>	33	0.1	0.2	0.2
	PSME-L	<i>Pseudotsuga menziesii</i>	33	0.1	0.2	0.2
<b>Shrub</b>						
	<b>VAOV2</b>	<b><i>Vaccinium ovatum</i></b>	<b>100</b>	<b>29.7</b>	<b>5</b>	<b>47</b>
	ARGL3	<i>Arctostaphylos glandulosa</i>	100	6.7	0.2	17
	QUWI2-M	<i>Quercus wislizeni</i>	67	1.0	1	2
	<b>CHCH7-M</b>	<b><i>Chrysolepis chrysophylla</i></b>	<b>33</b>	<b>14.7</b>	<b>44</b>	<b>44</b>
	ARNU3	<i>Arctostaphylos nummularia</i>	33	0.3	1	1
	HEAR5	<i>Heteromeles arbutifolia</i>	33	0.3	1	1
	ADFA	<i>Adenostoma fasciculatum</i>	33	0.1	0.2	0.2
	CEGLE	<i>Ceanothus gloriosus</i> var. <i>exaltatus</i>	33	0.1	0.2	0.2
	ERCA6	<i>Eriodictyon californicum</i>	33	0.1	0.2	0.2
	QUWI2-L	<i>Quercus wislizeni</i>	33	0.1	0.2	0.2
	RUUR	<i>Rubus ursinus</i>	33	0.1	0.2	0.2
	TODI	<i>Toxicodendron diversilobum</i>	33	0.1	0.2	0.2
<b>Herb</b>						
	PTAQ	<i>Pteridium aquilinum</i>	67	0.7	0.2	2
	AICA	<i>Aira caryophyllea</i>	33	0.1	0.2	0.2
	ERRE12	<i>Erigeron reductus</i>	33	0.1	0.2	0.2
	HYCO3	<i>Hypericum concinnum</i>	33	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	33	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	100	0.5	0.2	1
	LICHEN	<i>Lichen</i>	67	0.7	0.2	2

### ***Cupressus macrocarpa* Alliance or Habitat**

This alliance has a minor presence in the study area, in which individuals were introduced in small groves. No associations have been described.

### ***Cupressus macrocarpa* Alliance Monterey Cypress Alliance**

**Mapping Code: 1201mu**

#### **LOCAL VEGETATION DESCRIPTION**

One stand of *Cupressus macrocarpa* Woodland forms an intermittent tree layer (38%), with conifers at 20-35m tall (38%). The shrub layer is open (26%) with low shrubs at 0.5-1m and tall shrubs at 2-5m tall. The herbaceous layer is open (30-30%, mean 30%) at 0.5-1m tall. Total vegetation cover is 68%.

In one stand sampled, *Cupressus macrocarpa* dominates the overstory tree layer in intermittent cover. The shrub layer is characterized by *Toxicodendron diversilobum* and *Baccharis pilularis* in one stand, and the herbaceous layer is characterized by *Conium maculatum*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 100 ft.

Aspect: flat

Slope: flat, 0 degrees

Topography: bottom, linear or even

Small Rock Cover: none

Large Rock Cover: none

Litter Cover: 47%

Bare Ground: 44%

Parent Material: Franciscan melange

Soil Texture: no data

One stand of this alliance was sampled at Nicasio Reservoir, in which the trees have been introduced. Other stands may be found in the Mt. Tamalpais Watershed, also introduced.

#### **SITE IMPACTS**

The stand representing this alliance has moderate non-native plant cover (average 40%) relative to native cover. Non-native species that occur with the highest abundance include *Conium maculatum*, *Cynosurus echinatus*, and *Avena barbata*. Additional site impacts include light vandalism/dumping/litter.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0242 **Releve(s):** none

**Rank:** Not applicable, stands are planted and are considered exotic.

#### **GLOBAL DISTRIBUTION**

outer Central Coast; planted in outer North Coast and Central Coast

#### **REFERENCES**

Holland 1986, NatureServe et al. 2003a, Sawyer and Keeler-Wolf 1995

***Cupressus macrocarpa* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	CUMA2	<i>Cupressus macrocarpa</i>	100	38.0	38	38
<b>Tree Understory</b>						
	SALA6	<i>Salix lasiolepis</i>	100	0.2	0.2	0.2
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	100	8.0	8	8
	BAPI	<i>Baccharis pilularis</i>	100	0.2	0.2	0.2
<b>Herb</b>						
	COMA2	<i>Conium maculatum</i>	100	23.0	23	23
	CYEC	<i>Cynosurus echinatus</i>	100	6.0	6	6
	AVBA	<i>Avena barbata</i>	100	5.0	5	5
	CHPO3	<i>Chlorogalum pomeridianum</i>	100	3.0	3	3
	CLPE	<i>Claytonia perfoliata</i>	100	2.0	2	2
	CAPY2	<i>Carduus pycnocephalus</i>	100	1.0	1	1
	HOB2	<i>Hordeum brachyantherum</i>	100	1.0	1	1
	URDI	<i>Urtica dioica</i>	100	1.0	1	1
	BRMI2	<i>Briza minor</i>	100	0.2	0.2	0.2
	BRDI3	<i>Bromus diandrus</i>	100	0.2	0.2	0.2
	DAPU3	<i>Daucus pusillus</i>	100	0.2	0.2	0.2
	GAAP2	<i>Galium aparine</i>	100	0.2	0.2	0.2
	JUEF	<i>Juncus effusus</i>	100	0.2	0.2	0.2
	LOPE	<i>Lolium perenne</i>	100	0.2	0.2	0.2
	SIMA3	<i>Silybum marianum</i>	100	0.2	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	100	0.2	0.2	0.2

## ***Cupressus sargentii* Alliance or Habitat**

This alliance is found commonly on serpentine soils in the Mt. Tamalpais Watershed, showing variation within three associations as upland or riparian stands. Stands have varying structure of *Cupressus sargentii* from shrubby to tree forms, which may be attributed to variable microclimates (e.g., stronger wind-pruning, heavier serpentinite soil, or shallower soils in some areas) or to different stand ages (i.e., stands established at different times).

### ***Cupressus sargentii* (Pure) Association**

#### **Sargent Cypress (Pure) Association**

**Mapping Code: 1242**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Cupressus sargentii* (Pure) Woodland form an open to intermittent tree layer (22-55%, mean 43.2%), with hardwoods at 2-5m tall (0-1%, mean 0.2%) and conifers at 0-10m tall (22-55%, mean 43%). The shrub layer is open (0.2-13%, mean 4.7%) with low shrubs at 0.5-1m and tall shrubs at 0-5m tall. The herbaceous layer is open (2-16%, mean 9.5%) at 0-0.5m tall. Total vegetation cover is 42-61%, mean 52.7%.

In this association, *Cupressus sargentii* dominates as an overstory tree or a shrub at moderate cover. *Pseudotsuga menziesii* sometimes is regenerating in the understory. The shrub layer is characterized by *Arctostaphylos hookeri* subsp. *montana* at sparse cover. The herbaceous layer is characterized by *Melica torreyana* at sparse cover, while other herbs are often present including *Aspidotis densa*, *Polygala californica*, *Zigadenus fremontii*, and *Galium porrigens* var. *porrigens*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 800-2274 ft., mean 1586 ft.

Aspect: variable

Slope: gentle to steep, range 1-33 degrees, mean 16.2 degrees

Topography: lower slope to ridge top, usually undulating

Small Rock Cover: range 0-35%, mean 18.8%

Large Rock Cover: range 1-46%, mean 12.5%

Litter Cover: range 5-80%, mean 48.2%

Bare Ground: range 3-35%, mean 18%

Parent Material: serpentine

Soil Texture: moderately fine sandy clay loam, moderately coarse sandy loam, medium to very fine loamy sand

Stands of this association were sampled in the Mt. Tamalpais Watershed. They are typically adjacent to non-serpentine stands of conifers or hardwoods (e.g., *Pseudotsuga menziesii* or *Umbellularia californica* alliances), and encroachment of these species is occurring in mature stands with extended time since fire.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 1.1%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Bromus diandrus*, *Cynosurus echinatus*, and *Aira caryophyllea*. There are no additional site impacts.

#### **SENSITIVE SPECIES**

*Arctostaphylos hookeri* subsp. *montana* was found in 5 of 6 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 3-1-3. Global rank is G3T2, and State rank is S2.2. Federal and state listing is None (CNPS 2005).

*Calamagrostis ophitidis* was found in 1 of 6 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-1-3. Global rank is G3, and State rank is S3.3. Federal and state listing is None (CNPS 2005).

*Calochortus umbellatus* was found in 3 of 6 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-2-3. Global rank is G3, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

*Eriogonum luteolum* var. *caninum* was found in 1 of 6 surveys of this plant community. CNPS ranks this species as List 3 with R-E-D Code is ?-2-3. Global rank is G5T3Q, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

*Navarretia rosulata* was found in 1 of 6 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 2-2-3. Global rank is G2?, and State rank is S2?. Federal and state listing is None (CNPS 2005).

*Streptanthus glandulosus* subsp. *pulchellus* was found in 1 of 6 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 3-2-3. Global rank is G4T1, and State rank is S1.2. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=6)**

**Rapid Assessment(s):** none **Releve(s):** MMWD0075, MMWD0112, MMWD0115, MMWD0117, MMWD0287, MMWD0311

**Rank:** G3 S3?

**GLOBAL DISTRIBUTION**

Northern outer Central Coast (known from Mt. Tamalpais area) and probably other parts of Central Coast and outer North Coast (San Luis Obispo County to Colusa and Mendocino Counties); though full distribution is not known

**REFERENCES**

Kruckeberg 1984, Sawyer and Keeler-Wolf 1995

***Cupressus sargentii* (Pure) Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	CUSA3-T	<i>Cupressus sargentii</i>	50	20.0	20	55
<b>Tree Understory</b>						
	CUSA3-M	<i>Cupressus sargentii</i>	50	22.0	40	50
	PSME-L	<i>Pseudotsuga menziesii</i>	33	0.5	0.2	3
	PSME-M	<i>Pseudotsuga menziesii</i>	33	0.2	0.2	1
	UMCA-L	<i>Umbellularia californica</i>	33	0.1	0.2	0.2
<b>Shrub</b>						
	ARHOM	<i>Arctostaphylos hookeri</i> subsp. <i>montana</i>	83	1.4	0.2	3
	HEAR5	<i>Heteromeles arbutifolia</i>	50	0.6	0.2	3
	CEJE	<i>Ceanothus jepsonii</i>	33	0.2	0.2	1
	LOHI2	<i>Lonicera hispidula</i>	33	0.2	0.2	1
	ADFA	<i>Adenostoma fasciculatum</i>	33	0.1	0.2	0.2
	GAEL	<i>Garrya elliptica</i>	33	0.1	0.2	0.2
	QUWI2-L	<i>Quercus wislizeni</i>	33	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	33	0.1	0.2	0.2
<b>Herb</b>						
	METO	<i>Melica torreyana</i>	100	0.2	0.2	0.2
	ASDE6	<i>Aspidotis densa</i>	67	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	67	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	67	0.1	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	67	0.1	0.2	0.2
	CAUM	<i>Calochortus umbellatus</i>	50	0.1	0.2	0.2
	ERRE12	<i>Erigeron reductus</i>	50	0.1	0.2	0.2
	IRIS	<i>Iris</i>	50	0.1	0.2	0.2
	MINUA	<i>Minuartia</i>	50	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	50	0.1	0.2	0.2
	VUMI	<i>Vulpia microstachys</i>	50	0.1	0.2	0.2
	ALLIU	<i>Allium</i>	33	0.1	0.2	0.2
	EPMI	<i>Epilobium minutum</i>	33	0.1	0.2	0.2
	FRAF2	<i>Fritillaria affinis</i>	33	0.1	0.2	0.2
	POLYP	<i>Polypodium</i>	33	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	33	0.7	1	3



## ***Cupressus sargentii* (Riparian) Association**

### **Sargent Cypress (Riparian) Association**

**Mapping Code:** 1243

#### **LOCAL VEGETATION DESCRIPTION**

One stand of *Cupressus sargentii* (Riparian) Woodland forms an intermittent tree layer (51%), with hardwoods at 5-10m tall (24%) and conifers at 5-10m tall (27%). The shrub layer is open (2%) with shrubs 1-2m tall. The herbaceous layer is open (22%) at 0-0.5m tall. Total vegetation cover is 65%.

In one stand sampled, *Cupressus sargentii* dominates the overstory tree layer while *Pseudotsuga menziesii* is found in the understory tree layer. The shrub layer is characterized by riparian species, *Salix scouleriana* and *Rhododendron occidentale*, at low cover. The herbaceous layer is variable, with *Festuca idahoensis* most abundant at low cover, though wetland species such as *Carex serratodens* are present at sparse cover.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 1211 ft.

Aspect: NE

Slope: somewhat steep, 25 degrees

Topography: mid slope, undulating pattern

Small Rock Cover: 15%

Large Rock Cover: 7%

Litter Cover: range 20%

Bare Ground: range 35%

Parent Material: serpentine

Soil Texture: Moderately fine sandy clay loam

One stand of this association was sampled in the Mt. Tamalpais Watershed. During reconnaissance, stands have been observed in small riparian seeps and drainages on serpentine within the study area.

#### **SITE IMPACTS**

The stand representing this association has low non-native plant cover (average 0.7%) relative to native cover. Non-native species that occur with the highest abundance include *Bromus diandrus* and *Bromus hordeaceus*. There are no additional site impacts.

#### **SENSITIVE SPECIES**

*Calochortus umbellatus* was found in the 1 survey of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-2-3. Global rank is G3, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** none **Releve(s):** MMWD0144

**Rank:** S2 G2?

#### **GLOBAL DISTRIBUTION**

Northern outer Central Coast (known from Mt. Tamalpais area) and probably outer North Coast (Marin to Colusa and Mendocino Counties); though full distribution is not known

#### **REFERENCES**

Sawyer and Keeler-Wolf 1995

***Cupressus sargentii* (Riparian) Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	CUSA3-T	<i>Cupressus sargentii</i>	100	20.0	20	20
	UMCA-T	<i>Umbellularia californica</i>	100	10.0	10	10
	QUAG-T	<i>Quercus agrifolia</i>	100	7.0	7	7
<b>Tree Understory</b>						
	PSME-M	<i>Pseudotsuga menziesii</i>	100	7.0	7	7
<b>Shrub</b>						
	SASC	<i>Salix scouleriana</i>	100	7.0	7	7
	RHOC	<i>Rhododendron occidentale</i>	100	2.0	2	2
<b>Herb</b>						
	FEID	<i>Festuca idahoensis</i>	100	1.0	1	1
	ACMI2	<i>Achillea millefolium</i>	100	0.2	0.2	0.2
	ASDE6	<i>Aspidotis densa</i>	100	0.2	0.2	0.2
	BRDI3	<i>Bromus diandrus</i>	100	0.2	0.2	0.2
	BRHO2	<i>Bromus hordeaceus</i>	100	0.2	0.2	0.2
	CAUM	<i>Calochortus umbellatus</i>	100	0.2	0.2	0.2
	CASE2	<i>Carex serratodens</i>	100	0.2	0.2	0.2
	CHPO3	<i>Chlorogalum pomeridianum</i>	100	0.2	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	100	0.2	0.2	0.2
	FRAF2	<i>Fritillaria affinis</i>	100	0.2	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	100	0.2	0.2	0.2
	IRIS	<i>Iris</i>	100	0.2	0.2	0.2
	MADIA	<i>Madia</i>	100	0.2	0.2	0.2
	MECA2	<i>Melica californica</i>	100	0.2	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	100	0.2	0.2	0.2
	POCA5	<i>Polygala californica</i>	100	0.2	0.2	0.2
	RACA2	<i>Ranunculus californicus</i>	100	0.2	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	100	0.2	0.2	0.2
	THCA4	<i>Thermopsis californica</i>	100	0.2	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	100	0.2	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	100	0.2	0.2	0.2

***Cupressus sargentii*/Arctostaphylos hookeri subsp. montana Association**  
**Sargent Cypress / Mt. Tamalpais Manzanita Association**

**Mapping Code: 1241**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Cupressus sargentii*/Arctostaphylos hookeri subsp. montana Woodland form an open to intermittent tree layer (20-40%, mean 29.6%), with conifers at 0.5-10m tall (20-40%, mean 29.6%). The shrub layer is open (12-33%, mean 21.4%) with low shrubs at 0-0.5m and tall shrubs at 0-2m tall. The herbaceous layer is open (1-25%, mean 8.3%) at 0-0.5m tall. Total vegetation cover is 47-65%, mean 56.4%.

In this association, *Cupressus sargentii* characterizes and dominates the tree layer, though it sometimes is found in the shrub layer as a dominant. *Pseudotsuga menziesii* infrequently is regenerating in the understory. *Arctostaphylos hookeri* subsp. montana dominates the shrub layer with cover at least 10%, and *Pickeringia montana* is often present at trace cover. The herbaceous layer frequently includes *Zigadenus fremontii*, *Chlorogalum pomeridianum*, *Calamagrostis ophitidis*, and *Calochortus umbellatus* at low cover.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1366-1560 ft., mean 1428 ft.

Aspect: variable, sometimes flat

Slope: flat to steep, range 0-27 degrees, mean 7 degrees

Topography: usually mid to upper slope, infrequently lower slope or ridge top, linear to undulating

Small Rock Cover: range 8-32%, mean 22.1%

Large Rock Cover: range 2-25%, mean 9.7%

Litter Cover: range 1-75%, mean 27.3%

Bare Ground: range 5-70%, mean 38.1%

Parent Material: serpentine, rarely Franciscan melange

Soil Texture: medium to very fine sandy loam or moderately fine clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. They are found on serpentine, as woodlands commonly intermixed within a larger shrubland matrix.

**SITE IMPACTS**

This association has low non-native plant cover (average 0.6%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Aira caryophyllea*, *Anagallis arvensis*, and *Avena barbata*. There are no additional site impacts.

**SENSITIVE SPECIES**

*Arctostaphylos hookeri* subsp. montana was found in 7 of 7 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 3-1-3. Global rank is G3T2, and State rank is S2.2. Federal and state listing is None (CNPS 2005).

*Calamagrostis ophitidis* was found in 5 of 7 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-1-3. Global rank is G3, and State rank is S3.3. Federal and state listing is None (CNPS 2005).

*Calochortus umbellatus* was found in 5 of 7 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-2-3. Global rank is G3, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

*Navarretia rosulata* was found in 4 of 7 surveys of this plant community. CNPS ranks this species as a List 1B with R-E-D Code is 2-2-3. Global rank is G2, and State rank is S2. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=7)**

**Rapid Assessment(s):** none **Releve(s):** MMWD0116, MMWD0119, MMWD0141, MMWD0142, MMWD0143, MMWD0145, MMWD0146

**Rank:** G1 S1.2

**GLOBAL DISTRIBUTION**

Northern outer Central Coast (restricted to Mt. Tamalpais area)

**REFERENCES*****Cupressus sargentii*/Arctostaphylos hookeri subsp. montana Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	CUSA3-T	<i>Cupressus sargentii</i>	86	24.6	18	40
<b>Tree Understory</b>						
	CUSA3-M	<i>Cupressus sargentii</i>	29	5.0	10	25
	PSME-L	<i>Pseudotsuga menziesii</i>	29	0.1	0.2	0.2
<b>Shrub</b>						
	ARHOM	<i>Arctostaphylos hookeri</i> subsp. <i>montana</i>	100	20.6	10	32
	PIMO5	<i>Pickeringia montana</i>	57	0.1	0.2	0.2
	ADFA	<i>Adenostoma fasciculatum</i>	43	0.8	0.2	5
	CEJE	<i>Ceanothus jepsonii</i>	43	0.2	0.2	1
	ERLA6	<i>Eriophyllum lanatum</i>	29	0.1	0.2	0.2
<b>Herb</b>						
	ZIFR	<i>Zigadenus fremontii</i>	100	0.3	0.2	1
	CHPO3	<i>Chlorogalum pomeridianum</i>	86	0.6	0.2	3
	CAOP2	<i>Calamagrostis ophitidis</i>	71	0.4	0.2	1
	CAUM	<i>Calochortus umbellatus</i>	71	0.1	0.2	0.2
	NAVAR	<i>Navarretia</i>	57	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	57	0.1	0.2	0.2
	CASTI2	<i>Castilleja</i>	29	0.1	0.2	0.2
	ERRE12	<i>Erigeron reductus</i>	29	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	29	0.1	0.2	0.2
	LOPU3	<i>Lotus purshianus</i>	29	0.1	0.2	0.2
	PEDE	<i>Pedicularis densiflora</i>	29	0.1	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	29	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	43	0.1	0.2	0.2

### ***Lithocarpus densiflorus* Alliance or Habitat**

This alliance is represented by two associations in the study area, where *Lithocarpus densiflorus* is dominant and other evergreen species are sub-dominant. Stands typically have been dense without a well-developed understory; however, they are declining rapidly because Sudden Oak Death Syndrome is significantly impacting the *Lithocarpus densiflorus*.

### ***Lithocarpus densiflorus*-*Arbutus menziesii* Association**

#### **Tanoak - Pacific Madrone Association**

**Mapping Code: 1104mu**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Lithocarpus densiflorus*-*Arbutus menziesii* Woodland/Forest form an open to intermittent tree layer (29-67%, mean 44.5%), with hardwoods at 5-20m tall (18-59%, mean 39.8%) and conifers at 20-35m tall (0-20%, mean 4.7%). The shrub layer is open (5-15%, mean 10%) with low shrubs at 0-2m and tall shrubs at 2-10m tall. The herbaceous layer is open (0.2-5%, mean 2.4%) at 0-0.5m tall. Total vegetation cover is 38-68%, mean 52.7%.

In this association, *Lithocarpus densiflorus* is primarily dominant in the overstory tree layer, while *Arbutus menziesii* is characteristically present as a sub-dominant and *Quercus chrysolepis* is sometimes present as a sub-dominant. The shrub layer often has *Symphoricarpos mollis* and *Rosa gymnocarpa* at low cover. The herbaceous layer is variable and often contains *Iris douglasiana*, *Polystichum munitum*, and *Pteridium aquilinum* at trace cover.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 643-2051 ft., mean 1243 ft.

Aspect: variable, often NE or SE

Slope: gentle to steep, range 3-44 degrees, mean 23.8 degrees

Topography: usually mid slope, often convex

Small Rock Cover: range 0.2-1%, mean 0.6%

Large Rock Cover: range 0-1%, mean 0.2%

Litter Cover: range 75-91%, mean 85.7%

Bare Ground: range 6-22%, mean 11.2%

Parent Material: Franciscan melange

Soil Texture: moderately fine sandy clay loam, moderately fine clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed, usually in large expanses. Stands contain mature standing, dying, and fallen *Lithocarpus densiflorus* mixed with surviving *Arbutus menziesii* and other evergreen species. This association is found on more mesic exposures than the related *Lithocarpus densiflorus*-*Umbellularia californica* Association, and stands will be transitioning to the *Arbutus menziesii*-*Umbellularia californica*-*Lithocarpus densiflorus* Association in the next few years.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 5%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Vicia sativa*, *Bromus diandrus*, and *Torilis nodosa*. Additional site impacts include heavy Sudden Oak Death Syndrome in four stands and moderate Sudden Oak Death Syndrome in two stands.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=6)**

**Rapid Assessment(s):** MMWD0200, MMWD0201, MMWD0248, MMWD0283, MMWD0284, MMWD0420 **Releve(s):** none

**Rank:** G3 S3

## GLOBAL DISTRIBUTION

outer Central Coast (known from Mt. Tamalpais area) and probably other parts of Central Coast and outer North Coast; though full distribution is not known

## REFERENCES

NatureServe et al. 2003a

### *Lithocarpus densiflorus*-*Arbutus menziesii* Association

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	LIDE3-T	<i>Lithocarpus densiflorus</i>	100	26.8	20	35
	ARME-T	<i>Arbutus menziesii</i>	100	8.5	3	12
	QUCH2-T	<i>Quercus chrysolepis</i>	50	4.5	2	20
	PSME-T	<i>Pseudotsuga menziesii</i>	33	4.7	8	20
<b>Tree Understory</b>						
	TOCA	<i>Torreya californica</i>	33	0.4	0.2	2
<b>Shrub</b>						
	SYMO	<i>Symphoricarpos mollis</i>	67	0.1	0.2	0.2
	ROGY	<i>Rosa gymnocarpa</i>	50	0.1	0.2	0.2
	VAOV2	<i>Vaccinium ovatum</i>	33	0.2	0.2	1
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	33	0.1	0.2	0.2
	TODI	<i>Toxicodendron diversilobum</i>	33	0.1	0.2	0.2
<b>Herb</b>						
	IRDO	<i>Iris douglasiana</i>	50	0.1	0.2	0.2
	POMU	<i>Polystichum munitum</i>	50	0.1	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	50	0.1	0.2	0.2
	POLYP	<i>Polypodium</i>	33	0.2	0.2	1
	CAGL7	<i>Carex globosa</i>	33	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	33	0.1	0.2	0.2
	TRLA6	<i>Trientalis latifolia</i>	33	0.1	0.2	0.2
	VISA	<i>Vicia sativa</i>	33	0.1	0.2	0.2
	WHMO	<i>Whipplea modesta</i>	33	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	83	0.6	0.2	1
	LICHEN	<i>Lichen</i>	67	0.1	0.2	0.2

## ***Lithocarpus densiflorus*-*Umbellularia californica* Association**

### **Tanoak - California Bay Association**

**Mapping Code:** 1116/1104mu

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Lithocarpus densiflorus*-*Umbellularia californica* Woodland form an open to intermittent tree layer (30-35%, mean 32.6%), with hardwoods at 5-15m tall (25-35%, mean 30%) and conifers at 2-10m tall (0.2-5%, mean 2.6%). The shrub layer is open (24-29%, mean 26.5%) with low shrubs at 0.5-1m and tall shrubs at 2-5m tall. The herbaceous layer is open 6-7%, mean 6.5%) at 0-0.5m tall. Total vegetation cover is 60-70%, mean 65%.

In this association, *Lithocarpus densiflorus* is primarily dominant in the overstory tree layer, while *Umbellularia californica* is characteristically present as a sub-dominant. *Quercus wislizeni* and *Pseudotsuga menziesii* sometimes are present as sub-dominants, and various trees may be regenerating in the understory. The shrub layer is characterized *Arctostaphylos glandulosa* and *Toxicodendron diversilobum* at low cover. The herbaceous layer is characterized by *Pentagramma triangularis* and *Polygala californica* at trace cover.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1730-2017 ft., mean 1874 ft.

Aspect: variable

Slope: steep, range 32-34 degrees, mean 33 degrees

Topography: lower to mid slope, convex or undulating

Small Rock Cover: 1% (data from one plot)

Large Rock Cover: 4% (data from one plot)

Litter Cover: range 84% (data from one plot)

Bare Ground: range 8% (data from one plot)

Parent Material: Franciscan melange

Soil Texture: medium loam, moderately fine sandy clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. They are being impacted by Sudden Oak Death Syndrome, in which *Lithocarpus densiflorus* is found with downed limbs or trees. Within the next few years, stands will transition to *Umbellularia californica*-*Lithocarpus densiflorus* Association.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 0.2%) relative to native cover. The non-native species with the highest frequency and abundance is *Hypochaeris glabra*. Additional site impacts include moderate Sudden Oak Death Syndrome in one stand.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** MMWD0305, MMWD0371 **Releve(s):** none

**Rank:** G4 S4

#### **GLOBAL DISTRIBUTION**

North Coast, Central Coast, Klamath Ranges

#### **REFERENCES**

Jimerson et al. 1986

***Lithocarpus densiflorus*-*Umbellularia californica* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	LIDE3-T	<i>Lithocarpus densiflorus</i>	100	22.5	15	30
	UMCA-T	<i>Umbellularia californica</i>	100	7.5	2	13
	QUWI2-T	<i>Quercus wislizeni</i>	50	5.0	10	10
	PSME-T	<i>Pseudotsuga menziesii</i>	50	2.5	5	5
<b>Tree Understory</b>						
	QUCH2-L	<i>Quercus chrysolepis</i>	50	1.5	3	3
	ARME-M	<i>Arbutus menziesii</i>	50	0.1	0.2	0.2
	PSME-M	<i>Pseudotsuga menziesii</i>	50	0.1	0.2	0.2
	QUWI2-L	<i>Quercus wislizeni</i>	50	1.0	2	2
<b>Shrub</b>						
	ARGL3	<i>Arctostaphylos glandulosa</i>	100	10.0	5	15
	TODI	<i>Toxicodendron diversilobum</i>	100	0.6	0.2	1
	HEAR5	<i>Heteromeles arbutifolia</i>	50	1.5	3	3
	ADFA	<i>Adenostoma fasciculatum</i>	50	0.1	0.2	0.2
	ERCA6	<i>Eriodictyon californicum</i>	50	0.1	0.2	0.2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	50	0.1	0.2	0.2
	MIAU	<i>Mimulus aurantiacus</i>	50	0.1	0.2	0.2
	RUUR	<i>Rubus ursinus</i>	50	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	50	0.1	0.2	0.2
<b>Herb</b>						
	PETR7	<i>Pentagramma triangularis</i>	100	0.2	0.2	0.2
	POCA5	<i>Polygala californica</i>	100	0.2	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	50	0.5	1	1
	CALYS	<i>Calystegia</i>	50	0.1	0.2	0.2
	COHE2	<i>Collomia heterophylla</i>	50	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	50	0.1	0.2	0.2
	HYGL2	<i>Hypochaeris glabra</i>	50	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	50	0.1	0.2	0.2
	POMU	<i>Polystichum munitum</i>	50	0.1	0.2	0.2
	STRI	<i>Stachys rigida</i>	50	0.1	0.2	0.2
	VIGI	<i>Vicia gigantea</i>	50	0.1	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	50	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	100	1.1	0.2	2
	LICHEN	<i>Lichen</i>	50	0.5	1	1



### ***Pinus muricata* Alliance or Habitat**

This alliance is represented by two naturally occurring associations in the study area, which have *Pinus muricata* dominant in the overstory and shrub species abundant in the understory. It is also represented by planted stands in a few situations, such as in one plot sampled (MMWD0122) and classified at the alliance level.

### ***Pinus muricata*/Arctostaphylos glandulosa Association**

#### **Bishop Pine / Eastwood Manzanita Association**

**Mapping Code: 1231**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Pinus muricata*/Arctostaphylos glandulosa Woodland form an open to intermittent tree layer (23-37%, mean 29%), with hardwoods at 2-10m tall (0-7%, mean 3.3%) and conifers at 10-20m tall (20-30%, mean 25.7%). The shrub layer is open to intermittent (31-38%, mean 34.7%) with low shrubs at 0.5-1m and tall shrubs at 1-5m tall. The herbaceous layer is open (3-5%, mean 3.7%) at 0-0.5m tall. Total vegetation cover is 54-67%, mean 62.7%.

In this association, *Pinus muricata* characterizes the overstory tree layer as the most dominant species, while *Quercus wislizeni* and *Pseudotsuga menziesii* are often present as sub-dominants to co-dominants. The shrub layer is dominated by *Arctostaphylos glandulosa*, while *Vaccinium ovatum* and *Adenostoma fasciculatum* are characteristically present at low cover. The herbaceous layer is variable and sparse in cover without any characteristic species.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1015-1314 ft., mean 1148 ft.

Aspect: SW or SE

Slope: somewhat steep to steep, range 15-35 degrees, mean 27.3 degrees

Topography: mid to upper slope, concave or convex

Small Rock Cover: range 2-10%, mean 5%

Large Rock Cover: range 1-2%, mean 1.3%

Litter Cover: range 67-90%, mean 75.7%

Bare Ground: range 5-20%, mean 15%

Parent Material: Franciscan melange

Soil Texture: medium to very fine loamy sand, moderately fine clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands are typically found on the middle to upper third of the slope with variable soil texture. Stands of *Pinus muricata* tend to be even aged, usually originating after stand-replacing fires. This association has *Vaccinium ovatum*, similar to the *Pinus muricata* / *Vaccinium ovatum* Association; however, it also has *Arctostaphylos glandulosa* in much higher cover than *V. ovatum* and is found in higher elevations of Mt. Tamalpais.

#### **SITE IMPACTS**

This association has no non-native plant cover. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** MMWD0233, MMWD0237, MMWD0354 **Releve(s):** none

**Rank:** G2 S2

#### **GLOBAL DISTRIBUTION**

Northern outer Central Coast (known from Mt. Tamalpais area); though full distribution is not known

## REFERENCES

None

### *Pinus muricata*/Arctostaphylos glandulosa Association

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	<b>PIMU</b>	<b><i>Pinus muricata</i></b>	<b>100</b>	<b>15.7</b>	<b>13</b>	<b>20</b>
	QUWI2-T	<i>Quercus wislizeni</i>	100	5.0	3	7
	PSME-T	<i>Pseudotsuga menziesii</i>	67	10.7	15	17
	UMCA-T	<i>Umbellularia californica</i>	33	0.7	2	2
<b>Tree Understory</b>						
	LIDE3-M	<i>Lithocarpus densiflorus</i>	33	1.0	3	3
	ARME-L	<i>Arbutus menziesii</i>	33	0.1	0.2	0.2
	CHCH7-T	<i>Chrysolepis chrysophylla</i>	33	0.1	0.2	0.2
	LIDE3-L	<i>Lithocarpus densiflorus</i>	33	0.1	0.2	0.2
	TOCA	<i>Torreya californica</i>	33	0.1	0.2	0.2
<b>Shrub</b>						
	<b>ARGL3</b>	<b><i>Arctostaphylos glandulosa</i></b>	<b>100</b>	<b>29.0</b>	<b>25</b>	<b>35</b>
	VAOV2	<i>Vaccinium ovatum</i>	100	2.3	1	4
	ADFA	<i>Adenostoma fasciculatum</i>	100	1.1	0.2	2
	TODI	<i>Toxicodendron diversilobum</i>	67	0.4	0.2	1
	DERI	<i>Dendromecon rigida</i>	67	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	67	0.1	0.2	0.2
	HEAR5	<i>Heteromeles arbutifolia</i>	33	0.3	1	1
	ARMA	<i>Arctostaphylos manzanita</i>	33	0.1	0.2	0.2
	ERCA6	<i>Eriodictyon californicum</i>	33	0.1	0.2	0.2
	GAEL	<i>Garrya elliptica</i>	33	0.1	0.2	0.2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	33	0.1	0.2	0.2
	LOSC2	<i>Lotus scoparius</i>	33	0.1	0.2	0.2
	PIMO5	<i>Pickeringia montana</i>	33	0.1	0.2	0.2
	RHCA	<i>Rhamnus californica</i>	33	0.1	0.2	0.2
<b>Herb</b>						
	CHPO3	<i>Chlorogalum pomeridianum</i>	33	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	33	0.1	0.2	0.2
	GATR3	<i>Galium triflorum</i>	33	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	33	0.1	0.2	0.2
	LIHE	<i>Lithophragma heterophyllum</i>	33	0.1	0.2	0.2
	PEDE	<i>Pedicularis densiflora</i>	33	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	33	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	33	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	33	0.1	0.2	0.2
	XETE	<i>Xerophyllum tenax</i>	33	0.1	0.2	0.2
<b>Cryptogam</b>						
	LICHEN	<i>Lichen</i>	67	1.3	1	3
	MOSS	<i>Moss</i>	67	0.4	0.2	1

***Pinus muricata/Vaccinium ovatum* Association**  
**Bishop Pine / California Huckleberry Association**

**Mapping Code: 1230**

**LOCAL VEGETATION DESCRIPTION**

One stand of *Pinus muricata/Vaccinium ovatum* Woodland forms an open tree layer (15%), with conifers at 10-15m tall (15%). The shrub layer is dense (67%) with low shrubs at 0.5-1m and tall shrubs at 2-5m tall. The herbaceous layer is open (0.2%) at 0-0.5m tall. Total vegetation cover is 75%.

In one stand sampled, *Pinus muricata* occurs as the dominant in the overstory tree layer in open cover. *Pseudotsuga menziesii* is regenerating in the understory. *Vaccinium ovatum* is overwhelmingly dominant in the shrub layer, while other species may be present at low cover including *Arctostaphylos nummularia* and *A. glandulosa*. The herbaceous layer is sparse with *Pteridium aquilinum* present.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1007-1007 ft., mean 1007 ft.

Aspect: SW

Slope: steep, 35 degrees

Topography: upper slope, undulating pattern

Small Rock Cover: 0.2%

Large Rock Cover: none

Litter Cover: 94%

Bare Ground: 3%

Parent Material: Franciscan melange

Soil Texture: medium to very fine sandy loam

One stand of this association was sampled in the Mt. Tamalpais Watershed. Stands are typically found on the middle to upper third of the slope with fine to coarse sandy loams. This is equivalent to the *Pinus muricata* - *Arbutus menziesii* / *Vaccinium ovatum* Association (NatureServe et al. 2003a).

**SITE IMPACTS**

The stand representing this association has no non-native plant cover. There are no additional site impacts.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0353 **Releve(s):** none

**Rank:** G2 S2

**GLOBAL DISTRIBUTION**

n. outer Central Coast (known from Point Reyes National Seashore, Golden Gate NRA, and Mt. Tamalpais areas); though full distribution is not known.

**REFERENCES**

NatureServe et al. 2003a

***Pinus muricata/Vaccinium ovatum* Association**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>
<b>Tree Overstory</b>						
	<b>PIMU</b>	<b><i>Pinus muricata</i></b>	<b>100</b>	<b>15.0</b>	<b>15</b>	<b>15</b>
<b>Tree Understory</b>						
	PSME-L	<i>Pseudotsuga menziesii</i>	100	0.2	0.2	0.2
<b>Shrub</b>						
	<b>VAOV2</b>	<b><i>Vaccinium ovatum</i></b>	<b>100</b>	<b>55.0</b>	<b>55</b>	<b>55</b>
	PIMO5	<i>Pickeringia montana</i>	100	5.0	5	5
	ARNU3	<i>Arctostaphylos nummularia</i>	100	4.0	4	4
	ARGL3	<i>Arctostaphylos glandulosa</i>	100	2.0	2	2
	CHCH7-M	<i>Chrysolepis chrysophylla</i>	100	0.2	0.2	0.2
	QUWI2-L	<i>Quercus wislizeni</i>	100	0.2	0.2	0.2
<b>Herb</b>						
	PTAQ	<i>Pteridium aquilinum</i>	100	0.2	0.2	0.2
<b>Cryptogam</b>						
	LICHEN	<i>Lichen</i>	100	0.2	0.2	0.2

## ***Pseudotsuga menziesii* Alliance or Habitat**

This alliance has been classified into six local associations based on differences in subcanopy tree and understory species composition along with *Pseudotsuga menziesii* dominance in the overstory. The associations differ in their moisture and temperature regimes from warmer and drier (*Pseudotsuga menziesii* *Quercus agrifolia* Association and *Pseudotsuga menziesii* (Pure) Association with *Toxicodendron diversilobum*) to more mesic (*Pseudotsuga menziesii*/*Umbellularia californica*/*Polystichum munitum* and *Pseudotsuga menziesii*-*Umbellularia californica*/*Toxicodendron diversilobum* associations) to coolest and wettest (*Pseudotsuga menziesii*/*Quercus chrysolepis* and *Pseudotsuga menziesii*-*Chrysolepis chrysophylla*-*Lithocarpus densiflorus* associations).

## ***Pseudotsuga menziesii* (Pure) Association**

### **Douglas-fir (Pure) Association**

**Mapping Code: 1226**

### **LOCAL VEGETATION DESCRIPTION**

Stands of *Pseudotsuga menziesii* (Pure) Woodland/Forest form an intermittent to dense tree layer (43-75%, mean 54.5%), with hardwoods at 5-15m tall (0-7%, mean 3%) and conifers at 15-35m tall (43-70%, mean 51.5%). The shrub layer is open (0.2-5%, mean 2.1%) with low shrubs at 0.5-1m and tall shrubs at 0.5-5m tall. The herbaceous layer is open to dense (8-77%, mean 25.8%) at 0-0.5m tall. Total vegetation cover is 55-80%, mean 65.8%.

In this association, *Pseudotsuga menziesii* overwhelmingly dominates the overstory tree layer at moderate to high cover. Other trees are present in relatively low cover, such as *Arbutus menziesii* and *Lithocarpus densiflorus*. The shrub layer is characterized by *Toxicodendron diversilobum* and *Heteromeles arbutifolia* at trace cover. The herbaceous layer is characterized by *Satureja douglasii*, *Iris douglasiana*, *Sanicula crassicaulis*, and *Stachys rigida* at low cover.

### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 813-1454 ft., mean 1159 ft.

Aspect: variable, but often NE

Slope: gentle to somewhat steep, range 3-25 degrees, mean 15.8 degrees

Topography: lower to upper slope, usually undulating, infrequently convex

Small Rock Cover: range 0.2-6%, mean 1.9%

Large Rock Cover: range 0-1%, mean 0.3%

Litter Cover: range 75-90%, mean 84.8%

Bare Ground: range 2-20%, mean 10.3%

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam, moderately fine silty clay loam, moderately coarse sandy loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands occur in low to mid elevation uplands in the study area. This association is equivalent to the *Pseudotsuga menziesii* / *Toxicodendron diversilobum* Woodland Association defined in Oregon (Kagan et al. 2004), where *Pseudotsuga menziesii* is primarily dominant and hardwoods are low (<5%) in cover.

### **SITE IMPACTS**

This association has low non-native plant cover (average 0.4%) relative to native cover. Non-native species occurring with the highest frequency and abundance include *Holcus lanatus*, *Torilis arvensis*, and *Cynosurus echinatus*. Additional site impacts include heavy Sudden Oak Death Syndrome in one stand.

### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=4)**

**Rapid Assessment(s):** MMWD0224, MMWD0258, MMWD0296, MMWD0407 **Releve(s):** none

Rank: G4 S4

## GLOBAL DISTRIBUTION

Central Coast, probably North Coast and Klamath Range of California, and north into Oregon; though full distribution is not known

## REFERENCES

Kagan et al. 2004

### *Pseudotsuga menziesii* (Pure) Association

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	<b>PSME-T</b>	<b><i>Pseudotsuga menziesii</i></b>	<b>100</b>	<b>52.0</b>	<b>45</b>	<b>70</b>
	ARME-T	<i>Arbutus menziesii</i>	50	1.5	1	5
	QUAG-T	<i>Quercus agrifolia</i>	25	1.0	4	4
	UMCA-T	<i>Umbellularia californica</i>	25	0.5	2	2
<b>Tree Understory</b>						
	LIDE3-L	<i>Lithocarpus densiflorus</i>	75	0.6	0.2	2
	TOCA	<i>Torreya californica</i>	25	0.1	0.2	0.2
	UMCA-L	<i>Umbellularia californica</i>	25	0.1	0.2	0.2
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	100	0.9	0.2	2
	HEAR5	<i>Heteromeles arbutifolia</i>	100	0.4	0.2	1
	SYMO	<i>Symphoricarpos mollis</i>	75	0.3	0.2	1
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	75	0.2	0.2	0.2
	RUUR	<i>Rubus ursinus</i>	25	18.0	72	72
	BAPI	<i>Baccharis pilularis</i>	25	0.1	0.2	0.2
	CRATA	<i>Crataegus</i>	25	0.1	0.2	0.2
	MIAU	<i>Mimulus aurantiacus</i>	25	0.1	0.2	0.2
	QUWI2-L	<i>Quercus wislizeni</i>	25	0.1	0.2	0.2
	QUWI2-M	<i>Quercus wislizeni</i>	25	0.1	0.2	0.2
	RHCA	<i>Rhamnus californica</i>	25	0.1	0.2	0.2
	ROCA2	<i>Rosa californica</i>	25	0.1	0.2	0.2
	ROGY	<i>Rosa gymnocarpa</i>	25	0.1	0.2	0.2
	VAOV2	<i>Vaccinium ovatum</i>	25	0.1	0.2	0.2
<b>Herb</b>						
	SADO5	<i>Satureja douglasii</i>	75	0.8	0.2	2
	IRDO	<i>Iris douglasiana</i>	75	0.2	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	75	0.2	0.2	0.2
	STRI	<i>Stachys rigida</i>	75	0.2	0.2	0.2
	HIOC	<i>Hierochloe occidentalis</i>	50	0.6	0.2	2
	GAAP2	<i>Galium aparine</i>	50	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	50	0.1	0.2	0.2
	POMU	<i>Polystichum munitum</i>	50	0.1	0.2	0.2
	HOLA	<i>Holcus lanatus</i>	25	0.3	1	1
	METO	<i>Melica torreyana</i>	25	0.3	1	1
	NAPU4	<i>Nassella pulchra</i>	25	0.3	1	1

***Pseudotsuga menziesii* (Pure) Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
	ADBI	<i>Adenocaulon bicolor</i>	25	0.1	0.2	0.2
	ADJO	<i>Adiantum jordanii</i>	25	0.1	0.2	0.2
	CAGL7	<i>Carex globosa</i>	25	0.1	0.2	0.2
	CLPE	<i>Claytonia perfoliata</i>	25	0.1	0.2	0.2
	COMA4	<i>Corallorrhiza maculata</i>	25	0.1	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	25	0.1	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	25	0.1	0.2	0.2
	DRAR3	<i>Dryopteris arguta</i>	25	0.1	0.2	0.2
	FRVE	<i>Fragaria vesca</i>	25	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	25	0.1	0.2	0.2
	GATR3	<i>Galium triflorum</i>	25	0.1	0.2	0.2
	IRMA	<i>Iris macrosiphon</i>	25	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	25	0.1	0.2	0.2
	POLYP	<i>Polypodium</i>	25	0.1	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	25	0.1	0.2	0.2
	VAPL	<i>Vancouveria planipetala</i>	25	0.1	0.2	0.2
	WHMO	<i>Whipplea modesta</i>	25	0.1	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	25	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	50	0.1	0.2	0.2

***Pseudotsuga menziesii*-*Chrysolepis chrysophylla*-*Lithocarpus densiflorus* Association**  
**Douglas-fir - Chinquapin - Tanoak Association**

**Mapping Code: 1228**

**LOCAL VEGETATION DESCRIPTION**

One stand of *Pseudotsuga menziesii*-*Chrysolepis chrysophylla*-*Lithocarpus densiflorus* Woodland forms an intermittent tree layer (35%), with hardwoods at 2-5m tall (10%) and conifers at 5-10m tall (25%). The shrub layer is open (8%) with low shrubs at 0-0.5m and tall shrubs at 0.5-1m tall. The herbaceous layer is open (5%) at 0-0.5m tall. Total vegetation cover is 45%.

In one stand sampled, *Pseudotsuga menziesii* dominates the overstory tree layer. *Chrysolepis chrysophylla* dominates the understory tree layer alone; however, other stands observed in the study area and across range of association have *Arbutus menziesii* and *Lithocarpus densiflorus* also as constant species in the understory canopy. *Chrysolepis chrysophylla* is also regenerating in the understory. The shrub layer contains *Arctostaphylos glandulosa* at low cover, and the herbaceous layer includes *Pteridium aquilinum*.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 1253 ft.

Aspect: NE

Slope: somewhat steep, 25 degrees

Topography: mid slope, concave

Small Rock Cover: 15%

Large Rock Cover: none

Litter Cover: range 68%

Bare Ground: range 15%

Parent Material: Franciscan melange

Soil Texture: moderately fine sandy clay loam

One stand of this association was sampled in the Mt. Tamalpais Watershed. The stand sampled in study area is equivalent to the *Pseudotsuga menziesii* - *Chrysolepis chrysophylla* - *Lithocarpus densiflorus* Association (Jimerson et al. 1996) and also to the *Pseudotsuga menziesii* / *Lithocarpus densiflorus* - *Chrysolepis chrysophylla* Forest Association (Kagan et al. 2004). Stands in the study area are usually adjacent to chaparral (e.g., *Arctostaphylos glandulosa* Alliance).

**SITE IMPACTS**

The stand representing this association has no non-native plant cover. There are no additional site impacts.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0293 **Releve(s):** none

**Rank:** G4 S4

**GLOBAL DISTRIBUTION**

Northern Central Coast, North Coast and Klamath Mountains of northwestern California, and the western Siskiyou Mountains in Oregon.

**REFERENCES**

Jimerson et al. 1996, Kagan et al. 2004



***Pseudotsuga menziesii*-*Chrysolepis chrysophylla*-*Lithocarpus densiflorus* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	PSME-T	<i>Pseudotsuga menziesii</i>	100	25.0	25	25
	CUSA3-T	<i>Cupressus sargentii</i>	100	0.2	0.2	0.2
<b>Tree Understory</b>						
	CHCH7-T	<i>Chrysolepis chrysophylla</i>	100	10.0	10	10
	ARME-L	<i>Arbutus menziesii</i>	100	2.0	2	2
<b>Shrub</b>						
	ARGL3	<i>Arctostaphylos glandulosa</i>	100	7.0	7	7
	CHCH7-M	<i>Chrysolepis chrysophylla</i>	100	6.0	6	6
	QUWI2-L	<i>Quercus wislizeni</i>	100	1.0	1	1
	VAOV2	<i>Vaccinium ovatum</i>	100	1.0	1	1
	ERCA6	<i>Eriodictyon californicum</i>	100	0.2	0.2	0.2
	ERLA6	<i>Eriophyllum lanatum</i>	100	0.2	0.2	0.2
	HEAR5	<i>Heteromeles arbutifolia</i>	100	0.2	0.2	0.2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	100	0.2	0.2	0.2
	PIMO5	<i>Pickeringia montana</i>	100	0.2	0.2	0.2
	ROGY	<i>Rosa gymnocarpa</i>	100	0.2	0.2	0.2
<b>Herb</b>						
	PTAQ	<i>Pteridium aquilinum</i>	100	1.0	1	1
	HIAL2	<i>Hieracium albiflorum</i>	100	0.2	0.2	0.2
	HYCO3	<i>Hypericum concinnum</i>	100	0.2	0.2	0.2
	POMU	<i>Polystichum munitum</i>	100	0.2	0.2	0.2
<b>Cryptogam</b>						
	LICHEN	<i>Lichen</i>	100	0.2	0.2	0.2
	MOSS	<i>Moss</i>	100	0.2	0.2	0.2

## ***Pseudotsuga menziesii*-*Quercus agrifolia* Association**

### **Douglas-fir - Coast Live Oak Association**

**Mapping Code:** 1221mu

#### **LOCAL VEGETATION DESCRIPTION**

One stand of *Pseudotsuga menziesii*-*Quercus agrifolia* Forest forms a dense tree layer (67%), with hardwoods at 10-15m tall (41%) and conifers at 20-35m tall (26%). The shrub layer is open (2%) with low shrubs at 0.5-1m and tall shrubs at 1-2m tall. The herbaceous layer is intermittent (65%) at 0-0.5m tall. Total vegetation cover is 77%.

In one stand sampled, *Pseudotsuga menziesii* and *Quercus agrifolia* co-dominate with *Umbellularia californica* in the overstory tree layer, and *Lithocarpus densiflorus* is found in the understory. The shrub layer contains *Toxicodendron diversilobum* as most abundant, and the herbaceous layer contains *Rubus ursinus*, and *Satureja douglasii*, *Stachys rigida*, and *Polystichum munitum* as most abundant.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 1170 ft.

Aspect: variable

Slope: moderate, 11 degrees

Topography: upper slope, convex

Small Rock Cover: 0.2%

Large Rock Cover: 4%

Litter Cover: 79%

Bare Ground: 15%

Parent Material: Franciscan melange

Soil Texture: moderately fine silty clay loam

One stand of this association was sampled in the Mt. Tamalpais Watershed. The association is the most xeric of the *P. menziesii* associations, in which *Quercus agrifolia* is consistency present as a subcanopy tree, and *Umbellularia californica* may or may not be present. The association is usually found in warm site conditions, e.g., on southerly exposures, on moderate to steep slopes. Per NatureServe et al. (2003a), this association is closely related to mixed evergreen stands of *Quercus agrifolia* with *Umbellularia californica*. Likewise, disturbance ecology including fire history and logging history may have a significant role to play in the determination of whether a stand is a member of the *Pseudotsuga menziesii* alliance or the *Umbellularia californica* alliance.

#### **SITE IMPACTS**

The stand representing this association has low non-native plant cover (average 1.9%) relative to native cover. Non-native species that occur with the highest abundance include *Cynosurus echinatus* and *Torilis arvensis*. Additional site impacts include light Sudden Oak Death Syndrome.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0260 **Releve(s):** none

**Rank:** G3 S3?

#### **GLOBAL DISTRIBUTION**

Outer Central Coast (including from Point Reyes National Seashore, Golden Gate NRA, and Mt. Tamalpais areas); though full distribution is not known.

#### **REFERENCES**

NatureServe et al. 2003a

***Pseudotsuga menziesii*-*Quercus agrifolia* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	PSME-T	<i>Pseudotsuga menziesii</i>	100	26.0	26	26
	UMCA-T	<i>Umbellularia californica</i>	100	26.0	26	26
	QUAG-T	<i>Quercus agrifolia</i>	100	25.0	25	25
<b>Tree Understory</b>						
	LIDE3-M	<i>Lithocarpus densiflorus</i>	100	1.0	1	1
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	100	7.0	7	7
	RUUR	<i>Rubus ursinus</i>	100	5.0	5	5
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	100	4.0	4	4
	VAOV2	<i>Vaccinium ovatum</i>	100	1.0	1	1
	ROCA2	<i>Rosa californica</i>	100	0.2	0.2	0.2
<b>Herb</b>						
	SADO5	<i>Satureja douglasii</i>	100	10.0	10	10
	POMU	<i>Polystichum munitum</i>	100	3.0	3	3
	STRI	<i>Stachys rigida</i>	100	3.0	3	3
	CYEC	<i>Cynosurus echinatus</i>	100	2.0	2	2
	HIOC	<i>Hierochloe occidentalis</i>	100	2.0	2	2
	DRAR3	<i>Dryopteris arguta</i>	100	1.0	1	1
	SACR2	<i>Sanicula crassicaulis</i>	100	1.0	1	1
	CYGR	<i>Cynoglossum grande</i>	100	0.2	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	100	0.2	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	100	0.2	0.2	0.2
	TRLA16	<i>Triteleia laxa</i>	100	0.2	0.2	0.2

## ***Pseudotsuga menziesii*-*Quercus chrysolepis* Association**

### **Douglas-fir - Canyon Live Oak Association**

**Mapping Code: 1222**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Pseudotsuga menziesii*-*Quercus chrysolepis* Woodland/Forest form an intermittent to dense tree layer (40-85%, mean 65.8%), with hardwoods at 5-15m tall (26-45%, mean 33.3%) and conifers at 10-35m tall (10-45%, mean 32.5%). The shrub layer is open (0-12%, mean 6%) with low shrubs at 0.5-1m and tall shrubs at 1-5m tall. The herbaceous layer is open (4-10%, mean 8.5%) at 0-0.5m tall. Total vegetation cover is 60-80%, mean 69.5%.

In this alliance, *Pseudotsuga menziesii* and *Quercus chrysolepis* co-dominate in the overstory tree layer, though *Pseudotsuga menziesii* may be higher in cover. *Arbutus menziesii* and *Lithocarpus densiflorus* are usually present at lower cover. The shrub layer is characterized by *Toxicodendron diversilobum* and *Symphoricarpos mollis* at trace cover. The herbaceous layer is characterized by *Elymus glaucus* and *Sanicula crassicaulis* at low cover.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 365-2047 ft., mean 1439 ft.

Aspect: variable, but often NE or NW

Slope: moderate to steep, range 13-37 degrees, mean 21.8 degrees

Topography: mid to upper slope, undulating or convex

Small Rock Cover: range 0.2-5%, mean 2.1%

Large Rock Cover: range 0-20%, mean 5.3%

Litter Cover: range 70-88%, mean 78.3%

Bare Ground: range 6-23%, mean 11%

Parent Material: Franciscan melange

Soil Texture: medium loam, medium silt, medium to very fine sandy loam, moderately fine clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands occur in cool site conditions, e.g., on north exposures, in lower to upper elevation uplands that are somewhat steep. The association is found in the coldest and highest elevations of the *P. menziesii* associations in the study area. Stands are similar to two associations defined by Jimerson et al. (1996): *Pseudotsuga menziesii*-*Quercus chrysolepis*/Rockpile and *Pseudotsuga menziesii*-*Quercus chrysolepis*-*Lithocarpus densiflorus* associations.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 2.7%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Cynosurus echinatus*, *Torilis nodosa*, and *Carduus pycnocephalus*. Additional site impacts include heavy Sudden Oak Death Syndrome in three stands and light Sudden Oak Death Syndrome in one stand.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=4)**

**Rapid Assessment(s):** MMWD0176, MMWD0178, MMWD0186, MMWD0355 **Releve(s):** none

**Rank:** G4 S4?

#### **GLOBAL DISTRIBUTION**

Northern outer Central Coast (known from Golden Gate NRA and Mt. Tamalpais areas), North Coast, and Klamath Range of California; though full distribution is not known.

#### **REFERENCES**

Jimerson et al. 1996, NatureServe et al. 2003a

***Pseudotsuga menziesii*-*Quercus chrysolepis* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	PSME-T	<i>Pseudotsuga menziesii</i>	100	33.8	15	45
	QUCH2-T	<i>Quercus chrysolepis</i>	100	14.0	4	30
	LIDE3-T	<i>Lithocarpus densiflorus</i>	75	3.8	2	10
	ARME-T	<i>Arbutus menziesii</i>	75	3.0	2	5
	UMCA-T	<i>Umbellularia californica</i>	50	5.5	10	12
	QUAG-T	<i>Quercus agrifolia</i>	25	3.0	12	12
	QUWI2-T	<i>Quercus wislizeni</i>	25	1.0	4	4
<b>Tree Understory</b>						
	UMCA-L	<i>Umbellularia californica</i>	50	0.1	0.2	0.2
	AECA	<i>Aesculus californica</i>	25	1.5	6	6
	COCOC	<i>Corylus cornuta</i> var. <i>californica</i>	25	0.1	0.2	0.2
	LIDE3-L	<i>Lithocarpus densiflorus</i>	25	0.1	0.2	0.2
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	100	0.2	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	75	0.2	0.2	0.2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	50	0.1	0.2	0.2
	HEAR5	<i>Heteromeles arbutifolia</i>	25	0.3	1	1
	VAOV2	<i>Vaccinium ovatum</i>	25	0.3	1	1
	RUUR	<i>Rubus ursinus</i>	25	0.1	0.2	0.2
<b>Herb</b>						
	ELGL	<i>Elymus glaucus</i>	100	0.6	0.2	2
	SACR2	<i>Sanicula crassicaulis</i>	75	0.2	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	50	0.8	1	2
	GAAP2	<i>Galium aparine</i>	50	0.6	0.2	2
	TONO	<i>Torilis nodosa</i>	50	0.6	0.2	2
	CAPY2	<i>Carduus pycnocephalus</i>	50	0.3	0.2	1
	CAREX	<i>Carex</i>	50	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	50	0.1	0.2	0.2
	BRLA3	<i>Bromus laevipes</i>	25	0.5	2	2
	SADO5	<i>Satureja douglasii</i>	25	0.3	1	1
	STRI	<i>Stachys rigida</i>	25	0.3	1	1
	BRCA5	<i>Bromus carinatus</i>	25	0.1	0.2	0.2
	CACA39	<i>Cardamine californica</i>	25	0.1	0.2	0.2
	CLPE	<i>Claytonia perfoliata</i>	25	0.1	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	25	0.1	0.2	0.2
	DELPH	<i>Delphinium</i>	25	0.1	0.2	0.2
	DICA14	<i>Dichelostemma capitatum</i>	25	0.1	0.2	0.2
	FEAR3	<i>Festuca arundinacea</i>	25	0.1	0.2	0.2
	FECA	<i>Festuca californica</i>	25	0.1	0.2	0.2
	FRVE	<i>Fragaria vesca</i>	25	0.1	0.2	0.2
	HIOC	<i>Hierochloe occidentalis</i>	25	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	25	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	25	0.1	0.2	0.2
	PEDE	<i>Pedicularis densiflora</i>	25	0.1	0.2	0.2
	POLYP	<i>Polypodium</i>	25	0.1	0.2	0.2
	POMU	<i>Polystichum munitum</i>	25	0.1	0.2	0.2

***Pseudotsuga menziesii*-*Quercus chrysolepis* Association**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>
	PTAQ	<i>Pteridium aquilinum</i>	25	0.1	0.2	0.2
	STAJ	<i>Stachys ajugoides</i>	25	0.1	0.2	0.2
	VIAM	<i>Vicia americana</i>	25	0.1	0.2	0.2
	VIGI	<i>Vicia gigantea</i>	25	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	50	0.1	0.2	0.2

***Pseudotsuga menziesii*-*Umbellularia californica*/*Polystichum munitum* Association**  
**Douglas-fir - California Bay / Sword Fern Association**

**Mapping Code:** 1222mu/1223

**LOCAL VEGETATION DESCRIPTION**

Stands of *Pseudotsuga menziesii*-*Umbellularia californica*/*Polystichum munitum* Woodland/Forest form an intermittent to dense tree layer (39-77%, mean 57.4%), with hardwoods at 5-20m tall (24-34%, mean 28.4%) and conifers at 10-50m tall (12-45%, mean 29%). The shrub layer is open (4-9%, mean 5.8%) with low shrubs at 0-1m and tall shrubs at 0.5-5m tall. The herbaceous layer is open (3-31%, mean 12.2%) at 0-0.5m tall. Total vegetation cover is 50-73%, mean 60%.

In this association, *Pseudotsuga menziesii* and *Umbellularia californica* are co-dominant in the overstory tree layer. Other trees, if present, are low in cover. The shrub layer is characterized by *Toxicodendron diversilobum* at low cover. The herbaceous layer is characterized by *Polystichum munitum* usually as the most abundant herb though at low cover, and *Stachys rigida* and *Marah fabaceus* are often present.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 678-1542 ft., mean 1059 ft.

Aspect: usually NE or NW

Slope: somewhat steep to steep, range 26-38 degrees, mean 34.2 degrees

Topography: bottom to upper slope, convex, undulating or concave

Small Rock Cover: range 0.2-5%, mean 2.3%

Large Rock Cover: none

Litter Cover: range 50-96%, mean 81.2%

Bare Ground: range 3-42%, mean 14%

Parent Material: Franciscan melange

Soil Texture: moderately fine sandy clay loam, medium to very fine sandy loam, coarse loamy sand, medium silt

Stands of this association were sampled in the Mt. Tamalpais Watershed. This association is found in generally cool upland sites, e.g., northerly slopes, that may be somewhat steep or in concavities and drainages. It is generally a more mesic form than the related *P menziesii* / *U. californica* / *Toxicodendron diversilobum* Association.

**SITE IMPACTS**

This association has low non-native plant cover (average 1.8%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Torilis arvensis* and *Bromus diandrus*. Additional site impacts include heavy Sudden Oak Death Syndrome in three stands, light Sudden Oak Death Syndrome in one stand, light erosion/runoff in one stand, moderate erosion/runoff in one stand, and light vandalism/dumping/litter in one stand.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=5)**

**Rapid Assessment(s):** MMWD0229, MMWD0247, MMWD0262, MMWD0349, MMWD0418 **Releve(s):** none

**Rank:** G4 S4?

**GLOBAL DISTRIBUTION**

outer Central Coast (including Point Reyes National Seashore, Golden Gate NRA, and Mt. Tamalpais areas), North Coast, Klamath Range of California, and north into Oregon; though full distribution is not known

**REFERENCES**

Jimerson et al. 1996, Kagan et al. 2004, NatureServe et al. 2003a

***Pseudotsuga menziesii*-*Umbellularia californica*/*Polystichum munitum* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	PSME-T	<i>Pseudotsuga menziesii</i>	100	27.8	12	43
	UMCA-T	<i>Umbellularia californica</i>	100	27.0	22	34
	SESE3	<i>Sequoia sempervirens</i>	20	0.4	2	2
	LIDE3-T	<i>Lithocarpus densiflorus</i>	20	0.2	1	1
<b>Tree Understory</b>						
	COCOC	<i>Corylus cornuta</i> var. <i>californica</i>	60	0.6	0.2	2
	LIDE3-M	<i>Lithocarpus densiflorus</i>	40	1.6	4	4
	ARME-M	<i>Arbutus menziesii</i>	20	1.2	6	6
	TOCA	<i>Torreya californica</i>	20	0.8	4	4
	LIDE3-L	<i>Lithocarpus densiflorus</i>	20	0.4	2	2
	ACMA3-M	<i>Acer macrophyllum</i>	20	0.0	0.2	0.2
	AECA	<i>Aesculus californica</i>	20	0.0	0.2	0.2
	QUAG-M	<i>Quercus agrifolia</i>	20	0.0	0.2	0.2
	QUCH2-L	<i>Quercus chrysolepis</i>	20	0.0	0.2	0.2
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	80	0.7	0.2	2
	RUUR	<i>Rubus ursinus</i>	60	3.6	1	15
	HEAR5	<i>Heteromeles arbutifolia</i>	40	0.4	1	1
	ROGY	<i>Rosa gymnocarpa</i>	40	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	40	0.1	0.2	0.2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	20	0.0	0.2	0.2
	MIAU	<i>Mimulus aurantiacus</i>	20	0.0	0.2	0.2
	RHCA	<i>Rhamnus californica</i>	20	0.0	0.2	0.2
<b>Herb</b>						
	POMU	<i>Polystichum munitum</i>	100	2.4	0.2	5
	STRI	<i>Stachys rigida</i>	80	0.2	0.2	0.2
	MAFA3	<i>Marah fabaceus</i>	60	0.7	0.2	3
	MYLA4	<i>Myosotis latifolia</i>	40	1.0	0.2	5
	HIOC	<i>Hierochloe occidentalis</i>	40	0.4	0.2	2
	CAREX	<i>Carex</i>	40	0.4	1	1
	GATR3	<i>Galium triflorum</i>	40	0.2	0.2	1
	SADO5	<i>Satureja douglasii</i>	40	0.2	0.2	1
	POLYP	<i>Polypodium</i>	40	0.1	0.2	0.4
	CAGL7	<i>Carex globosa</i>	40	0.1	0.2	0.2
	DRAR3	<i>Dryopteris arguta</i>	40	0.1	0.2	0.2
	GAAP2	<i>Galium aparine</i>	40	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	40	0.1	0.2	0.2
	NEPA	<i>Nemophila parviflora</i>	40	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	40	0.1	0.2	0.2
	SCBI	<i>Scolioopus bigelovii</i>	40	0.1	0.2	0.2



***Pseudotsuga menziesii*-*Umbellularia californica*/*Polystichum munitum* Association**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>
	CLPE	<i>Claytonia perfoliata</i>	20	0.0	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	20	0.0	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	20	0.0	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	20	0.0	0.2	0.2
	ADBI	<i>Adenocaulon bicolor</i>	20	0.0	0.2	0.2
	ADJO	<i>Adiantum jordanii</i>	20	0.0	0.2	0.2
	AMME	<i>Amsinckia menziesii</i>	20	0.0	0.2	0.2
	BRCA5	<i>Bromus carinatus</i>	20	0.0	0.2	0.2
	BRDI3	<i>Bromus diandrus</i>	20	0.0	0.2	0.2
	CACA39	<i>Cardamine californica</i>	20	0.0	0.2	0.2
	NEHE	<i>Nemophila heterophylla</i>	20	0.0	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	20	0.0	0.2	0.2
	SMRAA	<i>Smilacina racemosa</i> var. <i>amplexicaulis</i>	20	0.0	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	20	0.0	0.2	0.2
	TRLA6	<i>Trientalis latifolia</i>	20	0.0	0.2	0.2
	VIAM	<i>Vicia americana</i>	20	0.0	0.2	0.2
	WHMO	<i>Whipplea modesta</i>	20	0.0	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	80	0.7	0.2	2
	LICHEN	<i>Lichen</i>	20	0.0	0.2	0.2

***Pseudotsuga menziesii*-*Umbellularia californica*/*Toxicodendron diversilobum* Association**  
**Douglas-fir - California Bay / Poison Oak Association**

**Mapping Code:** 1222mu/1223

**LOCAL VEGETATION DESCRIPTION**

Stands of *Pseudotsuga menziesii*-*Umbellularia californica*/*Toxicodendron diversilobum* Woodland/Forest form an intermittent to dense tree layer (31-68%, mean 48.7%), with hardwoods at 2-20m tall (6-35%, mean 21%) and conifers at 10-50m tall (12-40%, mean 27.7%). The shrub layer is open (0.2-14%, mean 4.3%) with low shrubs at 0-2m and tall shrubs at 0-10m tall. The herbaceous layer is open (2-10%, mean 6.3%) at 0-0.5m tall. Total vegetation cover is 42-68%, mean 54.1%.

In this association, *Pseudotsuga menziesii* and *Umbellularia californica* are co-dominant in the overstory tree layer. *Lithocarpus densiflorus* and *Umbellularia californica* may be regenerating in the understory. The shrub layer is characterized by *Toxicodendron diversilobum* as the most abundant at low cover. The herbaceous layer is characterized by *Iris douglasiana* at low cover, while *Carex globosa* and *Polygala californica* are often present.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 652-1955 ft., mean 1334 ft.

Aspect: variable

Slope: moderate to very steep, range 6-48 degrees, mean 27.1 degrees

Topography: lower slope to ridge top, often convex, infrequently concave or undulating

Small Rock Cover: range 0.2-31%, mean 5.7%

Large Rock Cover: range 0-17%, mean 3.1%

Litter Cover: range 44-91%, mean 73.6%

Bare Ground: range 3-38%, mean 16.1%

Parent Material: Franciscan melange

Soil Texture: moderately fine sandy clay loam, moderately coarse sandy loam, moderately fine silty clay loam, coarse loamy sand

Stands of this association were sampled in the Mt. Tamalpais Watershed. It may be found in mesic environments such as concavities or on convex, steep slopes with northerly or southerly aspects. Stands are similar in environmental context to the *P. menziesii* / *U. californica* / *Rhamnus californica* Association defined by NatureServe et al. (2003a) but they are lacking the *Rhamnus*; furthermore, the association is equivalent to the *P. menziesii* / *U. californica* / *T. diversilobum* Association defined by Jimerson et al. (1996).

**SITE IMPACTS**

This association has low non-native plant cover (average 0.1%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Torilis nodosa* and *Torilis arvensis*. Additional site impacts include light to heavy Sudden Oak Death Syndrome in six stands.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=7)**

**Rapid Assessment(s):** MMWD0168, MMWD0175, MMWD0187, MMWD0196, MMWD0207, MMWD0246, MMWD0397 **Releve(s):** none

**Rank:** G4 S4?

**GLOBAL DISTRIBUTION**

Northern outer Central Coast (including Mt. Tamalpais area), North Coast, Klamath Range of California, and north into Oregon; though full distribution is not known

**REFERENCES**

Jimerson et al. 1996, Kagan et al. 2004, NatureServe et al. 2003a

***Pseudotsuga menziesii*-*Umbellularia californica*/*Toxicodendron diversilobum* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	PSME-T	<i>Pseudotsuga menziesii</i>	100	27.9	11	40
	UMCA-T	<i>Umbellularia californica</i>	100	18.6	6	37
	QUCH2-T	<i>Quercus chrysolepis</i>	29	2.0	3	11
<b>Tree Understory</b>						
	LIDE3-L	<i>Lithocarpus densiflorus</i>	57	0.4	0.2	2
	UMCA-L	<i>Umbellularia californica</i>	29	0.1	0.2	0.2
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	100	0.8	0.2	3
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	71	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	43	0.1	0.2	0.2
	HEAR5	<i>Heteromeles arbutifolia</i>	29	0.3	0.2	2
	QUWI2-L	<i>Quercus wislizeni</i>	29	0.1	0.2	0.2
	ROCA2	<i>Rosa californica</i>	29	0.1	0.2	0.2
<b>Herb</b>						
	IRDO	<i>Iris douglasiana</i>	71	0.3	0.2	1
	CAGL7	<i>Carex globosa</i>	57	0.5	0.2	2
	POCA5	<i>Polygala californica</i>	57	0.1	0.2	0.2
	ADBI	<i>Adenocaulon bicolor</i>	43	0.2	0.2	1
	CYGR	<i>Cynoglossum grande</i>	43	0.1	0.2	0.2
	GATR3	<i>Galium triflorum</i>	43	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	43	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	43	0.1	0.2	0.2
	BRLA3	<i>Bromus laevipes</i>	29	0.1	0.2	0.2
	DRAR3	<i>Dryopteris arguta</i>	29	0.1	0.2	0.2
	GAAP2	<i>Galium aparine</i>	29	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	29	0.1	0.2	0.2
	MENTH	<i>Mentha</i>	29	0.1	0.2	0.2
	NEPA	<i>Nemophila parviflora</i>	29	0.1	0.2	0.2
	STRI	<i>Stachys rigida</i>	29	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	71	1.1	0.2	5
	LICHEN	<i>Lichen</i>	43	0.1	0.2	0.2

### ***Pseudotsuga menziesii*-*Lithocarpus densiflorus* Alliance or Habitat**

This alliance is represented as one primary type. No association was defined because stands appear to be transitioning into other types within the *Pseudotsuga menziesii* Alliance because of Sudden Oak Death Syndrome is impacting *Lithocarpus densiflorus*. However, the National Classification (NatureServe 2005) defines various associations under this mixed alliance that have similar species compositions and environmental settings to the alliance description in this report.

### ***Pseudotsuga menziesii*-*Lithocarpus densiflorus* Alliance Douglas-fir - Tanoak Alliance**

**Mapping Code: 1224**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Pseudotsuga menziesii*-*Lithocarpus densiflorus* Woodland/Forest form an intermittent to dense tree layer (43-67%, mean 56.8%), with hardwoods at 2-15m tall (18-52%, mean 25.2%) and conifers at 15-35m tall (15-48%, mean 31.6%). The shrub layer is open (2-23%, mean 8.6%) with low shrubs at 0-2m and tall shrubs at 0.5-10m tall. The herbaceous layer is open to intermittent (2-37%, mean 13%) at 0-0.5m tall. Total vegetation cover is 55-76%, mean 67.6%.

In this alliance, *Pseudotsuga menziesii* is co-dominant with *Lithocarpus densiflorus* in the tree layer, while *L. densiflorus* may be in the overstory or understory. *Quercus agrifolia* and *Umbellularia californica* are often present in the tree overstory, but usually lower in cover. The shrub layer often contains *Toxicodendron diversilobum* and *Vaccinium ovatum* at low cover. The herbaceous layer is characterized by *Polystichum munitum* at low cover.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 703-1994 ft., mean 1142 ft.

Aspect: NE, SE, SW

Slope: gentle to very steep, range 2-45 degrees, mean 29 degrees

Topography: bottom to ridge top, frequently convex, infrequently concave

Small Rock Cover: range 0.2-1%, mean 0.6%

Large Rock Cover: range 0-0.2%, mean 0.1%

Litter Cover: range 68-85%, mean 76.3%

Bare Ground: range 11-30%, mean 20.7%

Parent Material: Franciscan melange

Soil Texture: moderately fine sandy clay loam, moderately fine clay loam, medium to very fine sandy loam

Stands of this alliance were sampled in the Mt. Tamalpais Watershed. The co-occurrence of *Pseudotsuga menziesii* with *Lithocarpus densiflorus* is defined by NatureServe (2005) as an alliance, and it is defined by Jimerson et al. (1996) as a sub-alliance. This alliance is found in large upland stands on neutral slopes, e.g., north or south exposures. Stands with heavy Sudden Oak Death Syndrome may be transitioning into other associations, such as *P. menziesii* - *Umbellularia californica*/*Toxicodendron diversilobum* and *P. menziesii* - *U. californica*/*Polystichum munitum* associations.

#### **SITE IMPACTS**

This alliance has low non-native plant cover (average 1.4%) relative to native cover. Non-native species with highest cover mainly include *Torilis arvensis*, *Torilis nodosa*, and *Carduus pycnocephalus*. Additional site impacts are heavy Sudden Oak Death Syndrome in two stands and light erosion/runoff in one stand.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=5)**

**Rapid Assessment(s):** MMWD0159, MMWD0177, MMWD0228, MMWD0238, MMWD0245 **Releve(s):** none

**Rank:** G4 S4?

## GLOBAL DISTRIBUTION

outer Central Coast (including Point Reyes National Seashore and Mt. Tamalpais areas), outer North Coast, lower Klamath Range of California, montane Sierra Nevada

## REFERENCES

Jimerson et al. 1996, Lee 2004, NatureServe 2005, NatureServe et al. 2003a, Sawyer and Keeler-Wolf 1995

### *Pseudotsuga menziesii*-*Lithocarpus densiflorus* Alliance

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	<b>PSME-T</b>	<b><i>Pseudotsuga menziesii</i></b>	<b>100</b>	<b>31.6</b>	<b>15</b>	<b>48</b>
	QUAG-T	<i>Quercus agrifolia</i>	60	4.4	0.2	19
	UMCA-T	<i>Umbellularia californica</i>	60	1.8	2	4
	<b>LIDE3-T</b>	<b><i>Lithocarpus densiflorus</i></b>	<b>40</b>	<b>6.0</b>	<b>15</b>	<b>15</b>
	ARME-T	<i>Arbutus menziesii</i>	40	0.4	0.2	2
<b>Tree Understory</b>						
	<b>LIDE3-M</b>	<b><i>Lithocarpus densiflorus</i></b>	<b>60</b>	<b>10.8</b>	<b>10</b>	<b>30</b>
	UMCA-M	<i>Umbellularia californica</i>	20	2.4	12	12
	ARME-M	<i>Arbutus menziesii</i>	20	1.0	5	5
	ACMA3-M	<i>Acer macrophyllum</i>	20	0.6	3	3
	COCOC	<i>Corylus cornuta</i> var. <i>californica</i>	20	0.0	0.2	0.2
	TOCA	<i>Torreya californica</i>	20	0.0	0.2	0.2
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	60	2.1	0.2	10
	VAOV2	<i>Vaccinium ovatum</i>	60	1.2	1	4
	RUUR	<i>Rubus ursinus</i>	40	2.2	1	10
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	40	0.1	0.2	0.2
	QUWI2-L	<i>Quercus wislizeni</i>	40	0.1	0.2	0.2
	HODI	<i>Holodiscus discolor</i>	20	0.8	4	4
	RHCA	<i>Rhamnus californica</i>	20	0.2	1	1
	ROSP3	<i>Rosa spithamea</i>	20	0.0	0.2	0.2
<b>Herb</b>						
	POMU	<i>Polystichum munitum</i>	80	2.0	0.2	4
	GATR3	<i>Galium triflorum</i>	60	0.1	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	40	0.8	1	3
	DRAR3	<i>Dryopteris arguta</i>	40	0.2	0.2	1
	MAFA3	<i>Marah fabaceus</i>	40	0.2	0.2	1
	SACR2	<i>Sanicula crassicaulis</i>	40	0.2	0.2	1
	CACA39	<i>Cardamine californica</i>	40	0.1	0.2	0.2
	GAAP2	<i>Galium aparine</i>	40	0.1	0.2	0.2
	HIOC	<i>Hierochloe occidentalis</i>	40	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	40	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	40	0.1	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	40	0.1	0.2	0.2
	TONO	<i>Torilis nodosa</i>	40	0.1	0.2	0.2
	POACXX	<i>Poaceae</i>	20	1.0	5	5

***Pseudotsuga menziesii*-*Lithocarpus densiflorus* Alliance**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>
	MAEX	<i>Madia exigua</i>	20	0.4	2	2
	SADO5	<i>Satureja douglasii</i>	20	0.4	2	2
	VIAM	<i>Vicia americana</i>	20	0.4	2	2
	CAPY2	<i>Carduus pycnocephalus</i>	20	0.0	0.2	0.2
	CAGL7	<i>Carex globosa</i>	20	0.0	0.2	0.2
	CLPE	<i>Claytonia perfoliata</i>	20	0.0	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	20	0.0	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	20	0.0	0.2	0.2
	POCA5	<i>Polygala californica</i>	20	0.0	0.2	0.2
	SCBI	<i>Scoliopus bigelovii</i>	20	0.0	0.2	0.2
	SMST	<i>Smilacina stellata</i>	20	0.0	0.2	0.2
	STRI	<i>Stachys rigida</i>	20	0.0	0.2	0.2
	WHMO	<i>Whipplea modesta</i>	20	0.0	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	80	1.8	0.2	6

## ***Quercus agrifolia* Alliance or Habitat**

This alliance is represented by three associations in which the understory is primarily herbaceous and the overstory is dominated by *Quercus agrifolia*. An additional association has a mixed evergreen overstory with *Quercus agrifolia* dominant. Further variation is represented in one plot (MMWD0195) having a well-developed shrub understory including *Arctostaphylos glandulosa* and *Heteromeles arbutifolia*.

### ***Quercus agrifolia*/Grass (Annual) Association**

#### **Coast Live Oak / Grass (Annual) Association**

**Mapping Code: 2111**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Quercus agrifolia*/Grass (annual) Woodland form an open tree layer (20-32%, mean 26%), with hardwoods at 5-15m tall (20-32%, mean 26%). The shrub layer is open (4-4%, mean 4%) with low shrubs at 0-0.5m and tall shrubs at 0-2m tall. The herbaceous layer is open to intermittent (30-45%, mean 37.5%) at 0-0.5m tall. Total vegetation cover is 53-78%, mean 65.5%.

In this association, *Quercus agrifolia* dominates the overstory tree layer usually in open cover. The shrub layer is relatively sparse with *Lonicera hispidula* var. *vacillans* characteristic. The herbaceous layer is relatively abundant with annual grasses such as *Bromus hordeaceus*, *Avena barbata*, *Briza maxima*, and *Cynosurus echinatus*. Forbs are also present with *Carduus pycnocephalus*, *Sisyrinchium bellum*, and *Anagallis arvensis* characteristic.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 202-307 ft., mean 255 ft.

Aspect: variable

Slope: steep, range 27-37 degrees, mean 32 degrees

Topography: upper slope, undulating (data from one plot)

Small Rock Cover: 2% (data from one plot)

Large Rock Cover: none

Litter Cover: 81% (data from one plot)

Bare Ground: 15% (data from one plot)

Parent Material: Franciscan melange

Soil Texture: fine sandy clay

Stands of this association were sampled in the Mt. Tamalpais Watershed. They primarily occur in dry environments, including exposed slopes at lower elevations in the study area.

#### **SITE IMPACTS**

This association has moderate non-native plant cover (average 44.6%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Genista monspessulana*, *Bromus hordeaceus*, *Avena barbata*, and *Briza maxima*. There are no additional site impacts.

#### **SENSITIVE SPECIES**

*Lotus formosissimus* was found in 1 of 2 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-2-1. Global rank is G4, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** MMWD0067, MMWD0139 **Releve(s):** none

**Rank:** G4 S4

## GLOBAL DISTRIBUTION

Central Coast, Southern California

## REFERENCES

Allen et al. 1989, Evens and San 2005, Klein and Evens 2005, Shuford and Timossi 1989

### *Quercus agrifolia*/Grass (Annual) Association

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	<b>QUAG-T</b>	<b><i>Quercus agrifolia</i></b>	<b>100</b>	<b>24.0</b>	<b>18</b>	<b>30</b>
	QUKE-T	<i>Quercus kelloggii</i>	50	1.5	3	3
	UMCA-T	<i>Umbellularia californica</i>	50	1.0	2	2
<b>Shrub</b>						
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	100	0.2	0.2	0.2
	GEMO2	<i>Genista monspessulana</i>	50	1.5	3	3
	HEAR5	<i>Heteromeles arbutifolia</i>	50	0.1	0.2	0.2
	ROCA2	<i>Rosa californica</i>	50	0.1	0.2	0.2
	TODI	<i>Toxicodendron diversilobum</i>	50	0.1	0.2	0.2
<b>Herb</b>						
	<b>BRHO2</b>	<b><i>Bromus hordeaceus</i></b>	<b>100</b>	<b>12.5</b>	<b>10</b>	<b>15</b>
	<b>AVBA</b>	<b><i>Avena barbata</i></b>	<b>100</b>	<b>4.0</b>	<b>1</b>	<b>7</b>
	<b>BRMA</b>	<b><i>Briza maxima</i></b>	<b>100</b>	<b>2.1</b>	<b>0.2</b>	<b>4</b>
	<b>CYEC</b>	<b><i>Cynosurus echinatus</i></b>	<b>100</b>	<b>2.0</b>	<b>2</b>	<b>2</b>
	CAPY2	<i>Carduus pycnocephalus</i>	100	1.1	0.2	2
	ANAR	<i>Anagallis arvensis</i>	100	0.2	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	100	0.2	0.2	0.2
	GAAP2	<i>Galium aparine</i>	50	1.0	2	2
	LOFO2	<i>Lotus formosissimus</i>	50	1.0	2	2
	MIGU	<i>Mimulus guttatus</i>	50	1.0	2	2
	VISA	<i>Vicia sativa</i>	50	1.0	2	2
	CYGR	<i>Cynoglossum grande</i>	50	0.5	1	1
	NAPU4	<i>Nassella pulchra</i>	50	0.5	1	1
	CHPO3	<i>Chlorogalum pomeridianum</i>	50	0.1	0.2	0.2
	DAPU3	<i>Daucus pusillus</i>	50	0.1	0.2	0.2
	HYGL2	<i>Hypochaeris glabra</i>	50	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	50	0.1	0.2	0.2
	LOTUS	<i>Lotus</i>	50	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	50	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	50	0.1	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	50	0.1	0.2	0.2
	SIGA	<i>Silene gallica</i>	50	0.1	0.2	0.2
	STAJ	<i>Stachys ajugoides</i>	50	0.1	0.2	0.2



## ***Quercus agrifolia*/Grass (Perennial Native) Association**

### **Coast Live Oak / Grass (Perennial Native) Association**

**Mapping Code: 2111**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Quercus agrifolia*/Grass (perennial native) Woodland form an open to intermittent tree layer (18-35%, mean 27%), with hardwoods at 5-15m tall (17-35%, mean 26.8%) and conifers at 5-10m tall (0-1%, mean 0.3%). The shrub layer is open (1-10%, mean 7.3%) with low shrubs at 0-1m and tall shrubs at 0.5-5m tall. The herbaceous layer is open to intermittent (8-58%, mean 38.3%) at 0-1m tall. Total vegetation cover is 45-72%, mean 60.5%.

In this association, *Quercus agrifolia* dominates the overstory tree layer usually at open cover. The shrub layer is relatively open with *Toxicodendron diversilobum*, *Baccharis pilularis*, *Lonicera hispidula* var. *vacillans*, and/or *Mimulus aurantiacus* present at low cover. The herbaceous layer is relatively abundant with perennials characteristically present, including *Elymus glaucus*, *Carex* sp., and *Iris douglasiana*. Many other herbs are often present at low to moderate cover, including *Briza maxima*, *Bromus carinatus*, *Juncus* sp., and *Satureja douglasii*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 467-849 ft., mean 688 ft.

Aspect: variable

Slope: flat to steep, range 0-40 degrees, mean 11.8 degrees

Topography: bottom to upper slope, usually linear, infrequently convex

Small Rock Cover: range 0.2-2%, mean 0.9%

Large Rock Cover: range 0-0.2%, mean 0.1%

Litter Cover: range 55-93%, mean 76.3%

Bare Ground: range 3-40%, mean 19.5%

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam, medium loam, fine clay

Stands of this association were sampled in the Mt. Tamalpais Watershed. They contain a variety of understory herbs including mesic and riparian species such as *Carex* spp., *Iris douglasiana*, and *Juncus* spp. This association is usually found in more mesic situations with more developed clay soils than the *Q. agrifolia* / Grass (Annual) Association.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 20%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Genista monspessulana*, *Cytisus scoparius*, and *Briza maxima*. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=4)**

**Rapid Assessment(s):** MMWD0045, MMWD0183, MMWD0226, MMWD0340 **Releve(s):** none

**Rank:** G3 S3

#### **GLOBAL DISTRIBUTION**

Northern outer Central Coast (known from Mt. Tamalpais area) and probably outer North Coast; though full distribution is not known

#### **REFERENCES**

Shuford and Timossi 1989

**Quercus agrifolia/Grass (Perennial native) Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	QUAG-T	<i>Quercus agrifolia</i>	100	25.5	17	35
	UMCA-T	<i>Umbellularia californica</i>	75	2.8	0.2	8
	ARME-T	<i>Arbutus menziesii</i>	25	0.8	3	3
	PSME-T	<i>Pseudotsuga menziesii</i>	25	0.1	0.2	0.2
<b>Tree Understory</b>						
	PSME-M	<i>Pseudotsuga menziesii</i>	25	0.1	0.2	0.2
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	100	1.5	0.2	4
	BAPI	<i>Baccharis pilularis</i>	50	1.0	0.2	4
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	50	0.3	0.2	1
	MIAU	<i>Mimulus aurantiacus</i>	50	0.1	0.2	0.2
	CYSC4	<i>Cytisus scoparius</i>	25	0.1	0.2	0.2
	GEMO2	<i>Genista monspessulana</i>	25	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	25	0.1	0.2	0.2
<b>Herb</b>						
	CAREX	<i>Carex</i>	100	10.5	2	19
	ELGL	<i>Elymus glaucus</i>	100	2.5	1	5
	IRDO	<i>Iris douglasiana</i>	100	1.4	0.2	5
	BRMA	<i>Briza maxima</i>	50	10.0	10	30
	BRCA5	<i>Bromus carinatus</i>	50	4.8	4	15
	JUNCU	<i>Juncus</i>	50	2.0	4	4
	SADO5	<i>Satureja douglasii</i>	50	1.5	0.2	6
	HOLA	<i>Holcus lanatus</i>	50	0.8	1	2
	AVBA	<i>Avena barbata</i>	50	0.6	0.2	2
	CYEC	<i>Cynosurus echinatus</i>	50	0.3	0.2	1
	FRVE	<i>Fragaria vesca</i>	50	0.3	0.2	1
	BRDI3	<i>Bromus diandrus</i>	25	3.8	15	15
	KOMA	<i>Koeleria macrantha</i>	25	2.8	11	11
	AGHE2	<i>Agoseris heterophylla</i>	25	0.5	2	2
	PLLA	<i>Plantago lanceolata</i>	25	0.5	2	2
	GAAP2	<i>Galium aparine</i>	25	0.3	1	1
	HYGL2	<i>Hypochaeris glabra</i>	25	0.3	1	1
	JUEF	<i>Juncus effusus</i>	25	0.3	1	1
	NAPU4	<i>Nassella pulchra</i>	25	0.3	1	1
	PLER3	<i>Plantago erecta</i>	25	0.3	1	1
	CAOV4	<i>Camissonia ovata</i>	25	0.1	0.2	0.2
	CAPY2	<i>Carduus pycnocephalus</i>	25	0.1	0.2	0.2
	CHPO3	<i>Chlorogalum pomeridianum</i>	25	0.1	0.2	0.2
	CLGR	<i>Clarkia gracilis</i>	25	0.1	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	25	0.1	0.2	0.2
	ERBO	<i>Erodium botrys</i>	25	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	25	0.1	0.2	0.2
	GED1	<i>Geranium dissectum</i>	25	0.1	0.2	0.2
	GEMO	<i>Geranium molle</i>	25	0.1	0.2	0.2
	LOMI	<i>Lotus micranthus</i>	25	0.1	0.2	0.2
	MAEX	<i>Madia exigua</i>	25	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	25	0.1	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	25	0.1	0.2	0.2

**Quercus agrifolia/Grass (Perennial native) Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
	SIMA2	<i>Sidalcea malviflora</i>	25	0.1	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	25	0.1	0.2	0.2
	STRI	<i>Stachys rigida</i>	25	0.1	0.2	0.2
	THCA4	<i>Thermopsis californica</i>	25	0.1	0.2	0.2
	VIAM	<i>Vicia americana</i>	25	0.1	0.2	0.2
	VISA	<i>Vicia sativa</i>	25	0.1	0.2	0.2
	VIVI	<i>Vicia villosa</i>	25	0.1	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	25	0.1	0.2	0.2

***Quercus agrifolia*/Toxicodendron diversilobum/Grass Association**  
**Coast Live Oak / Poison Oak / Grass Association**

**Mapping Code: 2110**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Quercus agrifolia*/Toxicodendron diversilobum/Grass Woodland/Forest form an open to intermittent tree layer (8-63%, mean 40.8%), with hardwoods at 5-20m tall (8-63%, mean 40.8%) and conifers at 20-35m tall (0-0.2%, mean 0.04%). The shrub layer is open (3-17%, mean 7.4%) with low shrubs at 0.5-1m and tall shrubs at 0.5-10m tall. The herbaceous layer is open (6-25%, mean 13.6%) at 0-0.5m tall. Total vegetation cover is 30-76%, mean 57.4%.

In this association, *Quercus agrifolia* dominates the overstory tree layer at usually at moderate cover. The shrub layer is characterized by *Toxicodendron diversilobum* and *Lonicera hispidula* var. *vacillans* at low cover, and the herbaceous layer has similar cover to the shrub layer with annual herbs often present, including *Cynosurus echinatus*, *Torilis arvensis*, and *Bromus diandrus*.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 354-834 ft., mean 613 ft.

Aspect: usually SE or SW

Slope: moderate to very steep, range 6-52 degrees, mean 23.2 degrees

Topography: lower slope to ridge top, concave, convex or undulating

Small Rock Cover: range 0.2-1%, mean 0.6%

Large Rock Cover: range 0-1%, mean 0.5%

Litter Cover: range 70-83%, mean 76.5%

Bare Ground: range 14-25%, mean 19.5%

Parent Material: Franciscan melange

Soil Texture: usually moderately fine clay loam, infrequently moderately coarse sandy loam or medium to very fine sandy loam

Stands of this association were sampled in the Mt. Tamalpais Watershed and at Soulajule Reservoir. They primarily occur in dry environments, including southerly slopes at lower elevations in the study area. This association is similar to the *Q. agrifolia* / Annual Grass Association but has a shrub layer similar in cover to the herb layer.

**SITE IMPACTS**

This association has low non-native plant cover (average 7.5%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Cytisus scoparius*, *Cynosurus echinatus*, and *Torilis arvensis*. Additional site impacts include light Sudden Oak Death Syndrome in one stand and light erosion/runoff in one stand.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=5)**

**Rapid Assessment(s):** MMWD0108, MMWD0151, MMWD0181, MMWD0323, MMWD0375 **Releve(s):** none

**Rank:** G4 S4

**GLOBAL DISTRIBUTION**

Central Coast, Southern California

**REFERENCES**

Allen et al. 1989, Evens and San 2004, Evens and San 2005, Klein and Evens 2005

**Quercus agrifolia/Toxicodendron diversilobum/Grass Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	QUAG-T	<i>Quercus agrifolia</i>	100	38.4	8	63
	PSME-T	<i>Pseudotsuga menziesii</i>	40	1.8	4	5
	UMCA-T	<i>Umbellularia californica</i>	40	1.6	3	5
	ARME-T	<i>Arbutus menziesii</i>	20	0.0	0.2	0.2
	PIRA2	<i>Pinus radiata</i>	20	0.0	0.2	0.2
<b>Tree Understory</b>						
	ARME-M	<i>Arbutus menziesii</i>	40	0.2	0.2	1
	LIDE3-L	<i>Lithocarpus densiflorus</i>	40	0.1	0.2	0.2
	ARME-L	<i>Arbutus menziesii</i>	20	0.0	0.2	0.2
	UMCA-L	<i>Umbellularia californica</i>	20	0.0	0.2	0.2
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	100	2.9	0.2	7
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	80	0.3	0.2	1
	MIAU	<i>Mimulus aurantiacus</i>	40	1.8	4	5
	BAPI	<i>Baccharis pilularis</i>	40	1.2	3	3
	HEAR5	<i>Heteromeles arbutifolia</i>	40	0.2	0.2	1
	RUUR	<i>Rubus ursinus</i>	40	0.2	0.2	1
	ARGL3	<i>Arctostaphylos glandulosa</i>	20	0.4	2	2
	GEMO2	<i>Genista monspessulana</i>	20	0.4	2	2
	GAEL	<i>Garrya elliptica</i>	20	0.2	1	1
	CYSC4	<i>Cytisus scoparius</i>	20	0.0	0.2	0.2
<b>Herb</b>						
	CYEC	<i>Cynosurus echinatus</i>	60	0.8	1	2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	60	0.1	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	60	0.1	0.2	0.2
	BRDI3	<i>Bromus diandrus</i>	40	0.2	0.2	1
	CAPY2	<i>Carduus pycnocephalus</i>	40	0.2	0.2	1
	CAGL7	<i>Carex globosa</i>	40	0.2	0.2	1
	CYGR	<i>Cynoglossum grande</i>	40	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	40	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	40	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	40	0.1	0.2	0.2
	STRI	<i>Stachys rigida</i>	40	0.1	0.2	0.2
	VIGI	<i>Vicia gigantea</i>	40	0.1	0.2	0.2
	WHMO	<i>Whipplea modesta</i>	40	0.1	0.2	0.2
	BRHO2	<i>Bromus hordeaceus</i>	20	0.6	3	3
	AVBA	<i>Avena barbata</i>	20	0.2	1	1
	BRMA	<i>Briza maxima</i>	20	0.2	1	1
	GATR3	<i>Galium triflorum</i>	20	0.2	1	1
	UNKN	<i>irreconcilable unknown</i>	20	0.1	0.4	0.4
	ASRA	<i>Aster radulinus</i>	20	0.0	0.2	0.2
	CALYS	<i>Calystegia</i>	20	0.0	0.2	0.2
	CACA39	<i>Cardamine californica</i>	20	0.0	0.2	0.2

***Quercus agrifolia*/Toxicodendron diversilobum/Grass Association**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>
	CHPO3	<i>Chlorogalum pomeridianum</i>	20	0.0	0.2	0.2
	CIOC	<i>Cirsium occidentale</i>	20	0.0	0.2	0.2
	CLPU2	<i>Clarkia purpurea</i>	20	0.0	0.2	0.2
	CLPE	<i>Claytonia perfoliata</i>	20	0.0	0.2	0.2
	COMA4	<i>Corallorrhiza maculata</i>	20	0.0	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	20	0.0	0.2	0.2
	FRVE	<i>Fragaria vesca</i>	20	0.0	0.2	0.2
	GAAP2	<i>Galium aparine</i>	20	0.0	0.2	0.2
	GED1	<i>Geranium dissectum</i>	20	0.0	0.2	0.2
	HOBR2	<i>Hordeum brachyantherum</i>	20	0.0	0.2	0.2
	HYGL2	<i>Hypochaeris glabra</i>	20	0.0	0.2	0.2
	KOMA	<i>Koeleria macrantha</i>	20	0.0	0.2	0.2
	LOPE	<i>Lolium perenne</i>	20	0.0	0.2	0.2
	MAGR3	<i>Madia gracilis</i>	20	0.0	0.2	0.2
	MAMA	<i>Madia madioides</i>	20	0.0	0.2	0.2
	MEHA2	<i>Melica harfordii</i>	20	0.0	0.2	0.2
	PLLA	<i>Plantago lanceolata</i>	20	0.0	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	20	0.0	0.2	0.2
	SIMA3	<i>Silybum marianum</i>	20	0.0	0.2	0.2
	STAJ	<i>Stachys ajugoides</i>	20	0.0	0.2	0.2
	TONO	<i>Torilis nodosa</i>	20	0.0	0.2	0.2
	VIAM	<i>Vicia americana</i>	20	0.0	0.2	0.2
	VIVI	<i>Vicia villosa</i>	20	0.0	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	20	0.0	0.2	0.2

***Quercus agrifolia*-*Arbutus menziesii*-*Umbellularia californica* Association**  
**Coast Live Oak - Pacific Madrone - California Bay Association**

**Mapping Code:** 1104mu

**LOCAL VEGETATION DESCRIPTION**

Stands of *Quercus agrifolia*-*Arbutus menziesii*-*Umbellularia californica* Woodland form an open to intermittent tree layer (15-40%, mean 32.3%), with hardwoods at 2-15m tall (0-40%, mean 25.6%) and conifers at 2-20m tall (0-35%, mean 6.7%). The shrub layer is open to intermittent (2-36%, mean 11.4%) with low shrubs at 0-2m and tall shrubs at 0-10m tall. The herbaceous layer is open (6-29%, mean 14.1%) at 0-1m tall. Total vegetation cover is 40-67%, mean 52.6%.

In this association, *Quercus agrifolia* is the dominant overstory tree while *Arbutus menziesii* and *Umbellularia californica* are characteristically present as sub-dominant trees. The shrub layer often contains *Lonicera hispidula* var. *vacillans*, *Toxicodendron diversilobum*, and *Mimulus aurantiacus* at low cover. The herbaceous layer is similar in cover to the shrub layer, with *Cynosurus echinatus*, *Carduus pycnocephalus*, *Iris douglasiana*, and *Torilis arvensis* often present.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 233-1050 ft., mean 630 ft.

Aspect: variable

Slope: moderate to abrupt, range 9-70 degrees, mean 31.3 degrees

Topography: lower slope to ridge top, usually convex, sometimes concave

Small Rock Cover: range 0.2-3%, mean 1%

Large Rock Cover: none

Litter Cover: range 85-96%, mean 89.8%

Bare Ground: range 2-11%, mean 7%

Parent Material: Franciscan melange

Soil Texture: moderately fine clay, or silty clay loam, moderately coarse sandy loam, medium to very fine loamy sand, fine clay

Stands of this association were sampled in the Mt. Tamalpais Watershed. It occurs on neutral slopes, e.g., southeast or variable exposures, in lower to middle elevations of the study area. Adjacent stands include grasslands and *Umbellularia californica* Alliance. This association is equivalent to the *Quercus agrifolia* - (*Arbutus menziesii*) - *Umbellularia californica* Association identified by NatureServe et al. (2003a), which they included within the *Umbellularia californica* Alliance because of low sample size.

**SITE IMPACTS**

This association has low non-native plant cover (average 9.4%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Genista monspessulana*, *Cytisus scoparius*, *Cynosurus echinatus*, and *Carduus pycnocephalus*. Additional site impacts include light to moderate Sudden Oak Death Syndrome in two stands, moderate erosion/runoff in one stand, light vandalism/dumping/litter in one stand, and moderate wood cutting in one stand.

**SENSITIVE SPECIES**

*Elymus californicus* was found in 1 of 7 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-1-3. Global rank is G3, and State rank is S3.3. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=7)**

**Rapid Assessment(s):** MMWD0136, MMWD0219, MMWD0230, MMWD0275, MMWD0335, MMWD0338, MMWD0351 **Releve(s):** none

**Rank:** G3 S3

**GLOBAL DISTRIBUTION**

Northern Central Coast (known from Point Reyes National Seashore and the Mt. Tamalpais area); though full distribution is not known

## REFERENCES

NatureServe et al. 2003a, Shuford and Timossi 1989

### *Quercus agrifolia*-*Arbutus menziesii*-*Umbellularia californica* Association

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	QUAG-T	<i>Quercus agrifolia</i>	100	20.1	10	30
	UMCA-T	<i>Umbellularia californica</i>	100	8.1	2	16
	ARME-T	<i>Arbutus menziesii</i>	100	5.9	1	11
	PSME-T	<i>Pseudotsuga menziesii</i>	43	1.7	3	5
	QUKE-T	<i>Quercus kelloggii</i>	29	1.0	3	4
<b>Tree Understory</b>						
	LIDE3-M	<i>Lithocarpus densiflorus</i>	29	1.0	2	5
<b>Shrub</b>						
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	71	0.5	0.2	1
	TODI	<i>Toxicodendron diversilobum</i>	71	0.3	0.2	1
	MIAU	<i>Mimulus aurantiacus</i>	57	1.8	0.2	8
	GEMO2	<i>Genista monspessulana</i>	29	0.4	1	2
	CYSC4	<i>Cytisus scoparius</i>	29	0.1	0.2	0.2
<b>Herb</b>						
	CYEC	<i>Cynosurus echinatus</i>	86	0.5	0.2	2
	CAPY2	<i>Carduus pycnocephalus</i>	57	0.5	0.2	1
	IRDO	<i>Iris douglasiana</i>	57	0.4	0.2	2
	TOAR	<i>Torilis arvensis</i>	57	0.1	0.2	0.2
	BRMA	<i>Briza maxima</i>	43	1.3	1	6
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	43	0.3	0.2	2
	CHPO3	<i>Chlorogalum pomeridianum</i>	43	0.1	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	43	0.1	0.2	0.2
	STAJ	<i>Stachys ajugoides</i>	43	0.1	0.2	0.2
	TONO	<i>Torilis nodosa</i>	43	0.1	0.2	0.2
	AVBA	<i>Avena barbata</i>	29	0.6	0.2	4
	BRCA5	<i>Bromus carinatus</i>	29	0.1	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	29	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	29	0.1	0.2	0.2
	PIEL2	<i>Piperia elegans</i>	29	0.1	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	29	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	29	0.1	0.2	0.2
	STRI	<i>Stachys rigida</i>	29	0.1	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	29	0.1	0.2	0.2



### ***Quercus chrysolepis* Alliance or Habitat**

This alliance is represented by a single association in the study area, in which *Quercus chrysolepis* occurs in mixed evergreen stands with other hardwoods.

### ***Quercus chrysolepis*-*Arbutus menziesii*-*Lithocarpus densiflora* Association**

#### **Canyon Live Oak - Pacific Madrone - Tanoak Association**

**Mapping Code: 1170**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Quercus chrysolepis*-*Arbutus menziesii*-*Lithocarpus densiflora* Woodland form an open to intermittent tree layer (28-42%, mean 35%), with hardwoods at 2-10m tall (28-42%, mean 35%). The shrub layer is open (9-22%, mean 15.5%) with low shrubs at 0.5-1m and tall shrubs at 1-5m tall. The herbaceous layer is open (2-5%, mean 3.5%) at 0-0.5m tall. Total vegetation cover is 44-45%, mean 44.5%.

In this association, *Quercus chrysolepis* is most abundant as an the overstory or understory tree, while *Arbutus menziesii* and *Lithocarpus densiflora* are characteristically sub-dominant. These tree species along with *Umbellularia californica* and *Pseudotsuga menziesii* may be regenerating in the understory. The shrub layer is characterized by *Vaccinium ovatum*, *Heteromeles arbutifolia*, *Symphoricarpos mollis*, and *Lonicera hispidula* var. *vacillans* at low cover. The herbaceous layer is characterized by *Melica californica* and *Galium porrigens* var. *porrigens* at sparse cover.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 895-1290 ft., mean 1093 ft.

Aspect: variable

Slope: somewhat steep to steep, range 21-45 degrees, mean 33 degrees

Topography: mid slope, convex or undulating

Small Rock Cover: range 0.2-32%, mean 16.1%

Large Rock Cover: none

Litter Cover: range 33-75%, mean 54%

Bare Ground: range 23-32%, mean 27.5%

Parent Material: Franciscan melange

Soil Texture: moderately fine sandy clay loam, medium to very fine sandy loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. This association is found in middle elevations of the study area on steep slopes that have variable exposure. Stature of the hardwoods is variable from low to moderate sized trees, possibly due to differences in fire history.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 0.2%) relative to native cover. The non-native species with the highest frequency and abundance is *Cynosurus echinatus*. Additional site impacts include moderate to heavy Sudden Oak Death Syndrome in two stands.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** MMWD0267, MMWD0292 **Releve(s):** none

**Rank:** G4 S4?

#### **GLOBAL DISTRIBUTION**

Central Coast and probably common farther north into the North Coast; though full distribution is not known

#### **REFERENCES**

***Quercus chrysolepis*-*Arbutus menziesii*-*Lithocarpus densiflora* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	QUCH2-T	<i>Quercus chrysolepis</i>	50	10.0	20	20
	LIDE3-T	<i>Lithocarpus densiflorus</i>	50	6.0	12	12
	ARME-T	<i>Arbutus menziesii</i>	50	1.0	2	2
<b>Tree Understory</b>						
	PSME-L	<i>Pseudotsuga menziesii</i>	100	0.2	0.2	0.2
	QUCH2-M	<i>Quercus chrysolepis</i>	50	15.5	31	31
	UMCA-L	<i>Umbellularia californica</i>	50	4.0	8	8
	ARME-M	<i>Arbutus menziesii</i>	50	2.5	5	5
	LIDE3-M	<i>Lithocarpus densiflorus</i>	50	2.5	5	5
	UMCA-M	<i>Umbellularia californica</i>	50	1.0	2	2
<b>Shrub</b>						
	VAOV2	<i>Vaccinium ovatum</i>	100	4.5	1	8
	HEAR5	<i>Heteromeles arbutifolia</i>	100	2.1	0.2	4
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	100	0.2	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	100	0.2	0.2	0.2
	TODI	<i>Toxicodendron diversilobum</i>	50	1.0	2	2
	ARGL3	<i>Arctostaphylos glandulosa</i>	50	0.5	1	1
	ADFA	<i>Adenostoma fasciculatum</i>	50	0.1	0.2	0.2
	RHCA	<i>Rhamnus californica</i>	50	0.1	0.2	0.2
	ROGY	<i>Rosa gymnocarpa</i>	50	0.1	0.2	0.2
<b>Herb</b>						
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	100	0.2	0.2	0.2
	MECA2	<i>Melica californica</i>	100	0.2	0.2	0.2
	IRMA	<i>Iris macrosiphon</i>	50	0.5	1	1
	SADO5	<i>Satureja douglasii</i>	50	0.5	1	1
	ARDI6	<i>Arnica discoidea</i>	50	0.1	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	50	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	50	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	50	0.1	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	50	0.1	0.2	0.2
	TRLA6	<i>Trientalis latifolia</i>	50	0.1	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	50	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	100	0.6	0.2	1
	LICHEN	<i>Lichen</i>	50	0.1	0.2	0.2

## ***Quercus garryana* Alliance or Habitat**

This alliance is uncommon in the study area. It is represented by two samples with *Quercus garryana* dominant in the overstory, which are classified to the alliance level.

### ***Quercus garryana* Alliance Oregon White Oak Alliance**

**Mapping Code: 2210**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Quercus garryana* Woodland form an open to intermittent tree layer (28-40%, mean 34%), with hardwoods at 5-20m tall (28-40%, mean 34%). The shrub layer is open (0-5%, mean 2.5%) with low shrubs at 0.5-1m and tall shrubs at 1-2m tall. The herbaceous layer is intermittent (57-60%, mean 58.5%) at 0-1m tall. Total vegetation cover is 65-69%, mean 67%.

In this alliance, *Quercus garryana* dominates the overstory tree layer, while *Quercus agrifolia* is sub-dominant. The shrub layer is variable and may contain *Toxicodendron diversilobum*, *Genista monspessulana*, or *Lonicera hispidula* var. *vacillans* at low cover. The herbaceous layer is more pronounced with annual species such as *Briza maxima* and *Bromus diandrus*, while perennial species such as *Stachys rigida*, *Sanicula crassicaulis*, *Chlorogalum pomeridianum*, or *Festuca californica* are often present and sometimes abundant.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 653-764 ft., mean 709 ft.

Aspect: NE

Slope: somewhat steep, range 16-21 degrees, mean 18.5 degrees

Topography: mid to upper slope, convex or undulating

Small Rock Cover: 2.5% (data from one plot)

Large Rock Cover: 0.2% (data from one plot)

Litter Cover: range 88% (data from one plot)

Bare Ground: 2% (data from one plot)

Parent Material: Franciscan melange, chert

Soil Texture: moderately fine clay loam, medium to very fine sandy loam

Stands of this alliance were sampled in the Mt. Tamalpais Watershed. They occur in the lower elevations of the study area on cool, northerly slopes. The stands are adjacent to various grasslands or other hardwood alliances.

#### **SITE IMPACTS**

This alliance has moderate non-native plant cover (average 44.9%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Genista monspessulana*, *Briza maxima*, *Bromus diandrus*, *Vulpia bromoides*, and *Carduus pycnocephalus*. Additional site impacts include light vandalism/dumping/litter in one stand and light wood cutting in one stand.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** MMWD0001, MMWD0096 **Releve(s):** none

**Rank:** G4 S4 (alliance level)

#### **GLOBAL DISTRIBUTION**

North Coast, Klamath Ranges, Cascade Ranges, Modoc Plateau; to British Columbia

#### **REFERENCES**

Holland 1986, Lee 2004, NatureServe 2005, Sawyer and Keeler-Wolf 1995

**Quercus garryana Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	QUGA4	<i>Quercus garryana</i>	100	25.0	20	30
	QUAG-T	<i>Quercus agrifolia</i>	100	9.0	8	10
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	50	3.0	6	6
	GEMO2	<i>Genista monspessulana</i>	50	2.1	4.2	4.2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	50	1.5	3	3
	ROCA2	<i>Rosa californica</i>	50	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	50	0.1	0.2	0.2
<b>Herb</b>						
	BRMA	<i>Briza maxima</i>	100	20.0	20	20
	BRDI3	<i>Bromus diandrus</i>	100	15.5	1	30
	SACR2	<i>Sanicula crassicaulis</i>	100	1.1	0.2	2
	STRI	<i>Stachys rigida</i>	100	1.1	0.2	2
	CHPO3	<i>Chlorogalum pomeridianum</i>	100	0.6	0.2	1
	FECA	<i>Festuca californica</i>	50	11.0	22	22
	VUBR	<i>Vulpia bromoides</i>	50	4.0	8	8
	CAPY2	<i>Carduus pycnocephalus</i>	50	3.5	7	7
	GEMO	<i>Geranium molle</i>	50	2.5	5	5
	VISA	<i>Vicia sativa</i>	50	2.5	5	5
	MEPO3	<i>Medicago polymorpha</i>	50	1.0	2	2
	BRHO2	<i>Bromus hordeaceus</i>	50	0.5	1	1
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	50	0.5	1	1
	LOPE	<i>Lolium perenne</i>	50	0.5	1	1
	TRSU3	<i>Trifolium subterraneum</i>	50	0.5	1	1
	ANAR	<i>Anagallis arvensis</i>	50	0.1	0.2	0.2
	CACA39	<i>Cardamine californica</i>	50	0.1	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	50	0.1	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	50	0.1	0.2	0.2
	FRVE	<i>Fragaria vesca</i>	50	0.1	0.2	0.2
	GAAP2	<i>Galium aparine</i>	50	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	50	0.1	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	50	0.1	0.2	0.2
	TRWI3	<i>Trifolium willdenovii</i>	50	0.1	0.2	0.2
	VIVI	<i>Vicia villosa</i>	50	0.1	0.2	0.2

## ***Quercus kelloggii* Alliance or Habitat**

This alliance is represented by a single association in the study area. *Quercus kelloggii* is dominant and other hardwoods are subdominant.

### ***Quercus kelloggii*-*Arbutus menziesii*-*Quercus agrifolia* Association**

#### **Black Oak - Pacific Madrone - Coast Live Oak Association**

**Mapping Code:** 1410/1101mu

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Quercus kelloggii*-*Arbutus menziesii*-*Quercus agrifolia* Woodland form an intermittent tree layer (35-42%, mean 38.3%), with hardwoods at 10-15m tall (35-40%, mean 37.7%) and conifers at 10-15m tall (0-2%, mean 0.7%). The shrub layer is open (0-5%, mean 3%) with low shrubs at 0-1m and tall shrubs at 0.5-5m tall. The herbaceous layer is open to intermittent (30-75%, mean 55.7%) at 0-0.5m tall. Total vegetation cover is 50-85%, mean 69.7%.

In this association, *Quercus kelloggii* is dominant in the overstory tree layer while *Arbutus menziesii* and *Quercus agrifolia* are characteristically present and sub-dominant. The shrub layer is sparse and characterized by *Toxicodendron diversilobum*. The herbaceous layer has moderate to high cover, and non-native annuals are most abundant with *Avena barbata*, *Carduus pycnocephalus*, *Cynosurus echinatus*, and *Briza maxima*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 109-782 ft., mean 523 ft.

Aspect: usually NW, occasionally variable

Slope: somewhat steep, range 15-25 degrees, mean 21.7 degrees

Topography: mid to upper slope, convex

Small Rock Cover: range 0-1%, mean 0.3%

Large Rock Cover: none

Litter Cover: range 75-88%, mean 81.5%

Bare Ground: range 6-22%, mean 14%

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam, moderately coarse sandy loam, medium to very fine sandy loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. They are found on northerly slopes in the lower elevations of the study area, typically on somewhat steep upper slopes. This association is similar to the *Arbutus menziesii*-*Umbellularia californica*-*Q. kelloggii* Association. It is different in its more deciduous character and its more well-developed herbaceous understory.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 48.4%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Cytisus scoparius*, *Avena barbata*, *Carduus pycnocephalus*, and *Cynosurus echinatus*. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** MMWD0055, MMWD0411, MMWD0412 **Releve(s):** none

**Rank:** G3 S3

#### **GLOBAL DISTRIBUTION**

North Coast and Central Coast (Santa Cruz to Sonoma Counties)

#### **REFERENCES**

***Quercus kelloggii*-*Arbutus menziesii*-*Quercus agrifolia* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	QUKE-T	<i>Quercus kelloggii</i>	100	21.3	17	24
	QUAG-T	<i>Quercus agrifolia</i>	100	8.7	3	14
	ARME-T	<i>Arbutus menziesii</i>	100	3.3	2	4
	UMCA-T	<i>Umbellularia californica</i>	67	1.7	2	3
	QUGA4	<i>Quercus garryana</i>	33	0.7	2	2
<b>Tree Understory</b>						
	UMCA-L	<i>Umbellularia californica</i>	33	0.1	0.2	0.2
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	100	0.7	0.2	1
	BAPI	<i>Baccharis pilularis</i>	33	0.1	0.2	0.2
	CYSC4	<i>Cytisus scoparius</i>	33	0.1	0.2	0.2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	33	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	33	0.1	0.2	0.2
<b>Herb</b>						
	AVBA	<i>Avena barbata</i>	100	9.3	1	22
	CAPY2	<i>Carduus pycnocephalus</i>	100	1.0	1	1
	CYEC	<i>Cynosurus echinatus</i>	67	20.0	25	35
	BRMA	<i>Briza maxima</i>	67	11.3	4	30
	VISA	<i>Vicia sativa</i>	67	1.0	1	2
	STRI	<i>Stachys rigida</i>	67	0.7	1	1
	ELGL	<i>Elymus glaucus</i>	67	0.4	0.2	1
	TONO	<i>Torilis nodosa</i>	67	0.4	0.2	1
	FRVE	<i>Fragaria vesca</i>	67	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	67	0.1	0.2	0.2
	ANTHE	<i>Anthemis</i>	33	2.7	8	8
	MESU	<i>Melica subulata</i>	33	2.7	8	8
	BRDI3	<i>Bromus diandrus</i>	33	0.7	2	2
	GATR3	<i>Galium triflorum</i>	33	0.3	1	1
	TOAR	<i>Torilis arvensis</i>	33	0.3	1	1
	ADJO	<i>Adiantum jordanii</i>	33	0.1	0.2	0.2
	BREL	<i>Brodiaea elegans</i>	33	0.1	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	33	0.1	0.2	0.2
	FECA	<i>Festuca californica</i>	33	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	33	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	33	0.1	0.2	0.2
	LIAF	<i>Lithophragma affine</i>	33	0.1	0.2	0.2
	LUCO6	<i>Luzula comosa</i>	33	0.1	0.2	0.2
	MAMA	<i>Madia madioides</i>	33	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	33	0.1	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	33	0.1	0.2	0.2
	RACA2	<i>Ranunculus californicus</i>	33	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	33	0.1	0.2	0.2

### ***Quercus lobata* Alliance or Habitat**

This alliance is represented by a single association in the study area. The association has an open to intermittent canopy of *Quercus lobata* over a grassy understory, which is commonly found in the Central Coast of California in mesic sites, including intermittent drainages, flats, and draws.

### ***Quercus lobata*/Grass Association**

#### **Valley Oak / Grass Association**

**Mapping Code: 2230**

#### **LOCAL VEGETATION DESCRIPTION**

One stand of *Quercus lobata*/Grass Woodland forms an open tree layer (32%), with hardwoods at 5-10m tall (32%). The shrub layer is open (5%) with low shrubs at 0-0.5m and tall shrubs at 0.5-1m tall. The herbaceous layer is open (30%) at 0-0.5m tall. Total vegetation cover is 65%.

In this association, *Quercus lobata* is the dominant in the overstory tree layer. The shrub layer is sparse with *Toxicodendron diversilobum*, *Genista monspessulana*, and *Rubus ursinus*. The herbaceous layer is more prevalent with annual and perennial species such as *Briza maxima*, *Elymus glaucus*, *Cynoglossum grande*, *Plantago lanceolata*, and *Avena barbata*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 282 ft.

Aspect: variable

Slope: moderate, 11 degrees

Topography: mid slope, undulating

Small Rock Cover: 1%

Large Rock Cover: 1%

Litter Cover: 35%

Bare Ground: 65%

Parent Material: Franciscan melange

Soil Texture: fine sandy clay

One stand of this association was sampled in the Mt. Tamalpais Watershed. It is found in a shallow, mesic draw in the lower elevation of the study area with a high degree of bare ground. The deciduous overstory and herbaceous understory have a similar percent cover.

#### **SITE IMPACTS**

The stand representing this association has low non-native plant cover (average 28.3%) relative to native cover. Non-native species that occur with the highest abundance include *Genista monspessulana*, *Briza maxima*, *Plantago lanceolata*, and *Avena barbata*. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0068 **Releve(s):** none

**Rank:** G4 S4

#### **GLOBAL DISTRIBUTION**

North Coast, Central Coast Range, Central Valley (coastally from Mendocino to Los Angeles Counties, Inland in Contra Costa, Santa Clara, San Benito to Kern Counties)

#### **REFERENCES**

Allen et al. 1989, Holland 1986

**Quercus lobata/Grass Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	<b>QULO</b>	<b>Quercus lobata</b>	<b>100</b>	<b>30.0</b>	<b>30</b>	<b>30</b>
	UMCA-T	<i>Umbellularia californica</i>	100	4.0	4	4
	QUAG-T	<i>Quercus agrifolia</i>	100	0.2	0.2	0.2
<b>Tree Understory</b>						
	PSME-M	<i>Pseudotsuga menziesii</i>	100	1.0	1	1
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	100	3.0	3	3
	GEMO2	<i>Genista monspessulana</i>	100	1.0	1	1
	RUUR	<i>Rubus ursinus</i>	100	0.2	0.2	0.2
<b>Herb</b>						
	<b>BRMA</b>	<b>Briza maxima</b>	<b>100</b>	<b>12.0</b>	<b>12</b>	<b>12</b>
	<b>ELGL</b>	<b>Elymus glaucus</b>	<b>100</b>	<b>3.0</b>	<b>3</b>	<b>3</b>
	<b>AVBA</b>	<b>Avena barbata</b>	<b>100</b>	<b>2.0</b>	<b>2</b>	<b>2</b>
	CYGR	<i>Cynoglossum grande</i>	100	2.0	2	2
	PLLA	<i>Plantago lanceolata</i>	100	2.0	2	2
	CAPY2	<i>Carduus pycnocephalus</i>	100	1.0	1	1
	FRVE	<i>Fragaria vesca</i>	100	1.0	1	1
	STRI	<i>Stachys rigida</i>	100	1.0	1	1
	CHPO3	<i>Chlorogalum pomeridianum</i>	100	0.2	0.2	0.2
	LOTUS	<i>Lotus</i>	100	0.2	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	100	0.2	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	100	0.2	0.2	0.2
	TRDU2	<i>Trifolium dubium</i>	100	0.2	0.2	0.2



## ***Quercus wislizeni* Alliance or Habitat**

This alliance is represented by two associations of *Quercus wislizeni* in the overstory tree and by two associations of *Q. wislizeni* as a smaller statured shrub (or low tree). This variation in stature may be attributed to fire history, microsite climate variables, etc. Further, the tree-overstory associations occur in areas with well-developed soils, while the shrub associations occur in more rocky less-developed soils. These different associations are separated in descriptions corresponding to their stature.

### ***Quercus wislizeni*/Arctostaphylos glandulosa (Woodland) Association**

#### **Interior Live Oak / Eastwood Manzanita Association**

#### **Mapping Code: 3113**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Quercus wislizeni*/Arctostaphylos glandulosa Woodland form an open to intermittent tree layer (19-50%, mean 29.9%), with hardwoods at 2-10m tall (17-45%, mean 27.1%) and conifers at 2-20m tall (0-11%, mean 2.7%). The shrub layer is open to intermittent (17-65%, mean 37.4%) with low shrubs at 0-5m and tall shrubs at 1-10m tall. The herbaceous layer is open (4-10%, mean 6.1%) at 0-0.5m tall. Total vegetation cover is 44-80%, mean 64.7%.

In this association, *Quercus wislizeni* is dominant as an overstory tree, while other trees are sometime present such as *Arbutus menziesii*, *Umbellularia californica*, and *Lithocarpus densiflorus*. *Pseudotsuga menziesii* is often regenerating in the understory. The shrub layer is characterized by the dominance of *Arctostaphylos glandulosa*. The herb layer often contains *Polygala californica* and *Pteridium aquilinum* at low cover.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1096-2391 ft., mean 1475 ft.

Aspect: variable

Slope: moderate to steep, range 14-45 degrees, mean 25.4 degrees

Topography: mid slope to ridge top, usually concave or undulating

Small Rock Cover: range 0-28%, mean 6.3%

Large Rock Cover: range 0-5%, mean 1.7%

Litter Cover: range 31-95%, mean 71.7%

Bare Ground: range 3-45%, mean 18.3%

Parent Material: Franciscan melange

Soil Texture: moderately coarse sandy loam, moderately fine sandy clay loam, moderately fine clay loam, medium silt loam, medium loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands are typically found on the exposed, moderately steep slopes of Mt. Tamalpais. Depending on site history (e.g., time since last fire or clearing), stands may be woodland in nature as in this association, or they may be shrubland in nature as in the related *Arctostaphylos glandulosa*-*Quercus wislizeni* (Shrubland) Association.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 0.3%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Cynosurus echinatus* and *Aira caryophyllea*. Additional site impacts include light Sudden Oak Death Syndrome in one stand, light vandalism/dumping/litter in one stand, and light groundwater pumping in one stand.

#### **SENSITIVE SPECIES**

*Eriogonum luteolum* var. *caninum* was found in 1 of 7 surveys of this plant community. CNPS ranks this species as List 3 with R-E-D Code is ?-2-3. Global rank is G5T3Q, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION** (n=7)

**Rapid Assessment(s):** MMWD0218, MMWD0235, MMWD0263, MMWD0277, MMWD0280, MMWD0306, MMWD0315 **Releve(s):** none

**Rank:** G3 S3?

**GLOBAL DISTRIBUTION**

Northern outer Central Coast (known from Mt. Tamalpais area); though full distribution is not known

**REFERENCES**

NatureServe et al. 2003a

***Quercus wislizeni*/Arctostaphylos glandulosa (Woodland) Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	<b>QUWI2-T</b>	<b><i>Quercus wislizeni</i></b>	<b>100</b>	<b>21.0</b>	<b>10</b>	<b>42</b>
	ARME-T	<i>Arbutus menziesii</i>	43	2.6	0.2	15
	UMCA-T	<i>Umbellularia californica</i>	29	2.3	5	11
	LIDE3-T	<i>Lithocarpus densiflorus</i>	29	1.0	2	5
	PSME-T	<i>Pseudotsuga menziesii</i>	29	0.2	0.2	1
<b>Tree Understory</b>						
	PSME-L	<i>Pseudotsuga menziesii</i>	43	0.1	0.2	0.2
	UMCA-L	<i>Umbellularia californica</i>	29	0.1	0.2	0.2
<b>Shrub</b>						
	<b>ARGL3</b>	<b><i>Arctostaphylos glandulosa</i></b>	<b>100</b>	<b>30.3</b>	<b>10</b>	<b>60</b>
	TODI	<i>Toxicodendron diversilobum</i>	86	0.9	0.2	3
	MIAU	<i>Mimulus aurantiacus</i>	71	0.7	0.2	2
	ADFA	<i>Adenostoma fasciculatum</i>	57	2.3	1	8
	HEAR5	<i>Heteromeles arbutifolia</i>	57	0.9	0.2	3
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	57	0.1	0.2	0.2
	VAOV2	<i>Vaccinium ovatum</i>	43	0.7	0.2	3
	PIMO5	<i>Pickeringia montana</i>	43	0.6	0.2	2
	SYMO	<i>Symphoricarpos mollis</i>	43	0.1	0.2	0.2
	ERCA6	<i>Eriodictyon californicum</i>	29	0.1	0.2	0.2
	RHCA	<i>Rhamnus californica</i>	29	0.1	0.2	0.2
	ROCA2	<i>Rosa californica</i>	29	0.1	0.2	0.2
<b>Herb</b>						
	POCA5	<i>Polygala californica</i>	71	0.1	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	57	1.3	0.2	5
	IRDO	<i>Iris douglasiana</i>	57	0.3	0.2	1
	ZIFR	<i>Zigadenus fremontii</i>	57	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	43	0.1	0.2	0.2
	AICA	<i>Aira caryophyllea</i>	29	0.1	0.2	0.2
	CAGL7	<i>Carex globosa</i>	29	0.1	0.2	0.2
	CHPO3	<i>Chlorogalum pomeridianum</i>	29	0.1	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	29	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	29	0.1	0.2	0.2
	IRMA	<i>Iris macrosiphon</i>	29	0.1	0.2	0.2
	POMU	<i>Polystichum munitum</i>	29	0.1	0.2	0.2
	WHMO	<i>Whipplea modesta</i>	29	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	71	0.4	0.2	2
	LICHEN	<i>Lichen</i>	29	0.3	1	1

## ***Quercus wislizeni*/Heteromeles arbutifolia Association**

### **Interior Live Oak / Toyon Association**

**Mapping Code: 3160**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Quercus wislizeni*/Heteromeles arbutifolia Woodland form an intermittent tree layer (36-57%, mean 43.3%), with hardwoods at 2-10m tall (36-57%, mean 43.3%). The shrub layer is open to intermittent (2-46%, mean 23%) with low shrubs at 0.5-1m and tall shrubs at 1-5m tall. The herbaceous layer is open (8-20%, mean 12.7%) at 0-0.5m tall. Total vegetation cover is 42-68%, mean 57.7%.

In this association, *Quercus wislizeni* is dominant in the overstory tree layer, though *Umbellularia californica* is often sub-dominant. *Pseudotsuga menziesii* is often regenerating in the understory. The shrub layer is characterized by *Heteromeles arbutifolia* and *Toxicodendron diversilobum* with similar cover. The herbaceous layer is characterized by *Galium porrigens* var. *porrigens* and *Polygala californica*, though many other herbs as well shrubs are often present.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 891-1879 ft., mean 1356 ft.

Aspect: usually SE, sometimes variable

Slope: somewhat steep to steep, range 17-35 degrees, mean 24 degrees

Topography: mid slope to ridge top, concave

Small Rock Cover: range 0.2-4%, mean 2.4%

Large Rock Cover: range 0-2%, mean 1%

Litter Cover: range 65-86%, mean 72.7%

Bare Ground: range 6-33%, mean 21.3%

Parent Material: Franciscan melange

Soil Texture: moderately fine sandy clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. They are usually found in cool, mesic environments such as concave or neutral slopes within the middle to upper elevations of the study area. The stands are usually circumscribed by chaparral or adjacent to other hardwood alliances.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 0.3%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Carduus pycnocephalus*, *Torilis nodosa*, and *Torilis arvensis*. Additional site impacts include light Sudden Oak Death Syndrome in one plot, light groundwater pumping in one stand, and light vandalism/dumping/litter in one stand.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** MMWD0268, MMWD0308, MMWD0345 **Releve(s):** none

**Rank:** G4 S4

#### **GLOBAL DISTRIBUTION**

Central Coast, Sierra Nevada foothills

#### **REFERENCES**

Allen et al. 1989, Evens et al. 2004

**Quercus wislizeni/Heteromeles arbutifolia Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	QUWI2-T	<i>Quercus wislizeni</i>	100	33.0	30	37
	UMCA-T	<i>Umbellularia californica</i>	67	9.3	5	23
	LIDE3-T	<i>Lithocarpus densiflorus</i>	33	2.7	8	8
	QUCH2-T	<i>Quercus chrysolepis</i>	33	0.3	1	1
<b>Tree Understory</b>						
	PSME-L	<i>Pseudotsuga menziesii</i>	100	0.2	0.2	0.2
	ARME-M	<i>Arbutus menziesii</i>	33	0.1	0.2	0.2
	UMCA-L	<i>Umbellularia californica</i>	33	0.1	0.2	0.2
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	100	12.1	0.2	36
	HEAR5	<i>Heteromeles arbutifolia</i>	100	5.7	0.2	10
	ARGL3	<i>Arctostaphylos glandulosa</i>	67	1.1	0.2	3
	MIAU	<i>Mimulus aurantiacus</i>	67	0.1	0.2	0.2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	33	0.1	0.2	0.2
	LUAL4	<i>Lupinus albifrons</i>	33	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	33	0.1	0.2	0.2
<b>Herb</b>						
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	100	0.2	0.2	0.2
	POCA5	<i>Polygala californica</i>	100	0.2	0.2	0.2
	MECA2	<i>Melica californica</i>	67	2.3	1	6
	CYGR	<i>Cynoglossum grande</i>	67	0.1	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	67	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	33	3.0	9	9
	IRMA	<i>Iris macrosiphon</i>	33	0.3	1	1
	STAJ	<i>Stachys ajugoides</i>	33	0.3	1	1
	CALYS	<i>Calystegia</i>	33	0.1	0.2	0.2
	CAPY2	<i>Carduus pycnocephalus</i>	33	0.1	0.2	0.2
	CAGL7	<i>Carex globosa</i>	33	0.1	0.2	0.2
	CLPE	<i>Claytonia perfoliata</i>	33	0.1	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	33	0.1	0.2	0.2
	DRAR3	<i>Dryopteris arguta</i>	33	0.1	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	33	0.1	0.2	0.2
	ERNU3	<i>Eriogonum nudum</i>	33	0.1	0.2	0.2
	FRVE	<i>Fragaria vesca</i>	33	0.1	0.2	0.2
	HIAL2	<i>Hieracium albiflorum</i>	33	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	33	0.1	0.2	0.2
	PITR3	<i>Piperia transversa</i>	33	0.1	0.2	0.2
	POMU	<i>Polystichum munitum</i>	33	0.1	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	33	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	33	0.1	0.2	0.2
	SICA4	<i>Silene californica</i>	33	0.1	0.2	0.2
	STRI	<i>Stachys rigida</i>	33	0.1	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	33	0.1	0.2	0.2
	TONO	<i>Torilis nodosa</i>	33	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	Moss	33	0.3	1	1

### ***Quercus wislizeni*-*Quercus chrysolepis* Alliance or Habitat**

This alliance is represented by the type association of *Quercus chrysolepis* co-dominant with *Q. wislizeni*. These two oak species primarily have a tree-stature, though they may vary in height.

### ***Quercus wislizeni*-*Quercus chrysolepis* Association Interior Live Oak - Canyon Live Oak Association**

**Mapping Code: 3160/1170**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Quercus wislizeni*-*Quercus chrysolepis* Woodland form an intermittent tree layer (47-59%, mean 53%), with hardwoods at 2-10m tall (47-51%, mean 49%) and conifers at 2-5m tall (0-8%, mean 4%). The shrub layer is open (3-5%, mean 4%) with low shrubs at 0-0.5m and tall shrubs at 0.5-5m tall. The herbaceous layer is open (4-8%, mean 6%) at 0-0.5m tall. Total vegetation cover is 56-63%, mean 59.5%.

In this alliance, *Quercus wislizeni* and *Quercus chrysolepis* are co-dominant in the overstory tree layer at moderate cover. *Pseudotsuga menziesii* is frequently regenerating in the understory. The shrub layer is characterized by *Symphoricarpos mollis* at low cover, though many other shrubs may be present. The herbaceous layer is diverse, without any characteristic species.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1543-2158 ft., mean 1851 ft.

Aspect: NE and NW

Slope: steep, range 29-37 degrees, mean 33 degrees

Topography: mid to upper slope, undulating or convex.

Small Rock Cover: range 1-5%, mean 3%

Large Rock Cover: range 0-4%, mean 2%

Litter Cover: range 78-78%, mean 78%

Bare Ground: range 14-15%, mean 14.5%

Parent Material: Franciscan melange

Soil Texture: moderately fine sandy clay loam, moderately coarse sandy loam

Stands of this alliance were sampled in the Mt. Tamalpais Watershed. They occur in upper elevations of the study area on cool, northerly slopes that are generally steep and rocky.

#### **SITE IMPACTS**

This alliance has low non-native plant cover (average 1%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Carduus pycnocephalus*, and *Cynosurus echinatus*. Additional site impacts include light Sudden Oak Death Syndrome in one plot.

#### **SENSITIVE SPECIES**

*Elymus californicus* was found in 1 of 2 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-1-3. Global rank is G3, and State rank is S3.3. Federal and state listing is None (CNPS 2005).

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** MMWD0317, MMWD0356 **Releve(s):** none

**Rank:** G4 S4

#### **GLOBAL DISTRIBUTION**

Montane Central Coast, Transverse Ranges, montane Peninsular Ranges

## REFERENCES

Evens et al. 2006, Gordon and White 1994, Holland 1986, Klein and Evens 2005, NatureServe 2005

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

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	QUCH2-T	<i>Quercus chrysolepis</i>	100	27.0	24	30
	QUWI2-T	<i>Quercus wislizeni</i>	100	20.0	15	25
	UMCA-T	<i>Umbellularia californica</i>	100	2.5	2	3
	ARME-T	<i>Arbutus menziesii</i>	50	0.5	1	1
<b>Tree Understory</b>						
	PSME-L	<i>Pseudotsuga menziesii</i>	100	1.1	0.2	2
	TOCA	<i>Torreya californica</i>	50	4.0	8	8
	COCOC	<i>Corylus cornuta</i> var. <i>californica</i>	50	1.0	2	2
	LIDE3-M	<i>Lithocarpus densiflorus</i>	50	0.5	1	1
	LIDE3-L	<i>Lithocarpus densiflorus</i>	50	0.1	0.2	0.2
<b>Shrub</b>						
	SYMO	<i>Symphoricarpos mollis</i>	100	0.6	0.2	1
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	50	0.5	1	1
	RUUR	<i>Rubus ursinus</i>	50	0.5	1	1
	ARGL3	<i>Arctostaphylos glandulosa</i>	50	0.1	0.2	0.2
	HEAR5	<i>Heteromeles arbutifolia</i>	50	0.1	0.2	0.2
	HODI	<i>Holodiscus discolor</i>	50	0.1	0.2	0.2
	QUPAS2	<i>Quercus parvula</i> var. <i>shrevei</i>	50	0.1	0.2	0.2
	ROCA2	<i>Rosa californica</i>	50	0.1	0.2	0.2
	TODI	<i>Toxicodendron diversilobum</i>	50	0.1	0.2	0.2
	VAOV2	<i>Vaccinium ovatum</i>	50	0.1	0.2	0.2
<b>Herb</b>						
	CAPY2	<i>Carduus pycnocephalus</i>	50	0.5	1	1
	POMU	<i>Polystichum munitum</i>	50	0.5	1	1
	STRI	<i>Stachys rigida</i>	50	0.5	1	1
	CACA39	<i>Cardamine californica</i>	50	0.1	0.2	0.2
	CLEX2	<i>Claytonia exigua</i>	50	0.1	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	50	0.1	0.2	0.2
	ELCA10	<i>Elymus californicus</i>	50	0.1	0.2	0.2
	FRVE	<i>Fragaria vesca</i>	50	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	50	0.1	0.2	0.2
	GATR3	<i>Galium triflorum</i>	50	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	50	0.1	0.2	0.2
	UNKN	<i>irreconcilable unknown</i>	50	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	50	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	50	0.1	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	50	0.1	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	50	0.1	0.2	0.2

### ***Salix laevigata* Alliance or Habitat**

This alliance is represented by a single association in the study area, which contains an understory of shrubs and herbs, with *Salix laevigata* in the overstory.

### ***Salix laevigata*-*Cornus sericea*/*Scirpus microcarpus* Association Red Willow - Redosier Dogwood / Small-fruited Bulrush Association**

**Mapping Code: 1310**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Salix laevigata*-*Cornus sericea*/*Scirpus microcarpus* Woodland/Forest form an intermittent tree layer (34-60%, mean 47%), with hardwoods at 5-10m tall (32-57%, mean 44.5%) and conifers at 5-15m tall (2-3%, mean 2.5%). The shrub layer is open (11-11%, mean 11%) with low shrubs at 0.5-1m and tall shrubs at 1-5m tall. The herbaceous layer is intermittent (53-61%, mean 57%) at 0-1m tall. Total vegetation cover is 78-83%, mean 80.5%.

In this association, *Salix laevigata* dominates the overstory tree layer at moderate cover, while conifers or other hardwoods may be present at low cover. The shrub layer is characterized by *Cornus sericea*, and the herbaceous layer is characterized by *Scirpus microcarpus* and *Carex* sp. as dominant species.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1177-1670 ft., mean 1424 ft.

Aspect: flat or variable

Slope: flat to gentle, range 0-2 degrees, mean 1 degrees

Topography: bottom to lower slope, linear or undulating

Small Rock Cover: 0.5% (data from one plot)

Large Rock Cover: none

Litter Cover: 73% (data from one plot)

Bare Ground: 23% (data from one plot)

Parent Material: Franciscan melange

Soil Texture: moderately fine silty clay loam, medium silt

Stands of this association were sampled in riparian areas of the Mt. Tamalpais Watershed. They occur in middle elevations of the study area, having a strong presence of riparian/wetland species in the understory. They also occur in bottomland drainages in the Point Reyes

#### **SITE IMPACTS**

This association has low non-native plant cover (average 0.1%) relative to native cover. The non-native species that occurs with the highest frequency and abundance is *Cirsium vulgare*. There are no additional site impacts.

#### **SENSITIVE SPECIES**

*Elymus californicus* was found in 1 of 2 surveys of this plant community. MMWD regionally considers this species as Rare. CNPS ranks this species as List 4 with R-E-D Code is 1-1-3. Global rank is G3, and State rank is S3.3. Federal and state listing is None (CNPS 2005).

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** MMWD0408, MMWD0410 **Releve(s):** none

**Rank:** G3 S3?

#### **GLOBAL DISTRIBUTION**



Northern outer Central Coast (known from Mt. Tamalpais area and observed in Golden Gate NRA and Point Reyes National Seashore); though full distribution is not known

## REFERENCES

NatureServe et al. 2003a, Per. Obs. 2006

### *Salix laevigata*-*Cornus sericea*/*Scirpus microcarpus* Association

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	SESE3	<i>Sequoia sempervirens</i>	50	2.5	5	5
	PSME-T	<i>Pseudotsuga menziesii</i>	50	1.0	2	2
<b>Tree Understory</b>						
	<b>SALA3</b>	<b><i>Salix laevigata</i></b>	<b>100</b>	<b>44.5</b>	<b>32</b>	<b>57</b>
	TOCA	<i>Torreya californica</i>	50	0.1	0.2	0.2
<b>Shrub</b>						
	<b>COSEO</b>	<b><i>Cornus sericea</i> subsp. <i>occidentalis</i></b>	<b>100</b>	<b>12.5</b>	<b>3</b>	<b>22</b>
	BAPI	<i>Baccharis pilularis</i>	50	5.5	11	11
	RHOC	<i>Rhododendron occidentale</i>	50	4.0	8	8
	RIBES	<i>Ribes</i>	50	0.1	0.2	0.2
	TODI	<i>Toxicodendron diversilobum</i>	50	0.1	0.2	0.2
	VAOV2	<i>Vaccinium ovatum</i>	50	0.1	0.2	0.2
<b>Herb</b>						
	<b>SCMI2</b>	<b><i>Scirpus microcarpus</i></b>	<b>100</b>	<b>21.0</b>	<b>17</b>	<b>25</b>
	CAREX	<i>Carex</i>	100	13.0	13	13
	DRAR3	<i>Dryopteris arguta</i>	100	0.6	0.2	1
	UNKN	<i>irreconcilable unknown</i>	100	0.2	0.2	0.2
	JUPA2	<i>Juncus patens</i>	50	7.5	15	15
	ELCA10	<i>Elymus californicus</i>	50	4.0	8	8
	WOFI	<i>Woodwardia fimbriata</i>	50	3.5	7	7
	HELA4	<i>Heracleum lanatum</i>	50	0.5	1	1
	JUOC2	<i>Juncus occidentalis</i>	50	0.5	1	1
	CIVU	<i>Cirsium vulgare</i>	50	0.1	0.2	0.2
	HEMI7	<i>Heuchera micrantha</i>	50	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	50	0.1	0.2	0.2
	POMU	<i>Polystichum munitum</i>	50	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	100	8.5	2	15

### ***Salix lasiolepis* Alliance or Habitat**

This alliance is represented by a single association in the study area, which contains an understory of shrubs and vines with *Salix lasiolepis* in the overstory.

### ***Salix lasiolepis/Baccharis pilularis-Rubus ursinus* Association**

#### **Arroyo Willow / Coyote Brush - California Blackberry Association**

**Mapping Code: 1310**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Salix lasiolepis/Baccharis pilularis-Rubus ursinus* Woodland form an open to intermittent tree layer (10-40%, mean 21.3%), with hardwoods at 2-10m tall (10-40%, mean 21.3%). The shrub layer is open to intermittent (21-45%, mean 31.3%) with low shrubs at 0.5-1m and tall shrubs at 1-5m tall. The herbaceous layer is open to intermittent (13-50%, mean 27%) at 0-1m tall. Total vegetation cover is 77-81%, mean 79.3%.

In this association, *Salix lasiolepis* dominates the overstory tree layer at low to moderate cover, and various other hardwoods are usually present at low cover. The shrub layer is characterized by *Baccharis pilularis* and *Rubus ursinus*, which co-dominate in the stands sampled. The herbaceous layer often contains *Carex* spp., *Juncus* spp., *Cyperus eragrostis*, and *Mentha pulegium* at variable cover.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 147-363 ft., mean 234 ft.

Aspect: flat

Slope: flat, range 0-0 degrees, mean 0 degrees

Topography: bottom or draws in upper slopes, linear

Small Rock Cover: range 0-3%, mean 1.5%

Large Rock Cover: range 0-2%, mean 1%

Litter Cover: range 50-74%, mean 62%

Bare Ground: range 15-47%, mean 31%

Parent Material: Franciscan melange

Soil Texture: medium to very fine sandy loam, muck, fine clay

Stands of this association were sampled in the Mt. Tamalpais Watershed, at Nicasio Reservoir, and at Soulajule Reservoir. This association occurs in low elevations of the study area, and it is the equivalent to the *Salix lasiolepis* / *Rubus* spp. defined in NatureServe et al. (2003a).

#### **SITE IMPACTS**

This association has low non-native plant cover (average 14.5%) relative to native cover. Non-native species occurring with highest frequency and abundance include *Dipsacus sativus*, *Conium maculatum*, and *Carduus pycnocephalus*. Site impacts also include light vandalism/dumping/litter in one stand.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** MMWD0130, MMWD0241, MMWD0393 **Releve(s):** none

**Rank:** G3 S3

#### **GLOBAL DISTRIBUTION**

Outer Central Coast (known from Point Reyes National Seashore, Golden Gate NRA, Mt. Tamalpais, and Marin Co. Reservoir areas), likely common across coastal California; though full distribution is not known

#### **REFERENCES**

NatureServe et al. 2003a

***Salix lasiolepis/Baccharis pilularis-Rubus ursinus* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	SALU	<i>Salix lucida</i>	33	0.1	0.2	0.2
	UMCA-T	<i>Umbellularia californica</i>	33	0.1	0.2	0.2
<b>Tree Understory</b>						
	<b>SALA6</b>	<b><i>Salix lasiolepis</i></b>	<b>100</b>	<b>23.0</b>	<b>14</b>	<b>40</b>
	AECA	<i>Aesculus californica</i>	33	0.1	0.2	0.2
<b>Shrub</b>						
	<b>BAPI</b>	<b><i>Baccharis pilularis</i></b>	<b>100</b>	<b>14.3</b>	<b>3</b>	<b>30</b>
	<b>RUUR</b>	<b><i>Rubus ursinus</i></b>	<b>100</b>	<b>6.0</b>	<b>2</b>	<b>12</b>
	TODI	<i>Toxicodendron diversilobum</i>	67	1.0	1	2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	33	0.1	0.2	0.2
<b>Herb</b>						
	CYER	<i>Cyperus eragrostis</i>	67	2.7	1	7
	JUOC2	<i>Juncus occidentalis</i>	67	0.4	0.2	1
	CAREX	<i>Carex</i>	67	0.1	0.2	0.2
	MEPU	<i>Mentha pulegium</i>	67	0.1	0.2	0.2
	DISA9	<i>Dipsacus sativus</i>	33	6.7	20	20
	TYPHA	<i>Typha</i>	33	4.0	12	12
	COMA2	<i>Conium maculatum</i>	33	2.7	8	8
	JUEF	<i>Juncus effusus</i>	33	1.7	5	5
	EQUIS	<i>Equisetum</i>	33	1.3	4	4
	CAPY2	<i>Carduus pycnocephalus</i>	33	0.7	2	2
	STRI	<i>Stachys rigida</i>	33	0.7	2	2
	URDI	<i>Urtica dioica</i>	33	0.7	2	2
	UNKN	<i>irreconcilable unknown</i>	33	0.5	1.4	1.4
	CABA4	<i>Carex barbarae</i>	33	0.3	1	1
	CENTA2	<i>Centaurium</i>	33	0.3	1	1
	CYEC	<i>Cynosurus echinatus</i>	33	0.3	1	1
	HOLA	<i>Holcus lanatus</i>	33	0.3	1	1
	SOAS	<i>Sonchus asper</i>	33	0.3	1	1
	AICA	<i>Aira caryophyllea</i>	33	0.1	0.2	0.2
	ANAR	<i>Anagallis arvensis</i>	33	0.1	0.2	0.2
	AVBA	<i>Avena barbata</i>	33	0.1	0.2	0.2
	BRMI2	<i>Briza minor</i>	33	0.1	0.2	0.2
	CACA39	<i>Cardamine californica</i>	33	0.1	0.2	0.2
	CADE8	<i>Carex densa</i>	33	0.1	0.2	0.2
	CLPE	<i>Claytonia perfoliata</i>	33	0.1	0.2	0.2
	EPILO	<i>Epilobium</i>	33	0.1	0.2	0.2
	EQTE	<i>Equisetum telmateia</i>	33	0.1	0.2	0.2
	LOPE	<i>Lolium perenne</i>	33	0.1	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	33	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	33	0.1	0.2	0.2
	SCCA2	<i>Scrophularia californica</i>	33	0.1	0.2	0.2
	STAJ	<i>Stachys ajugoides</i>	33	0.1	0.2	0.2
	STME2	<i>Stellaria media</i>	33	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	33	0.3	1	1

### ***Salix lucida* Alliance or Habitat**

This alliance is represented by a single stand sampled with *Salix lucida* as an overstory dominant. No association was defined.

### ***Salix lucida* Alliance Shining Willow Alliance**

**Mapping Code: 1310**

#### **LOCAL VEGETATION DESCRIPTION**

One Stand of *Salix lucida* Woodland forms an intermittent tree layer (47%), with hardwoods at 5-10m tall (47%). The shrub layer is open (5%) with low shrubs at 0-0.5m and tall shrubs at 0.5-1m tall. The herbaceous layer is open (14%) at 0-0.5m tall. Total vegetation cover is 50%.

In this alliance, *Salix lucida* dominates or co-dominates with other hardwood species. In one stand sampled, *S. lucida* co-dominates with *Quercus agrifolia* and *Umbellularia californica*, and *Fraxinus latifolia* is present as an understory tree. The shrub layer contains various species such as *Baccharis pilularis* and *Toxicodendron diversilobum*. The herbaceous layer is diverse, including non-natives *Carthamus lanatus*, *Foeniculum vulgare*, and *Holcus lanatus* as well as natives *Equisetum telmateia* and *Urtica dioica*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: not recorded.

Aspect: variable

Slope: very steep, 68 degrees

Topography: bottom, concave

Small Rock Cover: 3%

Large Rock Cover: 1%

Litter Cover: 39%

Bare Ground: 55%

Parent Material: Franciscan melange

Soil Texture: medium silt

One stand of this alliance was sampled at Soulaule Reservoir.

#### **SITE IMPACTS**

The stand representing this alliance has low non-native plant cover (average 17.4%) relative to native cover. Non-native species that occur with the highest abundance include *Carthamus lanatus*, *Foeniculum vulgare*, *Holcus lanatus*, and *Hypochaeris glabra*. Additional site impacts include light erosion/runoff.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0387 **Releve(s):** none

**Rank:** G4 S4 (alliance level)

#### **GLOBAL DISTRIBUTION**

North Coast, Central Coast, Southern California, Sierra Nevada, Cascade Range foothills

#### **REFERENCES**

NatureServe et al. 2003a, NatureServe 2005, Potter 2006, Smith 1998

**Salix lucida Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	<b>SALU</b>	<b>Salix lucida</b>	<b>100</b>	<b>20.0</b>	<b>20</b>	<b>20</b>
	QUAG-T	Quercus agrifolia	100	17.0	17	17
	UMCA-T	Umbellularia californica	100	10.0	10	10
<b>Tree Understory</b>						
	FRLA	Fraxinus latifolia	100	1.0	1	1
<b>Shrub</b>						
	BAPI	Baccharis pilularis	100	2.0	2	2
	TODI	Toxicodendron diversilobum	100	2.0	2	2
	LOHIV	Lonicera hispidula var. vacillans	100	1.0	1	1
	RUUR	Rubus ursinus	100	0.2	0.2	0.2
<b>Herb</b>						
	CALA20	Carthamus lanatus	100	3.0	3	3
	FOVU	Foeniculum vulgare	100	3.0	3	3
	HOLA	Holcus lanatus	100	2.0	2	2
	CAPY2	Carduus pycnocephalus	100	1.0	1	1
	CYEC	Cynosurus echinatus	100	1.0	1	1
	HYGL2	Hypochaeris glabra	100	1.0	1	1
	AVBA	Avena barbata	100	0.2	0.2	0.2
	CAPU18	Calystegia purpurata	100	0.2	0.2	0.2
	CYER	Cyperus eragrostis	100	0.2	0.2	0.2
	EQTE	Equisetum telmateia	100	0.2	0.2	0.2
	RUAC3	Rumex acetosella	100	0.2	0.2	0.2
	URDI	Urtica dioica	100	0.2	0.2	0.2

## ***Sequoia sempervirens* Alliance or Habitat**

This alliance is found in upland and riparian settings, identified in seven associations. Riparian environments include an association of relatively pure *Sequoia sempervirens* in the canopy and a mixture of *S. sempervirens* with hardwoods in the subcanopy. Three mesic associations have subcanopies of hardwoods and shrubby understories especially with *Vaccinium ovatum*. The most variable, upland association has *Umbellularia californica* in the subcanopy because of past logging, fires, or other disturbances.

### ***Sequoia sempervirens*-*Acer macrophyllum*-*Umbellularia californica* (Riparian) Association Redwood - Bigleaf Maple - California Bay (Riparian) Association**

**Mapping Code: 1217**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Sequoia sempervirens*-*Acer macrophyllum*-*Umbellularia californica* Riparian Woodland form an open to intermittent tree layer (27-56%, mean 39.3%), with hardwoods at 2-35m tall (14-38%, mean 21.7%) and conifers at 5-35m tall (12-22%, mean 17.6%). The shrub layer is open (1-18%, mean 7.4%) with low shrubs at 0-2m and tall shrubs at 0-5m tall. The herbaceous layer is open (5-12%, mean 9%) at 0-0.5m tall. Total vegetation cover is 42-68%, mean 53.7%.

In this association, *Sequoia sempervirens* is dominant to co-dominant in the tree layer with riparian species *Acer macrophyllum* and mesic species *Umbellularia californica*. *Alnus rhombifolia* is often present at low to moderate cover, and *Lithocarpus densiflorus* is often regenerating in the understory at low cover. The shrub layer is variable and often contains *Toxicodendron diversilobum* at sparse cover. The herbaceous layer is also variable and often contains *Polystichum munitum*, *Whipplea modesta*, *Athyrium filix-femina*, and *Iris douglasiana*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 203-895 ft., mean 446 ft.

Aspect: frequently variable, infrequently flat

Slope: flat to abrupt, range 0-70 degrees, mean 27.9 degrees

Topography: usually bottom, undulating or concave, infrequently convex or linear

Small Rock Cover: range 1-15%, mean 8%

Large Rock Cover: range 0-5%, mean 2.5%

Litter Cover: range 40-56%, mean 48%

Bare Ground: range 39-40%, mean 39.5%

Parent Material: Franciscan melange

Soil Texture: usually moderately fine sandy clay loam, infrequently moderately fine clay loam, medium to very fine sandy loam, or coarse loamy sand

Stands of this association were sampled in perennially flowing drainages often with broad channels and steep banks in the Mt. Tamalpais Watershed. Stands occur in riparian zones adjacent to upland stands of *Sequoia sempervirens* and *Umbellularia californica* alliances.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 0.2%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Torilis arvensis*, and *Vicia sativa*. Additional site impacts include moderate to heavy Sudden Oak Death Syndrome in three stands, heavy erosion/runoff in one stand, heavy foot traffic/trampling in one stand, and light vandalism/dumping/litter in one stand.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=7)**

**Rapid Assessment(s):** MMWD0134, MMWD0135, MMWD0148, MMWD0149, MMWD0155, MMWD0158, MMWD0251 **Releve(s):** none

**Rank:** G3 S3

## GLOBAL DISTRIBUTION

Outer Central Coast (including southern Monterey County to Marin County), and possibly to outer North Coast and Oregon; though full distribution is not known

## REFERENCES

Borchert et al. 1988

### *Sequoia sempervirens*-*Acer macrophyllum*-*Umbellularia californica* (Riparian) Association

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	SESE3	<i>Sequoia sempervirens</i>	100	18.0	15	22
	UMCA-T	<i>Umbellularia californica</i>	100	9.6	4	15
	ACMA3-T	<i>Acer macrophyllum</i>	86	6.0	1	15
	ALRH2	<i>Alnus rhombifolia</i>	71	3.1	1	12
	ARME-T	<i>Arbutus menziesii</i>	43	1.7	1	10
	QUAG-T	<i>Quercus agrifolia</i>	29	2.7	6	13
<b>Tree Understory</b>						
	LIDE3-M	<i>Lithocarpus densiflorus</i>	71	1.1	0.2	3
	COCOC	<i>Corylus cornuta</i> var. <i>californica</i>	43	1.0	0.2	4
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	57	0.4	0.2	2
	VAOV2	<i>Vaccinium ovatum</i>	29	0.9	2	4
	HODI	<i>Holodiscus discolor</i>	29	0.1	0.2	0.2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	29	0.1	0.2	0.2
	ROCA2	<i>Rosa californica</i>	29	0.1	0.2	0.2
	RUUR	<i>Rubus ursinus</i>	29	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	29	0.1	0.2	0.2
<b>Herb</b>						
	POMU	<i>Polystichum munitum</i>	71	1.7	0.2	5
	WHMO	<i>Whipplea modesta</i>	57	0.5	0.2	2
	ATFI	<i>Athyrium filix-femina</i>	57	0.3	0.2	1
	IRDO	<i>Iris douglasiana</i>	57	0.3	0.2	1
	GATR3	<i>Galium triflorum</i>	57	0.1	0.2	0.2
	BRLA3	<i>Bromus laevipes</i>	43	0.1	0.2	0.2
	POLYP	<i>Polypodium</i>	43	0.1	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	43	0.1	0.2	0.2
	ADJO	<i>Adiantum jordanii</i>	29	0.2	0.2	1
	EQTE	<i>Equisetum telmateia</i>	29	0.2	0.2	1
	PTAQ	<i>Pteridium aquilinum</i>	29	0.2	0.2	1
	CLPE	<i>Claytonia perfoliata</i>	29	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	29	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	29	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	29	0.1	0.2	0.2
	STRI	<i>Stachys rigida</i>	29	0.1	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	29	0.1	0.2	0.2

***Sequoia sempervirens*-*Arbutus menziesii*/*Vaccinium ovatum* Association**  
**Redwood - Pacific Madrone / Black Huckleberry Association**

**Mapping Code:** 1216mu

**LOCAL VEGETATION DESCRIPTION**

Stands of *Sequoia sempervirens*-*Arbutus menziesii*/*Vaccinium ovatum* Woodland form an open to intermittent tree layer (7-48%, mean 34.1%), with hardwoods at 5-20m tall (1-24%, mean 12.3%) and conifers at 5-50m tall (3-42%, mean 21.9%). The shrub layer is open to dense (5-70%, mean 27.1%) with low shrubs at 0.5-2m and tall shrubs at 1-5m tall. The herbaceous layer is open (0.2-14%, mean 5.7%) at 0-1m tall. Total vegetation cover is 45-85%, mean 59.6%.

In this association, *Sequoia sempervirens* occurs as the dominant while *Arbutus menziesii* is sub-dominant in the overstory tree layer. *Lithocarpus densiflorus* is often present as an overstory or understory tree at low cover. The shrub layer is characterized primarily by *Vaccinium ovatum*. The herbaceous layer is variable with *Pteridium aquilinum*, *Whipplea modesta*, and *Dryopteris arguta* most abundant.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 103-1470 ft., mean 845 ft.

Aspect: usually NE

Slope: moderate to very steep, range 11-47 degrees, mean 30.7 degrees

Topography: usually mid slope, convex or undulating

Small Rock Cover: range 0-1%, mean 0.3%

Large Rock Cover: none

Litter Cover: range 72-95%, mean 87.2%

Bare Ground: range 3-25%, mean 9.8%

Parent Material: Franciscan melange

Soil Texture: clay loams or sandy loams, usually of fine texture

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands have considerable variability with young and mature *Sequoia sempervirens* as well as *Arbutus menziesii*. The *Sequoia sempervirens*-*Lithocarpus densiflorus*/*Vaccinium ovatum* Association may be transitioning to this association with *Arbutus menziesii*, since Sudden Oak Death Syndrome is compromising the *Lithocarpus densiflorus*. This is also potentially similar to *Sequoia sempervirens*/*Vaccinium ovatum* Association in Coast Range of Oregon.

**SITE IMPACTS**

This association has low non-native plant cover (average 0.2%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Vicia sativa*, and *Hedera helix*. Additional site impacts include heavy Sudden Oak Death Syndrome in two stands, light Sudden Oak Death Syndrome in two stands, and light vandalism/dumping/litter in two stands.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=7)**

**Rapid Assessment(s):** MMWD0107, MMWD0132, MMWD0209, MMWD0217, MMWD0270, MMWD0273, MMWD0415 **Releve(s):** none

**Rank:** G3 S3

**GLOBAL DISTRIBUTION**

Northern outer Central Coast (known from Mt. Tamalpais area) and probably outer North Coast north to Oregon; though full distribution is not known

**REFERENCES**

Kagan et al. 2004



***Sequoia sempervirens*-*Arbutus menziesii*/*Vaccinium ovatum* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	SESE3	<i>Sequoia sempervirens</i>	100	25.3	1	60
	ARME-T	<i>Arbutus menziesii</i>	100	8.9	1	20
	LIDE3-T	<i>Lithocarpus densiflorus</i>	43	3.6	3	18
	PSME-T	<i>Pseudotsuga menziesii</i>	29	0.3	0.2	2
<b>Tree Understory</b>						
	LIDE3-M	<i>Lithocarpus densiflorus</i>	29	2.0	2	12
<b>Shrub</b>						
	VAOV2	<i>Vaccinium ovatum</i>	100	16.1	1	50
	TODI	<i>Toxicodendron diversilobum</i>	86	0.3	0.2	1
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	57	1.5	0.2	7
	ARGL3	<i>Arctostaphylos glandulosa</i>	43	0.5	0.2	2
	SYMO	<i>Symphoricarpos mollis</i>	43	0.1	0.2	0.2
	QUWI2-L	<i>Quercus wislizeni</i>	29	0.1	0.2	0.2
<b>Herb</b>						
	PTAQ	<i>Pteridium aquilinum</i>	57	0.5	0.2	2
	WHMO	<i>Whipplea modesta</i>	57	0.2	0.2	1
	CAGL7	<i>Carex globosa</i>	57	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	57	0.1	0.2	0.2
	DRAR3	<i>Dryopteris arguta</i>	43	0.5	0.2	3
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	43	0.1	0.2	0.2
	VISA	<i>Vicia sativa</i>	43	0.1	0.2	0.2
	XETE	<i>Xerophyllum tenax</i>	29	0.6	1	3
	IRDO	<i>Iris douglasiana</i>	29	0.1	0.2	0.2
	POMU	<i>Polystichum munitum</i>	29	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	43	0.2	0.2	1

***Sequoia sempervirens*-*Chrysolepis chrysophylla*/*Arctostaphylos glandulosa* Association**  
**Redwood - Chinquapin / Eastwood Manzanita Association**

**Mapping Code: 1213**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Sequoia sempervirens*-*Chrysolepis chrysophylla*/*Arctostaphylos glandulosa* Woodland/Forest form an open to intermittent tree layer (28-60%, mean 47.7%), with hardwoods at 5-10m tall (20-35%, mean 26.7%) and conifers at 5-20m tall (8-30%, mean 21%). The shrub layer is open to intermittent (25-65%, mean 43.3%) with low shrubs at 0.5-2m and tall shrubs at 1-5m tall. The herbaceous layer is open (2-5%, mean 4%) at 0-0.5m tall. Total vegetation cover is 55-75%, mean 65%.

In this association, *Sequoia sempervirens* is the dominant overstory tree while *Chrysolepis chrysophylla* is the dominant understory tree. *Pseudotsuga menziesii* is often regenerating in the understory. The shrub layer is characterized by *Arctostaphylos glandulosa* and *Vaccinium ovatum* with similar cover values. The herbaceous layer is characterized by *Carex* spp. and *Pteridium aquilinum*, and many other herbs often occur.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 943-1602 ft., mean 1201 ft.

Aspect: NE

Slope: gentle to steep, range 3-27 degrees, mean 14.3 degrees

Topography: upper slope to ridge top, concave, convex or undulating

Small Rock Cover: range 0-1%, mean 0.7%

Large Rock Cover: none

Litter Cover: range 94-97%, mean 95.3%

Bare Ground: range 0.5-2%, mean 1.2%

Parent Material: Franciscan melange

Soil Texture: moderately coarse sandy loam, medium loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands have multiple overlapping layers of vegetation, from the overstory *Sequoia sempervirens* trees, sub-canopy *Chrysolepis chrysophylla* trees, and understory *Arctostaphylos glandulosa* and *Vaccinium ovatum* shrubs. They are upland in nature adjacent to stands of *Chrysolepis chrysophylla* and *Arctostaphylos glandulosa* alliances.

**SITE IMPACTS**

This association has low non-native plant cover (average 0.0%) relative to native cover. The only potential non-native species are an unidentified grass and another unknown. There are no additional site impacts.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** MMWD0215, MMWD0216, MMWD0417 **Releve(s):** none

**Rank:** G2 S2?

**GLOBAL DISTRIBUTION**

Northern outer Central Coast (known from Mt. Tamalpais area) and probably outer North Coast; though full distribution is not known

**REFERENCES**

None

***Sequoia sempervirens*-*Chrysolepis chrysophylla*/*Arctostaphylos glandulosa* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	<b>SESE3</b>	<b><i>Sequoia sempervirens</i></b>	<b>100</b>	<b>21.0</b>	<b>15</b>	<b>33</b>
	PIRA2	<i>Pinus radiata</i>	33	3.3	10	10
	QUWI2-T	<i>Quercus wislizeni</i>	33	0.3	1	1
<b>Tree Understory</b>						
	<b>CHCH7-T</b>	<b><i>Chrysolepis chrysophylla</i></b>	<b>100</b>	<b>22.7</b>	<b>5</b>	<b>35</b>
	PSME-L	<i>Pseudotsuga menziesii</i>	67	0.1	0.2	0.2
	LIDE3-L	<i>Lithocarpus densiflorus</i>	33	0.1	0.2	0.2
<b>Shrub</b>						
	<b>ARGL3</b>	<b><i>Arctostaphylos glandulosa</i></b>	<b>100</b>	<b>11.4</b>	<b>0.2</b>	<b>19</b>
	VAOV2	<i>Vaccinium ovatum</i>	100	9.0	2	18
	QUWI2-L	<i>Quercus wislizeni</i>	67	0.1	0.2	0.2
	ADFA	<i>Adenostoma fasciculatum</i>	33	0.1	0.2	0.2
	ARNU3	<i>Arctostaphylos nummularia</i>	33	0.1	0.2	0.2
	CHCH7-L	<i>Chrysolepis chrysophylla</i>	33	0.1	0.2	0.2
	PIMO5	<i>Pickeringia montana</i>	33	0.1	0.2	0.2
	ROSA5	<i>Rosa</i>	33	0.1	0.2	0.2
<b>Herb</b>						
	CAREX	<i>Carex</i>	133	0.3	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	100	0.2	0.2	0.2
	IRMA	<i>Iris macrosiphon</i>	67	0.1	0.2	0.2
	UNKN	<i>irreconcilable unknown</i>	67	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	67	0.1	0.2	0.2
	DRAR3	<i>Dryopteris arguta</i>	33	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	33	0.1	0.2	0.2
	POACXX	<i>Poaceae</i>	33	0.1	0.2	0.2
<b>Cryptogam</b>						
	LICHEN	<i>Lichen</i>	67	11.7	0.2	35
	MOSS	<i>Moss</i>	33	0.1	0.2	0.2

***Sequoia sempervirens*-*Lithocarpus densiflorus*/*Vaccinium ovatum* Association**  
**Redwood - Tanoak / Black Huckleberry Association**

**Mapping Code: 1211**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Sequoia sempervirens*-*Lithocarpus densiflorus*/*Vaccinium ovatum* Woodland form an open to intermittent tree layer (30-58%, mean 47.6%), with hardwoods at 5-20m tall (0-46%, mean 21.1%) and conifers at 10-50m tall (10-48%, mean 26.4%). The shrub layer is open to intermittent (2-58%, mean 19.1%) with low shrubs at 0.5-5m and tall shrubs at 0.5-10m tall. The herbaceous layer is open (0.2-15%, mean 4%) at 0-0.5m tall. Total vegetation cover is 40-76%, mean 54.7%.

In this association, *Sequoia sempervirens* is co-dominant with *Lithocarpus densiflorus* in the tree overstory layer. *Lithocarpus densiflorus* may also be regenerating in the understory. The shrub layer is characterized by a dominance of *Vaccinium ovatum* at low to moderate cover. The herbaceous layer is characterized by *Polystichum munitum*, and often present is *Carex*.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 420-1565 ft., mean 1026 ft.

Aspect: usually NE or NW

Slope: gentle to steep, range 2-43 degrees, mean 19 degrees

Topography: lower slope to ridge top, concave, convex or undulating

Small Rock Cover: range 0-2%, mean 0.4%

Large Rock Cover: range 0-1%, mean 0.1%

Litter Cover: range 75-95%, mean 89.2%

Bare Ground: range 2-23%, mean 7.8%

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam, or fine sandy or silty clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands are variable in stature and mesic to riparian in nature, some possibly stunted from the fine-textured soil. The *Lithocarpus densiflorus* has noticeable decadance from Sudden Oak Death Syndrome. They are often adjacent to riparian or upland stands of *Sequoia sempervirens* or *Umbellularia californica* alliances.

**SITE IMPACTS**

This association has low non-native plant cover (average 0.1%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Torilis arvensis*, and *Vicia sativa*. Additional site impacts include heavy Sudden Oak Death Syndrome in seven stands and moderate Sudden Oak Death Syndrome in one stand, moderate vandalism/dumping/litter in one stand, and heavy logging in one stand.

**SENSITIVE SPECIES**

*Amorpha californica* var. *napensis* was found in 1 of 9 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 2-2-3. Global rank is G4T2, and State rank is S2.2. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=9)**

**Rapid Assessment(s):** MMWD0179, MMWD0180, MMWD0252, MMWD0285, MMWD0390, MMWD0391, MMWD0392, MMWD0406, MMWD0416 **Releve(s):** none

**Rank:** G3 S3

**GLOBAL DISTRIBUTION**

Northern outer Central Coast (including Point Reyes National Seashore, Golden Gate NRA, and Mt. Tamalpais areas); though full distribution is not known.

## REFERENCES

NatureServe et al. 2003a

### *Sequoia sempervirens*-*Lithocarpus densiflorus*/*Vaccinium ovatum* Association

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	SESE3	<i>Sequoia sempervirens</i>	100	27.2	10	48
	LIDE3-T	<i>Lithocarpus densiflorus</i>	78	20.2	1	45
	UMCA-T	<i>Umbellularia californica</i>	44	1.4	0.2	5
<b>Tree Understory</b>						
	LIDE3-M	<i>Lithocarpus densiflorus</i>	22	1.8	4	12
	UMCA-L	<i>Umbellularia californica</i>	22	0.0	0.2	0.2
<b>Shrub</b>						
	VAOV2	<i>Vaccinium ovatum</i>	100	13.2	1	47
	SYMO	<i>Symphoricarpos mollis</i>	22	0.4	0.2	3
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	22	0.0	0.2	0.2
<b>Herb</b>						
	POMU	<i>Polystichum munitum</i>	89	1.0	0.2	5
	CAREX	<i>Carex</i>	67	0.3	0.2	1
	POLYP	<i>Polypodium</i>	56	0.1	0.2	0.4
	DRAR3	<i>Dryopteris arguta</i>	44	0.5	0.2	3
	CACA39	<i>Cardamine californica</i>	44	0.1	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	44	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	33	0.2	0.2	1
	GATR3	<i>Galium triflorum</i>	33	0.1	0.2	0.2
	HIOC	<i>Hierochloe occidentalis</i>	33	0.1	0.2	0.2
	JUNCU	<i>Juncus</i>	22	0.0	0.2	0.2
	POCA5	<i>Polygala californica</i>	22	0.0	0.2	0.2
	SMRAA	<i>Smilacina racemosa</i> var. <i>amplexicaulis</i>	22	0.0	0.2	0.2
	TRLA6	<i>Trientalis latifolia</i>	22	0.0	0.2	0.2
	TROV2	<i>Trillium ovatum</i>	22	0.0	0.2	0.2
	VISA	<i>Vicia sativa</i>	22	0.0	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	89	5.9	0.2	20
	LICHEN	<i>Lichen</i>	44	0.3	0.2	2

***Sequoia sempervirens*/Woodwardia fimbriata (Riparian) Association**  
**Redwood - Tanoak / Chain Fern Riparian Association**

**Mapping Code: 1217**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Sequoia sempervirens*/Woodwardia fimbriata Riparian Woodland/Forest form an intermittent to dense tree layer (34-70%, mean 50.3%), with hardwoods at 5-20m tall (0-30%, mean 16.4%) and conifers at 10-35m tall (17-50%, mean 33.9%). The shrub layer is open (3-29%, mean 12.3%) with low shrubs at 0-2m and tall shrubs at 0.5-5m tall. The herbaceous layer is open (3-32%, mean 11.3%) at 0-1m tall. Total vegetation cover is 52-73%, mean 62%.

In this association, *Sequoia sempervirens* is the dominant overstory tree in riparian stands, while *Lithocarpus densiflorus* and *Umbellularia californica* are frequently present at low cover as an overstory or understory tree. The shrub layer contains *Lonicera hispidula* var. *vacillans* and *Toxicodendron diversilobum*, often present at low cover. The herbaceous layer contains perennial riparian species with *Woodwardia fimbriata* characteristically present and *Aralia californica* often present, and both are abundant at low to moderate cover.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 369-1819 ft., mean 932 ft.

Aspect: NE, NW or variable

Slope: gentle to abrupt, range 5-70 degrees, mean 30.4 degrees

Topography: bottom to upper slope, usually concave or undulating

Small Rock Cover: range 0.2-2%, mean 1.5%

Large Rock Cover: range 0-12%, mean 2.5%

Litter Cover: range 58-93%, mean 83.7%

Bare Ground: range 0.2-38%, mean 9.7%

Parent Material: Franciscan melange

Soil Texture: moderately fine sandy clay loam, moderately coarse sandy loam, medium silt loam, fine sandy clay

Stands of this association were sampled along intermittently to perennially flowing drainages, often with narrow channels and steep banks, in the Mt. Tamalpais Watershed. Stands are in small riparian zones with upland stands of *Umbellularia californica* alliance often adjacent.

**SITE IMPACTS**

This association has low non-native plant cover (average 0.1%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Holcus lanatus*, and *Myosotis latifolia*. Additional site impacts include heavy Sudden Oak Death Syndrome in all of the sampled stands, light vandalism/dumping/litter in one stand, and moderate vandalism/dumping/litter in one stand.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=7)**

**Rapid Assessment(s):** MMWD0133, MMWD0172, MMWD0271, MMWD0286, MMWD0289, MMWD0398, MMWD0400 **Releve(s):** none

**Rank:** G3 S3

**GLOBAL DISTRIBUTION**

Outer Central Coast (including southern Monterey County to Marin County), and possibly to outer North Coast and Oregon; though full distribution is not known

**REFERENCES**

Borchert et al. 1988

***Sequoia sempervirens*/Woodwardia fimbriata (Riparian) Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	<b>SESE3</b>	<b><i>Sequoia sempervirens</i></b>	<b>100</b>	<b>33.1</b>	<b>17</b>	<b>50</b>
	UMCA-T	<i>Umbellularia californica</i>	71	6.2	0.2	17
	LIDE3-T	<i>Lithocarpus densiflorus</i>	57	11.7	17	27
	ARME-T	<i>Arbutus menziesii</i>	29	0.4	1	2
<b>Tree Understory</b>						
	LIDE3-M	<i>Lithocarpus densiflorus</i>	29	1.1	4	4
	COCOC	<i>Corylus cornuta</i> var. <i>californica</i>	29	0.2	0.2	1
<b>Shrub</b>						
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	71	0.1	0.2	0.2
	TODI	<i>Toxicodendron diversilobum</i>	71	0.1	0.2	0.2
	VAOV2	<i>Vaccinium ovatum</i>	43	0.2	0.2	1
	RUUR	<i>Rubus ursinus</i>	29	0.7	0.2	5
	SYMO	<i>Symphoricarpos mollis</i>	29	0.2	0.2	1
<b>Herb</b>						
	<b>WOFI</b>	<b><i>Woodwardia fimbriata</i></b>	<b>100</b>	<b>3.5</b>	<b>0.2</b>	<b>20</b>
	POMU	<i>Polystichum munitum</i>	71	0.7	0.2	2
	ARCA2	<i>Aralia californica</i>	57	3.2	0.2	20
	EQTE	<i>Equisetum telmateia</i>	43	0.5	0.2	3
	DRAR3	<i>Dryopteris arguta</i>	43	0.2	0.2	1
	PTAQ	<i>Pteridium aquilinum</i>	43	0.2	0.2	1
	GATR3	<i>Galium triflorum</i>	43	0.1	0.2	0.2
	SMRAA	<i>Smilacina racemosa</i> var. <i>amplexicaulis</i>	43	0.1	0.2	0.2
	TRLA6	<i>Trientalis latifolia</i>	43	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	29	0.3	0.2	2
	WHMO	<i>Whipplea modesta</i>	29	0.3	0.2	2
	HIOC	<i>Hierochloe occidentalis</i>	29	0.2	0.2	1
	CAGL7	<i>Carex globosa</i>	29	0.1	0.2	0.2
	IRMA	<i>Iris macrosiphon</i>	29	0.1	0.2	0.2
	POLYP	<i>Polypodium</i>	29	0.1	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	29	0.1	0.2	0.2
	SCBI	<i>Scoliopus bigelovii</i>	29	0.1	0.2	0.2
	SMST	<i>Smilacina stellata</i>	29	0.1	0.2	0.2
	STRI	<i>Stachys rigida</i>	29	0.1	0.2	0.2
	TROV2	<i>Trillium ovatum</i>	29	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	71	1.3	1	5

***Sequoia sempervirens*-*Pseudotsuga menziesii*-*Umbellularia californica* Association**  
**Redwood - Douglas-fir - California Bay Association**

**Mapping Code: 1212**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Sequoia sempervirens*-*Pseudotsuga menziesii*-*Umbellularia californica* Woodland form an intermittent tree layer (46-55%, mean 51.5%), with hardwoods at 5-10m tall (5-25%, mean 17.3%) and conifers at 15-50m tall (22-50%, mean 34.3%). The shrub layer is open (3-12%, mean 8.5%) with low shrubs at 1-2m and tall shrubs at 1-5m tall. The herbaceous layer is open (4-20%, mean 10%) at 0-0.5m tall. Total vegetation cover is 55-65%, mean 61.8%.

In this association, *Sequoia sempervirens* and *Pseudotsuga menziesii* are co-dominant in the overstory tree layer, and *Umbellularia californica* is also co-dominant as a smaller statured tree. *Lithocarpus densiflorus* is often present in the tree layer. The shrub layer frequently contains *Vaccinium ovatum*, *Toxicodendron diversilobum*, and *Lonicera hispidula* var. *vacillans* at low cover. The herbaceous layer frequently contains *Polystichum munitum*, *Iris douglasiana*, and *Carex globosa* at low cover.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 478-1403 ft., mean 1002 ft.

Aspect: variable

Slope: gentle to very steep, range 2-60 degrees, mean 29.5 degrees

Topography: lower slope to ridge top, convex, linear or undulating

Small Rock Cover: range 0.2-2%, mean 0.7%

Large Rock Cover: range 0-1%, mean 0.3%

Litter Cover: range 83-92%, mean 86.3%

Bare Ground: range 5-15%, mean 10%

Parent Material: Franciscan melange

Soil Texture: medium loam, fine sandy clay, moderately fine silty clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. They represent an admixture of conifers and hardwoods within multiple tree canopies. Stands are often old-growth with tall trees, which occur in relatively large stand sizes.

**SITE IMPACTS**

This association has low non-native plant cover (average 0.1%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Torilis nodosa*, and *Hedera helix*. Additional site impacts include heavy Sudden Oak Death Syndrome in two stands and light Sudden Oak Death Syndrome in one stand.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=4)**

**Rapid Assessment(s):** MMWD0205, MMWD0255, MMWD0295, MMWD0389 **Releve(s):** none

**Rank:** G4 S3?

**GLOBAL DISTRIBUTION**

northern outer Central Coast (known from Point Reyes National Seashore, Golden Gate NRA, and Mt. Tamalpais areas); though full distribution is not known

**REFERENCES**

NatureServe et al. 2003a



***Sequoia sempervirens*-*Pseudotsuga menziesii*-*Umbellularia californica* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	PSME-T	<i>Pseudotsuga menziesii</i>	100	17.3	7	29
	SESE3	<i>Sequoia sempervirens</i>	100	17.0	4	25
	UMCA-T	<i>Umbellularia californica</i>	100	12.0	5	15
	LIDE3-T	<i>Lithocarpus densiflorus</i>	75	4.3	2	8
	ARME-T	<i>Arbutus menziesii</i>	50	1.3	2	3
<b>Tree Understory</b>						
	COCOC	<i>Corylus cornuta</i> var. <i>californica</i>	50	1.8	2	5
	QUCH2-L	<i>Quercus chrysolepis</i>	25	1.3	5	5
	QUAG-L	<i>Quercus agrifolia</i>	25	0.3	1	1
	ACMA3-L	<i>Acer macrophyllum</i>	25	0.1	0.2	0.2
	LIDE3-L	<i>Lithocarpus densiflorus</i>	25	0.1	0.2	0.2
	TOCA	<i>Torreya californica</i>	25	0.1	0.2	0.2
<b>Shrub</b>						
	VAOV2	<i>Vaccinium ovatum</i>	75	3.0	1	8
	TODI	<i>Toxicodendron diversilobum</i>	75	0.6	0.2	1
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	75	0.2	0.2	0.2
	BEPI	<i>Berberis pinnata</i>	50	0.1	0.2	0.2
	RUUR	<i>Rubus ursinus</i>	50	0.1	0.2	0.2
	HEHE	<i>Hedera helix</i>	25	0.1	0.2	0.2
	HEAR5	<i>Heteromeles arbutifolia</i>	25	0.1	0.2	0.2
	QUWI2-M	<i>Quercus wislizeni</i>	25	0.1	0.2	0.2
	ROGY	<i>Rosa gymnocarpa</i>	25	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	25	0.1	0.2	0.2
<b>Herb</b>						
	POMU	<i>Polystichum munitum</i>	75	1.0	1	2
	CAGL7	<i>Carex globosa</i>	75	0.3	0.2	1
	IRDO	<i>Iris douglasiana</i>	75	0.3	0.2	1
	TRLA6	<i>Trientalis latifolia</i>	50	1.3	0.2	5
	DRAR3	<i>Dryopteris arguta</i>	50	0.3	0.2	1
	SCBI	<i>Scolopos bigelovii</i>	50	0.1	0.2	0.2
	STAJ	<i>Stachys ajugoides</i>	50	0.1	0.2	0.2
	CACA39	<i>Cardamine californica</i>	25	0.3	1	1
	ADBI	<i>Adenocaulon bicolor</i>	25	0.1	0.2	0.2
	ADJO	<i>Adiantum jordanii</i>	25	0.1	0.2	0.2
	ATFI	<i>Athyrium filix-femina</i>	25	0.1	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	25	0.1	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	25	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	25	0.1	0.2	0.2
	HIAL2	<i>Hieracium albiflorum</i>	25	0.1	0.2	0.2
	HIOC	<i>Hierochloe occidentalis</i>	25	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	25	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	25	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	25	0.1	0.2	0.2
	POLYP	<i>Polypodium</i>	25	0.1	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	25	0.1	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	25	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	25	0.1	0.2	0.2
	SMRAA	<i>Smilacina racemosa</i> var. <i>amplexicaulis</i>	25	0.1	0.2	0.2

***Sequoia sempervirens*-*Pseudotsuga menziesii*-*Umbellularia californica* Association**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>
	SMST	<i>Smilacina stellata</i>	25	0.1	0.2	0.2
	TONO	<i>Torilis nodosa</i>	25	0.1	0.2	0.2
	TROV2	<i>Trillium ovatum</i>	25	0.1	0.2	0.2
	WHMO	<i>Whipplea modesta</i>	25	0.1	0.2	0.2
	WOFI	<i>Woodwardia fimbriata</i>	25	0.1	0.2	0.2

## ***Sequoia sempervirens-Umbellularia californica* Association**

### **Redwood - California Bay Association**

**Mapping Code:** 1214

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Sequoia sempervirens-Umbellularia californica* Woodland/Forest form an intermittent to dense tree layer (42-75%, mean 58.4%), with hardwoods at 5-20m tall (10-40%, mean 22.1%) and conifers at 15-50m tall (19-52%, mean 36.3%). The shrub layer is open (0-6%, mean 1.9%) with low shrubs at 0-2m and tall shrubs at 1-10m tall. The herbaceous layer is open 1-11%, mean 4.9%) at 0-0.5m tall. Total vegetation cover is 50-75%, mean 63%.

In this association, the tree layer contains *Sequoia sempervirens* co-dominant with the smaller-statured tree *Umbellularia californica*. *Lithocarpus densiflorus* is commonly regenerating in the understory. The shrub layer is characterized by *Toxicodendron diversilobum*, *Lonicera hispidula* var. *vacillans*, and/or *Rosa* spp. The herbaceous layer is characterized by *Polystichum munitum* at low cover, though often present are *Dryopteris arguta* and *Iris douglasiana*. This association is closely related to *Sequoia sempervirens-Pseudotsuga menziesii-Umbellularia californica* Association.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 373-1402 ft., mean 1001 ft.

Aspect: frequently NE

Slope: somewhat steep to steep, range 22-40 degrees, mean 29.7 degrees

Topography: lower to upper slope, concave, convex, or undulating

Small Rock Cover: range 0-2%, mean 1%

Large Rock Cover: range 0-1%, mean 0.2%

Litter Cover: range 50-96%, mean 81%

Bare Ground: range 0.2-44%, mean 13.7%

Parent Material: Franciscan melange

Soil Texture: moderately fine clay or sandy clay loam, moderately coarse sandy loam, medium to very fine sandy loam, medium loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands occur on protected steep, upland slopes that are variable in structure not only because of past logging or fires, but also because of Sudden Oak Death Syndrome.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 0.2%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Torilis nodosa*, and *Vicia sativa*. Additional site impacts include heavy Sudden Oak Death Syndrome in two stands, moderate Sudden Oak Death Syndrome in one stand, and light Sudden Oak Death Syndrome in three stands.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=7)**

**Rapid Assessment(s):** MMWD0152, MMWD0154, MMWD0171, MMWD0204, MMWD0225, MMWD0249, MMWD0339 **Releve(s):** none

**Rank:** G3 S3

#### **GLOBAL DISTRIBUTION**

Northern outer Central Coast (known from Mt. Tamalpais area) and probably outer North Coast; though full distribution is not known

#### **REFERENCES**

None

***Sequoia sempervirens*-*Umbellularia californica* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	SESE3	<i>Sequoia sempervirens</i>	100	36.4	19	52
	UMCA-T	<i>Umbellularia californica</i>	100	18.7	8	40
	ARME-T	<i>Arbutus menziesii</i>	57	3.9	0.2	18
<b>Tree Understory</b>						
	LIDE3-M	<i>Lithocarpus densiflorus</i>	43	1.3	1	5
	COCOC	<i>Corylus cornuta</i> var. <i>californica</i>	43	0.3	0.2	2
	LIDE3-L	<i>Lithocarpus densiflorus</i>	43	0.3	0.2	2
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	57	0.1	0.2	0.2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	43	0.1	0.2	0.2
	ROCA2	<i>Rosa californica</i>	29	0.1	0.2	0.2
	ROGY	<i>Rosa gymnocarpa</i>	29	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	29	0.1	0.2	0.2
<b>Herb</b>						
	POMU	<i>Polystichum munitum</i>	100	0.3	0.2	1
	DRAR3	<i>Dryopteris arguta</i>	71	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	71	0.1	0.2	0.2
	GATR3	<i>Galium triflorum</i>	57	0.1	0.2	0.2
	STRI	<i>Stachys rigida</i>	57	0.1	0.2	0.2
	POLYP	<i>Polypodium</i>	43	0.1	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	29	0.2	0.2	1
	CAREX	<i>Carex</i>	29	0.1	0.2	0.2
	CAGL7	<i>Carex globosa</i>	29	0.1	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	29	0.1	0.2	0.2
	HIOC	<i>Hierochloe occidentalis</i>	29	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	29	0.1	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	29	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	29	0.1	0.2	0.2
	SCBI	<i>Scoliopus bigelovii</i>	29	0.1	0.2	0.2
	SMRAA	<i>Smilacina racemosa</i> var. <i>amplexicaulis</i>	29	0.1	0.2	0.2
	SMST	<i>Smilacina stellata</i>	29	0.1	0.2	0.2
	TONO	<i>Torilis nodosa</i>	29	0.1	0.2	0.2
	TRLA6	<i>Trientalis latifolia</i>	29	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	86	0.3	0.2	1
	LICHEN	<i>Lichen</i>	43	0.1	0.2	0.2

## ***Umbellularia californica* Alliance or Habitat**

This alliance commonly occurs in the study area in mesic to riparian environments. It is represented by ten different associations that are primarily on non-serpentine soils. Associations that are in cooler, mesic environments include two pure overstory types primarily of *Umbellularia californica* (with or without a developed understory) and a mixed evergreen type of *U. californica* with *Quercus chrysolepis*. Associations that are in riparian have *Acer macrophyllum*, *Aesculus californica*, or *Alnus rhombifolia* as a secondary hardwood species. A fourth riparian association contains *Pseudotsuga menziesii* in the overstory and *Rhododendron occidentale* in the understory. Associations that are found in warmer and drier environments include the mixed evergreen types with *Lithocarpus densiflorus* or with *Quercus agrifolia* in the overstory. Additional variation is sampled along the Alturo Trail in two plots (MMWD0312, MMWD0313) classified at the alliance level, in which *Pseudotsuga menziesii* is emerging in the overstory. They will likely transition to *P. menziesii* Alliance without fire disturbance.

### ***Umbellularia californica* (Pure - Coastal) Association**

#### **California Bay (Pure - Coastal) Association**

**Mapping Code: 1111**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Umbellularia californica* (Pure - Coastal) Woodland/Forest form an intermittent to dense tree layer (34-75%, mean 47.4%), with hardwoods at 5-15m tall (34-75%, mean 46.6%) and conifers at 2-35m tall (0-5%, mean 0.9%). The shrub layer is open (0.2-9%, mean 3.3%) with low shrubs at 0-2m and tall shrubs at 0-10m tall. The herbaceous layer is open (4-16%, mean 10.6%) at 0-0.5m tall. Total vegetation cover is 37-82%, mean 56.6%.

In this association, *Umbellularia californica* is the primary dominant in the overstory tree layer at moderate to high cover. *Lithocarpus densiflorus* and *Pseudotsuga menziesii* sometimes are regenerating in the understory. The shrub layer is relatively sparse with *Toxicodendron diversilobum* and *Lonicera hispidula* var. *vacillans* characteristically present. In the herbaceous layer, *Iris douglasiana*, *Polystichum munitum*, *Dryopteris arguta*, and *Carex globosa* are frequently present at low cover.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 258-1156 ft., mean 849 ft.

Aspect: usually NE or NW

Slope: moderate to very steep, range 13-60 degrees, mean 31.3 degrees

Topography: bottom to mid slope, usually undulating

Small Rock Cover: range 0.2-7%, mean 2.4%

Large Rock Cover: range 0-5%, mean 1.8%

Litter Cover: range 21-96%, mean 62.2%

Bare Ground: range 2-78%, mean 31%

Parent Material: Franciscan melange

Soil Texture: usually clay loam or sandy clay loam of medium to fine texture

Stands of this association were sampled in the Mt. Tamalpais Watershed. Dense stands of relatively pure *Umbellularia californica* are common in the study area on relatively steep, mesic northerly slopes. They are often adjacent to upland stands of *Pseudotsuga menziesii* or *Quercus agrifolia* alliances.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 0.2%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Torilis nodosa*, *Convolvulus arvensis*, and *Vicia villosa*. There are no additional site impacts.

#### **SENSITIVE SPECIES**

*Elymus californicus* was found in 1 of 7 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-1-3. Global rank is G3, and State rank is S3.3. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION** (n=7)

**Rapid Assessment(s):** MMWD0161, MMWD0170, MMWD0190, MMWD0257, MMWD0259, MMWD0274, MMWD0363 **Releve(s):** none

**Rank:** G3 S3

**GLOBAL DISTRIBUTION**

Outer Central Coast (known from Mt. Tamalpais area and Santa Ynez Mountains) and probably outer North Coast; though full distribution is not known

**REFERENCES**

Borchert et al. 2004

***Umbellularia californica* (Pure - Coastal) Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	UMCA-T	<i>Umbellularia californica</i>	100	46.1	33	75
	ARME-T	<i>Arbutus menziesii</i>	29	0.7	1	4
	QUAG-T	<i>Quercus agrifolia</i>	29	0.6	0.2	4
<b>Tree Understory</b>						
	COCOC	<i>Corylus cornuta</i> var. <i>californica</i>	57	0.2	0.2	1
	LIDE3-M	<i>Lithocarpus densiflorus</i>	43	0.6	1	2
	PSME-M	<i>Pseudotsuga menziesii</i>	29	0.3	1	1
	LIDE3-L	<i>Lithocarpus densiflorus</i>	29	0.1	0.2	0.2
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	86	0.7	0.2	3
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	86	0.3	0.2	1
	ROCA2	<i>Rosa californica</i>	43	0.1	0.2	0.2
	HODI	<i>Holodiscus discolor</i>	29	0.2	0.2	1
	HEAR5	<i>Heteromeles arbutifolia</i>	29	0.1	0.2	0.2
	RUUR	<i>Rubus ursinus</i>	29	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	29	0.1	0.2	0.2
<b>Herb</b>						
	IRDO	<i>Iris douglasiana</i>	86	0.3	0.2	1
	POMU	<i>Polystichum munitum</i>	71	0.5	0.2	2
	CAGL7	<i>Carex globosa</i>	71	0.3	0.2	1
	DRAR3	<i>Dryopteris arguta</i>	71	0.3	0.2	1
	HIOC	<i>Hierochloe occidentalis</i>	57	0.6	0.2	2
	SACR2	<i>Sanicula crassicaulis</i>	57	0.2	0.2	1
	SADO5	<i>Satureja douglasii</i>	57	0.2	0.2	1
	PETR7	<i>Pentagramma triangularis</i>	57	0.1	0.2	0.2
	CLPE	<i>Claytonia perfoliata</i>	43	0.2	0.2	1
	GAAP2	<i>Galium aparine</i>	43	0.1	0.2	0.2
	GATR3	<i>Galium triflorum</i>	43	0.1	0.2	0.2
	SMRAA	<i>Smilacina racemosa</i> var. <i>amplexicaulis</i>	43	0.1	0.2	0.2
	STRI	<i>Stachys rigida</i>	43	0.1	0.2	0.2
	WHMO	<i>Whipplea modesta</i>	29	2.1	7	8
	ADJO	<i>Adiantum jordanii</i>	29	0.2	0.2	1
	ADBI	<i>Adenocaulon bicolor</i>	29	0.1	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	29	0.1	0.2	0.2
	FRVE	<i>Fragaria vesca</i>	29	0.1	0.2	0.2
	POLYP	<i>Polypodium</i>	29	0.1	0.2	0.2
	TONO	<i>Torilis nodosa</i>	29	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	Moss	29	2.3	1	15

***Umbellularia californica*/Polystichum munitum Association**  
**California Bay / Sword Fern Association**

**Mapping Code: 1111**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Umbellularia californica*/Polystichum munitum Woodland/Forest form an intermittent tree layer (43-60%, mean 49%), with hardwoods at 5-15m tall (43-60%, mean 49%). The shrub layer is open (1-11%, mean 5.7%) with shrubs at 2-5m tall. The herbaceous layer is open to intermittent (12-44%, mean 32%) at 0-0.5m tall. Total vegetation cover is 55-80%, mean 67.3%.

In this association, *Umbellularia californica* dominates/characterizes the overstory tree layer at moderate cover, while *Quercus agrifolia* or *Lithocarpus densiflorus* may be present but at low cover. The shrub layer is characterized by *Toxicodendron diversilobum* at low cover. The herbaceous layer is dominated by *Polystichum munitum* at more than 5% cover in open to dense clumps, though a variety of other herbs may be present.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 235-1175 ft., mean 612 ft.

Aspect: NE, NW or variable

Slope: somewhat steep to steep, range 26-40 degrees, mean 31.3 degrees

Topography: bottom to mid slope; convex, concave or undulating

Small Rock Cover: range 1-4%, mean 2.3%

Large Rock Cover: range 0-0.2%, mean 0.1%

Litter Cover: range 65-72%, mean 69%

Bare Ground: range 21-31%, mean 26%

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam, moderately fine silty clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed, at Nicasio Reservoir, and at Soulajule Reservoir. They are common in ravine bottoms or steep northerly slopes in the San Francisco Bay area with a well-developed tree layer and herbaceous layer.

**SITE IMPACTS**

This association has low non-native plant cover (average 2.7%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Holcus lanatus*, *Cynosurus echinatus*, and *Carduus pycnocephalus*. Additional site impacts include heavy Sudden Oak Death Syndrome in one stand.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** MMWD0243, MMWD0261, MMWD0379 **Releve(s):** none

**Rank:** G4 S4

**GLOBAL DISTRIBUTION**

Northern Central Coast (known from the San Francisco Bay area); though full distribution is not known

**REFERENCES**

NatureServe et al. 2003a



***Umbellularia californica*/Polystichum munitum Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	UMCA-T	<i>Umbellularia californica</i>	100	41.3	34	45
	QUAG-T	<i>Quercus agrifolia</i>	67	5.1	0.2	15
	LIDE3-T	<i>Lithocarpus densiflorus</i>	33	3.0	9	9
<b>Tree Understory</b>						
	COCOC	<i>Corylus cornuta</i> var. <i>californica</i>	67	0.4	0.2	1
	AECA	<i>Aesculus californica</i>	33	0.7	2	2
	PSME-M	<i>Pseudotsuga menziesii</i>	33	0.1	0.2	0.2
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	100	6.7	0.2	10
	ROCA2	<i>Rosa californica</i>	67	0.4	0.2	1
	BAPI	<i>Baccharis pilularis</i>	33	0.1	0.2	0.2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	33	0.1	0.2	0.2
	RUUR	<i>Rubus ursinus</i>	33	0.1	0.2	0.2
<b>Herb</b>						
	POMU	<i>Polystichum munitum</i>	100	23.0	8	40
	DRAR3	<i>Dryopteris arguta</i>	67	1.1	0.2	3
	GATR3	<i>Galium triflorum</i>	67	0.4	0.2	1
	POLYP	<i>Polypodium</i>	67	0.4	0.2	1
	SMRAA	<i>Smilacina racemosa</i> var. <i>amplexicaulis</i>	67	0.4	0.2	1
	CLPE	<i>Claytonia perfoliata</i>	67	0.1	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	67	0.1	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	67	0.1	0.2	0.2
	STRI	<i>Stachys rigida</i>	67	0.1	0.2	0.2
	HOLA	<i>Holcus lanatus</i>	33	1.7	5	5
	SADO5	<i>Satureja douglasii</i>	33	1.7	5	5
	CYEC	<i>Cynosurus echinatus</i>	33	1.0	3	3
	CAPY2	<i>Carduus pycnocephalus</i>	33	0.7	2	2
	HIOC	<i>Hierochloe occidentalis</i>	33	0.3	1	1
	LIAF	<i>Lithophragma affine</i>	33	0.3	1	1
	STAJ	<i>Stachys ajugoides</i>	33	0.3	1	1
	TAKE	<i>Tauschia kelloggii</i>	33	0.3	1	1
	ADJO	<i>Adiantum jordanii</i>	33	0.1	0.2	0.2
	BRCA5	<i>Bromus carinatus</i>	33	0.1	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	33	0.1	0.2	0.2
	FRVE	<i>Fragaria vesca</i>	33	0.1	0.2	0.2
	GAAP2	<i>Galium aparine</i>	33	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	33	0.1	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	33	0.1	0.2	0.2
	TONO	<i>Torilis nodosa</i>	33	0.1	0.2	0.2
	TRLA6	<i>Trientalis latifolia</i>	33	0.1	0.2	0.2
	TRILL	<i>Trillium</i>	33	0.1	0.2	0.2
<b>Cryptogam</b>						
	LICHEN	<i>Lichen</i>	33	0.1	0.2	0.2
	MOSS	<i>Moss</i>	33	0.1	0.2	0.2

***Umbellularia californica*-*Acer macrophyllum* Association**  
**California Bay - Big Leaf Maple Association**

**Mapping Code:** 2321/1103mu

**LOCAL VEGETATION DESCRIPTION**

Stands of *Umbellularia californica*-*Acer macrophyllum* Woodland/Forest form an intermittent to dense tree layer (35-72%, mean 49%), with hardwoods at 5-20m tall (35-65%, mean 47.6%) and conifers at 0-5m tall (0-7%, mean 1.4%). The shrub layer is open (0.2-13%, mean 6%) with low shrubs at 0-1m and tall shrubs at 0.5-10m tall. The herbaceous layer is open (6-30%, mean 18.8%) at 0-0.5m tall. Total vegetation cover is 47-75%, mean 62%.

In this riparian association, *Umbellularia californica* and *Acer macrophyllum* co-dominate the overstory tree layer at moderate to high cover. Other hardwood trees are often present at lower cover, including *Arbutus menziesii*, *Quercus lobata*, and *Quercus agrifolia* in the overstory or understory. The shrub layer is characterized by a low cover of *Toxicodendron diversilobum*. The herbaceous layer has a variety of species. *Stachys rigida* is characteristic at low cover, and *Satureja douglasii* and *Iris douglasiana* are often present at low cover.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 186-791 ft., mean 436 ft.

Aspect: variable

Slope: flat to steep, range 0-45 degrees, mean 17.8 degrees

Topography: usually bottom, undulating, linear or convex

Small Rock Cover: range 2-45%, mean 13.5%

Large Rock Cover: range 0-23%, mean 6.6%

Litter Cover: range 22-87%, mean 69.5%

Bare Ground: range 5-17%, mean 9.8%

Parent Material: Franciscan melange

Soil Texture: usually clay loam or sandy clay loam of moderately fine texture

Stands of this association were sampled in riparian areas of the Mt. Tamalpais Watershed. Stands are usually small and along streams. They are often adjacent to upland conifer or *Umbellularia californica* stands.

**SITE IMPACTS**

This association has low non-native plant cover (average 2%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Torilis arvensis*, *Carduus pycnocephalus*, and *Cynosurus echinatus*. Additional site impacts include light Sudden Oak Death Syndrome in one stand, light erosion/runoff in one stand, and light Douglas-fir encroachment in one stand.

**SENSITIVE SPECIES**

*Elymus californicus* was found in 1 of 5 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-1-3. Global rank is G3, and State rank is S3.3. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=5)**

**Rapid Assessment(s):** MMWD0123, MMWD0182, MMWD0191, MMWD0327, MMWD0341 **Releve(s):** none

**Rank:** G3 S3?

**GLOBAL DISTRIBUTION**

Northern outer Central Coast (known from Mt. Tamalpais area), and may be more common in inner and middle North Coast; though full distribution is not known

## REFERENCES

None

### *Umbellularia californica*-*Acer macrophyllum* Association

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	UMCA-T	<i>Umbellularia californica</i>	100	19.6	15	25
	ACMA3-T	<i>Acer macrophyllum</i>	100	13.8	4	30
	ARME-T	<i>Arbutus menziesii</i>	60	3.6	1	15
	QULO	<i>Quercus lobata</i>	40	3.0	5	10
	QUAG-T	<i>Quercus agrifolia</i>	40	0.8	1	3
	PSME-T	<i>Pseudotsuga menziesii</i>	20	1.4	7	7
<b>Tree Understory</b>						
	COCOC	<i>Corylus cornuta</i> var. <i>californica</i>	60	3.4	5	7
	QUAG-L	<i>Quercus agrifolia</i>	40	1.0	0.2	5
	AECA	<i>Aesculus californica</i>	20	2.0	10	10
	FRLA	<i>Fraxinus latifolia</i>	20	2.0	10	10
	LIDE3-M	<i>Lithocarpus densiflorus</i>	20	1.0	5	5
	PSME-L	<i>Pseudotsuga menziesii</i>	20	0.0	0.2	0.2
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	80	0.3	0.2	1
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	60	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	40	0.1	0.2	0.2
	HODI	<i>Holodiscus discolor</i>	20	0.2	1	1
	ERLA6	<i>Eriophyllum lanatum</i>	20	0.0	0.2	0.2
	HEAR5	<i>Heteromeles arbutifolia</i>	20	0.0	0.2	0.2
	MIAU	<i>Mimulus aurantiacus</i>	20	0.0	0.2	0.2
	ROCA2	<i>Rosa californica</i>	20	0.0	0.2	0.2
<b>Herb</b>						
	STRI	<i>Stachys rigida</i>	100	0.7	0.2	2
	SADO5	<i>Satureja douglasii</i>	60	0.8	0.2	3
	IRDO	<i>Iris douglasiana</i>	60	0.6	0.2	2
	VIAM	<i>Vicia americana</i>	40	0.4	0.2	2
	BRLA3	<i>Bromus laevipes</i>	40	0.2	0.2	1
	MEHA2	<i>Melica harfordii</i>	40	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	40	0.1	0.2	0.2
	SMRAA	<i>Smilacina racemosa</i> var. <i>amplexicaulis</i>	40	0.1	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	40	0.1	0.2	0.2
	POLYP	<i>Polypodium</i>	20	1.0	5	5
	ATFI	<i>Athyrium filix-femina</i>	20	0.8	4	4
	CAGL7	<i>Carex globosa</i>	20	0.8	4	4
	CAGY3	<i>Carex gynodynema</i>	20	0.8	4	4
	POMU	<i>Polystichum munitum</i>	20	0.8	4	4

***Umbellularia californica*-*Acer macrophyllum* Association**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>
	ADCA	<i>Adiantum capillus-veneris</i>	20	0.4	2	2
	BRCA5	<i>Bromus carinatus</i>	20	0.4	2	2
	CAPY2	<i>Carduus pycnocephalus</i>	20	0.4	2	2
	DRAR3	<i>Dryopteris arguta</i>	20	0.4	2	2
	ADJO	<i>Adiantum jordanii</i>	20	0.2	1	1
	CYEC	<i>Cynosurus echinatus</i>	20	0.2	1	1
	ELGL	<i>Elymus glaucus</i>	20	0.2	1	1
	JUPA2	<i>Juncus patens</i>	20	0.2	1	1
	OSBE	<i>Osmorhiza berteroi</i>	20	0.2	1	1
	SACR2	<i>Sanicula crassicaulis</i>	20	0.2	1	1
	AVBA	<i>Avena barbata</i>	20	0.0	0.2	0.2
	BRDI3	<i>Bromus diandrus</i>	20	0.0	0.2	0.2
	CHPO3	<i>Chlorogalum pomeridianum</i>	20	0.0	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	20	0.0	0.2	0.2
	DICA14	<i>Dichelostemma capitatum</i>	20	0.0	0.2	0.2
	ELCA10	<i>Elymus californicus</i>	20	0.0	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	20	0.0	0.2	0.2
	GEMO	<i>Geranium molle</i>	20	0.0	0.2	0.2
	MESU	<i>Melica subulata</i>	20	0.0	0.2	0.2
	MIGU	<i>Mimulus guttatus</i>	20	0.0	0.2	0.2
	NEPA	<i>Nemophila parviflora</i>	20	0.0	0.2	0.2
	RUAC3	<i>Rumex acetosella</i>	20	0.0	0.2	0.2
	TAKE	<i>Tauschia kelloggii</i>	20	0.0	0.2	0.2
	TONO	<i>Torilis nodosa</i>	20	0.0	0.2	0.2
	TRLA6	<i>Trientalis latifolia</i>	20	0.0	0.2	0.2
	VIVI	<i>Vicia villosa</i>	20	0.0	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	40	1.0	0.2	5
	LICHEN	<i>Lichen</i>	20	0.0	0.2	0.2

***Umbellularia californica*-*Aesculus californica*/*Holodiscus discolor* Association**  
**California Bay - California Buckeye / Oceanspray Association**

**Mapping Code: 1112**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Umbellularia californica*-*Aesculus californica*/*Holodiscus discolor* Woodland form an open to intermittent tree layer (23.2-59%, mean 33.4%), with hardwoods at 2-10m tall (23-59%, mean 33.3%) and conifers at 2-5m tall (0-0.2%, mean 0.03%). The shrub layer is open (9-20%, mean 14.8%) with low shrubs at 0-2m and tall shrubs at 0.5-5m tall. The herbaceous layer is open (7-30%, mean 17.8%) at 0-1m tall. Total vegetation cover is 39-70%, mean 59.3%.

In this riparian association, *Umbellularia californica* is the dominant overstory tree, while *Aesculus californica* is the most characteristic and abundant understory tree. A variety of other hardwoods may be present, including *Acer macrophyllum*, *Alnus rhombifolia*, and *Quercus agrifolia* at low cover. The shrub layer is characterized by *Holodiscus discolor* as the most abundant shrub at low cover. The herbaceous layer is relatively variable, open, and diverse with *Whipplea modesta* and *Dryopteris arguta* often present.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 212-903 ft., mean 619 ft.

Aspect: usually variable

Slope: gentle to steep, range 3-35 degrees, mean 20.8 degrees

Topography: usually bottom, often concave, sometimes undulating

Small Rock Cover: range 0.2-16%, mean 8.7%

Large Rock Cover: range 0-15%, mean 7.7%

Litter Cover: range 10-56%, mean 32.7%

Bare Ground: range 40-57%, mean 48.3%

Parent Material: Franciscan melange

Soil Texture: often moderately fine sandy clay loam, infrequently moderately fine clay loam or medium silt

Stands of this association were sampled in riparian areas in the Mt. Tamalpais Watershed. Stands often have running water in moderately sized riparian areas with a diverse range in plant species in multiple layers. They are often adjacent to other hardwood stands or grasslands.

**SITE IMPACTS**

This association has low non-native plant cover (average 3.8%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Genista monspessulana*, *Cynosurus echinatus*, and *Briza maxima*. Additional site impacts include light Sudden Oak Death Syndrome in one stand, light erosion/runoff in one stand and heavy surface water diversion in one stand.

**SENSITIVE SPECIES**

*Lotus formosissimus* was found in 1 of 6 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-2-1. Global rank is G4, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=6)**

**Rapid Assessment(s):** MMWD0126, MMWD0156, MMWD0160, MMWD0162, MMWD0329, MMWD0332 **Releve(s):** none

**Rank:** G3 S3

**GLOBAL DISTRIBUTION**

Northern outer Central Coast (known from Mt. Tamalpais area), and may be more common in inner and middle North Coast; though full distribution is not known

**REFERENCES**

None

***Umbellularia californica*-*Aesculus californica*/*Holodiscus discolor* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	<b>UMCA-T</b>	<b><i>Umbellularia californica</i></b>	<b>100</b>	<b>22.3</b>	<b>15</b>	<b>30</b>
	ACMA3-T	<i>Acer macrophyllum</i>	50	2.5	3	8
	QUAG-T	<i>Quercus agrifolia</i>	50	2.0	3	5
	ALRH2	<i>Alnus rhombifolia</i>	50	1.2	0.2	4
	PSME-T	<i>Pseudotsuga menziesii</i>	33	0.4	0.2	2
	ARME-T	<i>Arbutus menziesii</i>	33	0.2	0.2	1
<b>Tree Understory</b>						
	<b>AECA</b>	<b><i>Aesculus californica</i></b>	<b>83</b>	<b>2.5</b>	<b>0.2</b>	<b>7</b>
	COCOC	<i>Corylus cornuta</i> var. <i>californica</i>	33	1.2	1	6
<b>Shrub</b>						
	<b>HODI</b>	<b><i>Holodiscus discolor</i></b>	<b>100</b>	<b>6.0</b>	<b>3</b>	<b>15</b>
	TODI	<i>Toxicodendron diversilobum</i>	83	2.1	0.2	8
	RUUR	<i>Rubus ursinus</i>	67	0.7	0.2	3
	GEMO2	<i>Genista monspessulana</i>	33	1.0	2	4
	MIAU	<i>Mimulus aurantiacus</i>	33	0.5	0.2	3
	HEAR5	<i>Heteromeles arbutifolia</i>	33	0.1	0.2	0.2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	33	0.1	0.2	0.2
<b>Herb</b>						
	WHMO	<i>Whipplea modesta</i>	67	0.7	0.2	2
	DRAR3	<i>Dryopteris arguta</i>	67	0.5	0.2	1
	CYEC	<i>Cynosurus echinatus</i>	50	0.4	0.2	2
	POMU	<i>Polystichum munitum</i>	50	0.2	0.2	1
	SACR2	<i>Sanicula crassicaulis</i>	50	0.1	0.2	0.2
	ADCA	<i>Adiantum capillus-veneris</i>	33	0.7	2	2
	IRDO	<i>Iris douglasiana</i>	33	0.4	0.2	2
	PETR7	<i>Pentagramma triangularis</i>	33	0.2	0.2	1
	FRVE	<i>Fragaria vesca</i>	33	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	33	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	50	3.3	1	15

## ***Umbellularia californica*-*Alnus rhombifolia* Association**

### **California Bay - White Alder Association**

**Mapping Code:** 1321/1103mu

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Umbellularia californica*-*Alnus rhombifolia* Woodland form an open to intermittent tree layer (26-57%, mean 44.3%), with hardwoods at 5-15m tall (20-56%, mean 40.3%) and conifers at 5-20m tall (1-6%, mean 4%). The shrub layer is open (1-18%, mean 9.3%) with shrubs at 0-2m tall. The herbaceous layer is open (3-12%, mean 7.3%) at 0-0.5m tall. Total vegetation cover is 54-66%, mean 60%.

In this riparian association, *Umbellularia californica* is co-dominant with *Alnus rhombifolia* in the overstory tree layer, while *Acer macrophyllum*, *Quercus chrysolepis*, and *Sequoia sempervirens* are often present at lower cover. *Lithocarpus densiflorus* and *Pseudotsuga menziesii* are sometimes regenerating in the understory. The shrub layer contains *Toxicodendron diversilobum* and *Rubus ursinus* often present at low cover. The herbaceous layer often contains *Polystichum munitum*, *Athyrium filix-femina*, and *Equisetum telmateia* at low cover.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 531-813 ft., mean 672 ft.

Aspect: SE, SW, or flat

Slope: flat to abrupt, range 0-75 degrees, mean 46.7 degrees

Topography: lower to mid slope, linear, undulating or concave

Small Rock Cover: range 10-15%, mean 12.5%

Large Rock Cover: range 5-6%, mean 5.5%

Litter Cover: range 15-30%, mean 22.5%

Bare Ground: range 50-65%, mean 57.5%

Parent Material: Franciscan melange

Soil Texture: moderately coarse sandy loam, moderately fine silty clay loam

Stands of this association were sampled in riparian areas of the Mt. Tamalpais Watershed. Stands occur in perennially flowing drainages. They are often adjacent to riparian or upland stands of *Sequoia sempervirens*. This association is mainly hardwood dominant in the overstory, yet it is similar environmentally and compositionally to *Sequoia sempervirens*-*Acer macrophyllum*-*Umbellularia californica* (Riparian) Association.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 1.5%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Trifolium dubium* and *Torilis nodosa*. Additional site impacts include light to moderate Sudden Oak Death Syndrome in two plots and light erosion/runoff in one stand.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** MMWD0157, MMWD0188, MMWD0250 **Releve(s):** none

**Rank:** G3 S3

#### **GLOBAL DISTRIBUTION**

northern Central Coast and Southern California; though full distribution is not known

#### **REFERENCES**

Keeler-Wolf and Evens 2006

***Umbellularia californica*-*Alnus rhombifolia* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	UMCA-T	<i>Umbellularia californica</i>	100	18.7	10	30
	ALRH2	<i>Alnus rhombifolia</i>	100	11.3	5	23
	SESE3	<i>Sequoia sempervirens</i>	100	4.3	2	6
	ACMA3-T	<i>Acer macrophyllum</i>	67	8.7	5	21
	QUCH2-T	<i>Quercus chrysolepis</i>	67	7.3	2	20
	LIDE3-T	<i>Lithocarpus densiflorus</i>	33	1.0	3	3
<b>Tree Understory</b>						
	COCOC	<i>Corylus cornuta</i> var. <i>californica</i>	67	3.3	4	6
	FRLA	<i>Fraxinus latifolia</i>	33	0.7	2	2
	LIDE3-L	<i>Lithocarpus densiflorus</i>	33	0.3	1	1
	LIDE3-M	<i>Lithocarpus densiflorus</i>	33	0.1	0.2	0.2
	PSME-M	<i>Pseudotsuga menziesii</i>	33	0.1	0.2	0.2
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	67	0.7	1	1
	RUUR	<i>Rubus ursinus</i>	67	0.1	0.2	0.2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	33	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	33	0.1	0.2	0.2
	VAOV2	<i>Vaccinium ovatum</i>	33	0.1	0.2	0.2
<b>Herb</b>						
	POMU	<i>Polystichum munitum</i>	100	2.0	1	3
	ATFI	<i>Athyrium filix-femina</i>	67	0.7	0.2	2
	EQTE	<i>Equisetum telmateia</i>	67	0.4	0.2	1
	SMST	<i>Smilacina stellata</i>	67	0.1	0.2	0.2
	WOFI	<i>Woodwardia fimbriata</i>	67	0.1	0.2	0.2
	POLYP	<i>Polypodium</i>	33	1.0	3	3
	POCA25	<i>Polystichum californicum</i>	33	0.7	2	2
	TRDU2	<i>Trifolium dubium</i>	33	0.7	2	2
	ADBI	<i>Adenocaulon bicolor</i>	33	0.1	0.2	0.2
	ADJO	<i>Adiantum jordanii</i>	33	0.1	0.2	0.2
	BRLA3	<i>Bromus laevipes</i>	33	0.1	0.2	0.2
	CACA39	<i>Cardamine californica</i>	33	0.1	0.2	0.2
	CAGL7	<i>Carex globosa</i>	33	0.1	0.2	0.2
	COHE	<i>Collinsia heterophylla</i>	33	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	33	0.1	0.2	0.2
	GATR3	<i>Galium triflorum</i>	33	0.1	0.2	0.2
	HIOC	<i>Hierochloe occidentalis</i>	33	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	33	0.1	0.2	0.2
	NEPA	<i>Nemophila parviflora</i>	33	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	33	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	33	0.1	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	33	0.1	0.2	0.2
	SYRE	<i>Synthyris reniformis</i>	33	0.1	0.2	0.2
	TAKE	<i>Tauschia kelloggii</i>	33	0.1	0.2	0.2
	TONO	<i>Torilis nodosa</i>	33	0.1	0.2	0.2
	TRLA6	<i>Trientalis latifolia</i>	33	0.1	0.2	0.2
	VAPL	<i>Vancouveria planipetala</i>	33	0.1	0.2	0.2



***Umbellularia californica*-*Lithocarpus densiflorus* Association**  
**California Bay - Tanoak Association**

**Mapping Code:** 1116/1102mu

**LOCAL VEGETATION DESCRIPTION**

Stands of *Umbellularia californica*-*Lithocarpus densiflorus* Woodland form an open tree layer (15-20%, mean 17.5%), with hardwoods at 10-20m tall (12-15%, mean 13.5%) and conifers at 15-35m tall (3-5%, mean 4%). The shrub layer is open (3-5%, mean 4%) with shrubs that are 0.5-5m tall. The herbaceous layer is open to intermittent (0.5-40%, mean 20.3%) at 0-0.5m tall. Total vegetation cover is 15-57%, mean 36%.

In this association, *Umbellularia californica* occurs as the dominant overstory tree while *Lithocarpus densiflorus* is a sub-dominant overstory tree or dominant understory tree. *Pseudotsuga menziesii* is sometimes present as a sub-dominant tree and may be regenerating in the understory. The shrub layer is variable and sparse, while the herbaceous layer is more abundant with species such as *Carex* sp., *Stachys rigida*, *Stachys rigida*, and *Pteridium aquilinum*.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 710-813 ft., mean 762 ft.

Aspect: variable

Slope: somewhat steep to steep, range 20-37 degrees, mean 28.5 degrees

Topography: mid to upper slope, convex or concave

Small Rock Cover: range 0.2-3%, mean 1.6%

Large Rock Cover: none

Litter Cover: range 72-77%, mean 74.5%

Bare Ground: range 17-23%, mean 20%

Parent Material: Franciscan melange

Soil Texture: moderately fine silty clay loam, moderately coarse sandy loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. They occur in dry to mesic slopes that are usually steep and low in elevation within the study area.

**SITE IMPACTS**

This association has low non-native plant cover (average 2.2%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Torilis arvensis*, *Conium maculatum*, and *Vicia villosa*. Additional site impacts include heavy Sudden Oak Death Syndrome in two stands.

**SAMPLES USED TO DESCRIBE ASSOCIATION** (n=2)

**Rapid Assessment(s):** MMWD0097, MMWD0419 **Releve(s):** none

**Rank:** G3 S3

**GLOBAL DISTRIBUTION**

Northern outer Central Coast (including Point Reyes National Seashore and the Mt. Tamalpais area); though full distribution is not known

**REFERENCES**

NatureServe et al. 2003a

***Umbellularia californica*-*Lithocarpus densiflorus* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	UMCA-T	<i>Umbellularia californica</i>	100	12.5	10	15
	LIDE3-T	<i>Lithocarpus densiflorus</i>	50	2.5	5	5
	PSME-T	<i>Pseudotsuga menziesii</i>	50	2.5	5	5
<b>Tree Understory</b>						
	LIDE3-M	<i>Lithocarpus densiflorus</i>	100	4.0	3	5
	ARME-L	<i>Arbutus menziesii</i>	50	0.5	1	1
	ACMA3-L	<i>Acer macrophyllum</i>	50	0.1	0.2	0.2
	LIDE3-L	<i>Lithocarpus densiflorus</i>	50	0.1	0.2	0.2
	PSME-L	<i>Pseudotsuga menziesii</i>	50	0.1	0.2	0.2
<b>Shrub</b>						
	ERCA6	<i>Eriodictyon californicum</i>	50	0.1	0.2	0.2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	50	0.1	0.2	0.2
	MIAU	<i>Mimulus aurantiacus</i>	50	0.1	0.2	0.2
	RUUR	<i>Rubus ursinus</i>	50	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	50	0.1	0.2	0.2
	TODI	<i>Toxicodendron diversilobum</i>	50	0.1	0.2	0.2
<b>Herb</b>						
	CAREX	<i>Carex</i>	100	0.2	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	100	0.2	0.2	0.2
	STRI	<i>Stachys rigida</i>	100	0.2	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	100	0.2	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	50	17.5	35	35
	BRCA5	<i>Bromus carinatus</i>	50	0.1	0.2	0.2
	CIVU	<i>Cirsium vulgare</i>	50	0.1	0.2	0.2
	COMA2	<i>Conium maculatum</i>	50	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	50	0.1	0.2	0.2
	UNKN	<i>irreconcilable unknown</i>	50	0.1	0.2	0.2
	MAFA3	<i>Marah fabaceus</i>	50	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	50	0.1	0.2	0.2
	MYLA4	<i>Myosotis latifolia</i>	50	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	50	0.1	0.2	0.2
	POLYP	<i>Polypodium</i>	50	0.1	0.2	0.2
	POMU	<i>Polystichum munitum</i>	50	0.1	0.2	0.2
	VIVI	<i>Vicia villosa</i>	50	0.1	0.2	0.2
	WHMO	<i>Whipplea modesta</i>	50	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	50	0.1	0.2	0.2

***Umbellularia californica*-*Pseudotsuga menziesii*/*Rhododendron occidentale* Association**  
**California Bay - Douglas-fir / Western Azalea Association**

**Mapping Code:** 1123mu

**LOCAL VEGETATION DESCRIPTION**

Stands of *Umbellularia californica*-*Pseudotsuga menziesii*/*Rhododendron occidentale* Woodland form an open to intermittent tree layer (31-46%, mean 39.3%), with hardwoods at 5-15m tall (15-44%, mean 29.8%) and conifers at 5-15m tall (0.5-23%, mean 9.4%). The shrub layer is open to intermittent (5-40%, mean 17.5%) with low shrubs at 0.5-2m and tall shrubs at 2-5m tall. The herbaceous layer is open (6-15%, mean 9.3%) at 0-1m tall. Total vegetation cover is 50-65%, mean 55.8%.

In this riparian association, *Umbellularia californica* is dominant while *Pseudotsuga menziesii* is sub-dominant in the overstory tree layer. Other hardwoods may be present at lower cover in the tree layer, including *Alnus rhombifolia*, *Cupressus sargentii*, *Quercus wislizeni*, and *Acer macrophyllum*. The shrub layer is characterized by a dominance of *Rhododendron occidentale*, and *Heteromeles arbutifolia* is sub-dominant. The herbaceous layer is characterized by *Iris douglasiana* and various fern species.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 689-1943 ft., mean 1237 ft.

Aspect: usually variable

Slope: moderate to very steep, range 8-60 degrees, mean 32.3 degrees

Topography: bottom to upper slope, usually concave, sometimes undulating

Small Rock Cover: range 3-25%, mean 9.5%

Large Rock Cover: range 3-30%, mean 20.3%

Litter Cover: range 24-58%, mean 39.8%

Bare Ground: range 7-45%, mean 29%

Parent Material: Franciscan melange, serpentine

Soil Texture: moderately fine clay loam, moderately coarse sandy loam, medium to very fine sandy loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands occur in riparian areas with a variety of settings, including substrates derived from marine sedimentary and serpentine alluvium. They often have running water throughout the growing season.

**SITE IMPACTS**

This association has no non-native plant cover. Additional site impacts include heavy Sudden Oak Death Syndrome in two stands, light Sudden Oak Death Syndrome in one stand, and light erosion/runoff in one stand.

**SENSITIVE SPECIES**

*Lotus formosissimus* was found in 1 of 6 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-2-1. Global rank is G4, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

*Zigadenus micranthus* was found in 1 of 6 surveys of this plant community. This could be *Z. micranthus* var. *fontanus*. CNPS ranks this subspecies as List 4 with R-E-D Code is 1-2-3. Global rank is G4T3, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=6)**

**Rapid Assessment(s):** MMWD0185, MMWD0198, MMWD0290, MMWD0291, MMWD0369, MMWD0409 **Releve(s):** none

**Rank:** G3 S3?

**GLOBAL DISTRIBUTION**

Northern outer Central Coast (known from Mt. Tamalpais area); though full distribution is not known

## REFERENCES

None

### *Umbellularia californica*-*Pseudotsuga menziesii*/*Rhododendron occidentale* Association

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	UMCA-T	<i>Umbellularia californica</i>	100	18.7	10	28
	PSME-T	<i>Pseudotsuga menziesii</i>	83	7.4	0.2	15
	ALRH2	<i>Alnus rhombifolia</i>	50	3.5	2	12
	CUSA3-T	<i>Cupressus sargentii</i>	50	2.5	2	10
	QUWI2-T	<i>Quercus wislizeni</i>	33	4.2	0.2	25
	ACMA3-T	<i>Acer macrophyllum</i>	33	1.7	3	7
<b>Tree Understory</b>						
	LIDE3-M	<i>Lithocarpus densiflorus</i>	50	0.4	0.2	2
	QUCH2-L	<i>Quercus chrysolepis</i>	33	1.7	0.2	10
<b>Shrub</b>						
	RHOC	<i>Rhododendron occidentale</i>	100	9.3	2	34
	TODI	<i>Toxicodendron diversilobum</i>	100	0.8	0.2	2
	HEAR5	<i>Heteromeles arbutifolia</i>	83	3.2	1	8
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	50	0.1	0.2	0.2
	RUUR	<i>Rubus ursinus</i>	33	1.0	2	4
	MIAU	<i>Mimulus aurantiacus</i>	33	0.1	0.2	0.2
<b>Herb</b>						
	IRDO	<i>Iris douglasiana</i>	83	0.4	0.2	1
	POCA5	<i>Polygala californica</i>	50	0.1	0.2	0.2
	POMU	<i>Polystichum munitum</i>	50	0.1	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	50	0.1	0.2	0.2
	CAREX	<i>Carex</i>	33	0.3	1	1
	HIOC	<i>Hierochloe occidentalis</i>	33	0.2	0.2	1
	POLYP	<i>Polypodium</i>	33	0.1	0.2	0.4
	METO	<i>Melica torreyana</i>	33	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	33	0.1	0.2	0.2
	TRLA6	<i>Trientalis latifolia</i>	33	0.1	0.2	0.2

## ***Umbellularia californica*-*Quercus agrifolia* Association**

### **California Bay - Coast Live Oak Association**

**Mapping Code:** 1115

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Umbellularia californica*-*Quercus agrifolia* Woodland/Forest form an intermittent to dense tree layer (34-68%, mean 45%), with hardwoods at 5-20m tall (34-63%, mean 43.8%) and conifers at 20-35m tall (0-5%, mean 1.3%). The shrub layer is open (2-17%, mean 8.5%) with low shrubs at 0-1m and tall shrubs at 2-5m tall. The herbaceous layer is open (1-12%, mean 7.8%) at 0-0.5m tall. Total vegetation cover is 44-68%, mean 54.8%.

In this association, *Umbellularia californica* co-dominates with *Quercus agrifolia* in the overstory tree layer at moderate to dense cover, though *Q. agrifolia* is usually less than 50% relative cover. Other hardwoods may be present at lower cover, including *Quercus lobata*, *Q. chrysolepis*, and *Aesculus californica*. Various tree species may be regenerating in the understory. The shrub and herbaceous layers are usually open and variable, with *Mimulus aurantiacus*, *Lonicera hispidula* var. *vacillans*, *Iris douglasiana*, and *Galium porrigens* var. *porrigens* most common.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 291-2065 ft., mean 953 ft.

Aspect: NE, NW or variable

Slope: gentle to steep, range 2-35 degrees, mean 25 degrees

Topography: bottom to mid slope, convex, concave or undulating

Small Rock Cover: range 0.2-20%, mean 9.8%

Large Rock Cover: range 0-7%, mean 1.8%

Litter Cover: range 36-94%, mean 73.3%

Bare Ground: range 0-36%, mean 11.8%

Parent Material: Franciscan melange

Soil Texture: moderately coarse sandy loam, moderately fine clay loam, moderately fine silty clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands occur from low to high elevations in the study area in mesic environments, especially northerly slopes. Stands are similar to the -*Quercus agrifolia*/*Toxicodendron diversilobum* (*Corylus cornuta*) Association, but they are a more xeric representation without as well developed shrub or herbaceous understory.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 11.2%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Cytisus scoparius*, *Genista monspessulana*, and *Briza maxima*. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=4)**

**Rapid Assessment(s):** MMWD0174, MMWD0189, MMWD0336, MMWD0350 **Releve(s):** none

**Rank:** G4 S4

#### **GLOBAL DISTRIBUTION**

northern Central Coast (known from San Francisco Bay area, including pers. obs.), and has potential to occur in other parts of the Central Coast and southern North Coast; though full distribution is not known

#### **REFERENCES**

None

***Umbellularia californica*-*Quercus agrifolia* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	UMCA-T	<i>Umbellularia californica</i>	100	25.0	17	30
	QUAG-T	<i>Quercus agrifolia</i>	100	12.8	7	25
	QUCH2-T	<i>Quercus chrysolepis</i>	25	2.0	8	8
	QULO	<i>Quercus lobata</i>	25	2.0	8	8
	ARME-T	<i>Arbutus menziesii</i>	25	1.5	6	6
	PSME-T	<i>Pseudotsuga menziesii</i>	25	1.3	5	5
<b>Tree Understory</b>						
	AECA	<i>Aesculus californica</i>	50	1.8	2	5
	PSME-M	<i>Pseudotsuga menziesii</i>	25	0.8	3	3
	LIDE3-L	<i>Lithocarpus densiflorus</i>	25	0.5	2	2
	ARME-L	<i>Arbutus menziesii</i>	25	0.1	0.2	0.2
<b>Shrub</b>						
	MIAU	<i>Mimulus aurantiacus</i>	75	1.0	1	2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	75	0.2	0.2	0.2
	TODI	<i>Toxicodendron diversilobum</i>	50	0.5	1	1
	SYMO	<i>Symphoricarpos mollis</i>	50	0.1	0.2	0.2
	CYSC4	<i>Cytisus scoparius</i>	25	3.8	15	15
	GEMO2	<i>Genista monspessulana</i>	25	0.5	2	2
	HEAR5	<i>Heteromeles arbutifolia</i>	25	0.3	1	1
	BAPI	<i>Baccharis pilularis</i>	25	0.1	0.2	0.2
	ROCA2	<i>Rosa californica</i>	25	0.1	0.2	0.2
<b>Herb</b>						
	IRDO	<i>Iris douglasiana</i>	75	0.6	0.2	1
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	75	0.2	0.2	0.2
	BRMA	<i>Briza maxima</i>	50	0.8	0.2	3
	CYEC	<i>Cynosurus echinatus</i>	50	0.6	0.2	2
	VIAM	<i>Vicia americana</i>	50	0.3	0.2	1
	CAREX	<i>Carex</i>	50	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	50	0.1	0.2	0.2
	STRI	<i>Stachys rigida</i>	50	0.1	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	50	0.1	0.2	0.2
	TONO	<i>Torilis nodosa</i>	50	0.1	0.2	0.2
	AVBA	<i>Avena barbata</i>	25	0.3	1	1
	ADJO	<i>Adiantum jordanii</i>	25	0.1	0.2	0.2
	BRDI2	<i>Brachypodium distachyon</i>	25	0.1	0.2	0.2
	BRTE4	<i>Brodiaea terrestris</i>	25	0.1	0.2	0.2
	CAPY2	<i>Carduus pycnocephalus</i>	25	0.1	0.2	0.2
	CAGL7	<i>Carex globosa</i>	25	0.1	0.2	0.2
	CHPO3	<i>Chlorogalum pomeridianum</i>	25	0.1	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	25	0.1	0.2	0.2
	FRVE	<i>Fragaria vesca</i>	25	0.1	0.2	0.2
	GAAP2	<i>Galium aparine</i>	25	0.1	0.2	0.2
	UNKN	<i>irreconcilable unknown</i>	25	0.1	0.2	0.2
	MAGR3	<i>Madia gracilis</i>	25	0.1	0.2	0.2
	PIPER2	<i>Piperia</i>	25	0.1	0.2	0.2
	PIEL2	<i>Piperia elegans</i>	25	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	25	0.1	0.2	0.2
	POLYP	<i>Polypodium</i>	25	0.1	0.2	0.2

***Umbellularia californica*-*Quercus agrifolia* Association**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>
	STAJ	<i>Stachys ajugoides</i>	25	0.1	0.2	0.2
	VISA	<i>Vicia sativa</i>	25	0.1	0.2	0.2
	VIVI	<i>Vicia villosa</i>	25	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	25	0.1	0.2	0.2

***Umbellularia californica*-*Quercus agrifolia*/*Genista monspessulana* Association**  
**California Bay - Coast Live Oak / French Broom Association**

**Mapping Code: 1115**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Umbellularia californica*-*Quercus agrifolia*/*Genista monspessulana* Woodland form an open tree layer (12-18%, mean 16%), with hardwoods at 5-10m tall (12-18%, mean 16%). The shrub layer is open to intermittent (4.5-35%, mean 22.5%) with low shrubs at 0.5-1m and tall shrubs at 1-5m tall. The herbaceous layer is open to intermittent (19-58%, mean 32.2%) at 0-0.5m tall. Total vegetation cover is 63-72%, mean 66.7%.

In this association, *Umbellularia californica* and *Quercus agrifolia* are co-dominant in the overstory tree layer at low cover. Other hardwoods may be present at low cover such as *Arbutus menziesii*. The shrub layer is dominated by *Genista monspessulana*. The herbaceous layer has an abundance of non-native and native herbs including *Briza maxima*, *Cynoglossum grande*, *Cynosurus echinatus*, and *Vicia villosa*.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 273-563 ft., mean 382 ft.

Aspect: NE or SW

Slope: gentle to steep, range 3-33 degrees, mean 13.5 degrees

Topography: lower to mid slope, linear or undulating

Small Rock Cover: range 3-5%, mean 4%

Large Rock Cover: range 0-1%, mean 0.5%

Litter Cover: range 40-60%, mean 50%

Bare Ground: range 30-54%, mean 42%

Parent Material: Franciscan melange

Soil Texture: moderately fine silty clay loam, medium loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. This association has lower tree cover and higher herbaceous and broom cover as compared to the *Umbellularia californica*-*Quercus agrifolia* Association and the *Umbellularia californica*-*Quercus agrifolia*/*Toxicodendron diversilobum* (*Corylus cornuta*) Association. However, this association may be considered a disturbed phase of the *Umbellularia californica*-*Quercus agrifolia* Association.

**SITE IMPACTS**

This association has high non-native plant cover (average 60.1%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Genista monspessulana*, *Briza maxima*, and *Cynosurus echinatus*. Additional site impacts include heavy Sudden Oak Death Syndrome in two stands.

**SENSITIVE SPECIES**

*Lotus formosissimus* was found in 1 of 3 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-2-1. Global rank is G4, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** MMWD0069, MMWD0094, MMWD0138 **Releve(s):** none

**Rank:** Not applicable, a disturbed phase of *Umbellularia californica*-*Quercus agrifolia* Association.

**GLOBAL DISTRIBUTION**

Northern Central Coast (known from San Francisco Bay area, including pers. obs.), and has potential to occur in other parts of the Central Coast and southern North Coast; though full distribution is not known

**REFERENCES**



None

***Umbellularia californica*-*Quercus agrifolia*/*Genista monspessulana* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	<b>QUAG-T</b>	<b><i>Quercus agrifolia</i></b>	<b>100</b>	<b>7.7</b>	<b>3</b>	<b>14</b>
	<b>UMCA-T</b>	<b><i>Umbellularia californica</i></b>	<b>100</b>	<b>6.0</b>	<b>5</b>	<b>7</b>
	ARME-T	<i>Arbutus menziesii</i>	100	1.3	1	2
	QUWI2-T	<i>Quercus wislizeni</i>	33	2.0	6	6
	QULO	<i>Quercus lobata</i>	33	0.1	0.2	0.2
<b>Tree Understory</b>						
	AECA	<i>Aesculus californica</i>	33	0.3	1	1
<b>Shrub</b>						
	<b>GEMO2</b>	<b><i>Genista monspessulana</i></b>	<b>100</b>	<b>20.7</b>	<b>2</b>	<b>35</b>
	MIAU	<i>Mimulus aurantiacus</i>	67	1.3	1	3
	TODI	<i>Toxicodendron diversilobum</i>	67	0.7	1	1
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	67	0.4	0.2	1
	HEAR5	<i>Heteromeles arbutifolia</i>	67	0.1	0.2	0.2
	ADFA	<i>Adenostoma fasciculatum</i>	33	0.1	0.2	0.2
	HODI	<i>Holodiscus discolor</i>	33	0.1	0.2	0.2
	RHCA	<i>Rhamnus californica</i>	33	0.1	0.2	0.2
<b>Herb</b>						
	BRMA	<i>Briza maxima</i>	100	10.3	3	20
	CYGR	<i>Cynoglossum grande</i>	100	0.5	0.2	1
	CYEC	<i>Cynosurus echinatus</i>	67	1.1	0.2	3
	VIVI	<i>Vicia villosa</i>	67	0.7	0.2	2
	CHPO3	<i>Chlorogalum pomeridianum</i>	67	0.1	0.2	0.2
	AVBA	<i>Avena barbata</i>	33	1.0	3	3
	HYGL2	<i>Hypochaeris glabra</i>	33	1.0	3	3
	LOMI	<i>Lotus micranthus</i>	33	1.0	3	3
	BRHO2	<i>Bromus hordeaceus</i>	33	0.7	2	2
	LOFO2	<i>Lotus formosissimus</i>	33	0.7	2	2
	CAPY2	<i>Carduus pycnocephalus</i>	33	0.3	1	1
	DAPU3	<i>Daucus pusillus</i>	33	0.3	1	1
	TRMI4	<i>Trifolium microcephalum</i>	33	0.3	1	1
	BROMU	<i>Bromus</i>	33	0.1	0.2	0.2
	BRDI3	<i>Bromus diandrus</i>	33	0.1	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	33	0.1	0.2	0.2
	FECA	<i>Festuca californica</i>	33	0.1	0.2	0.2
	FRVE	<i>Fragaria vesca</i>	33	0.1	0.2	0.2
	GEDI	<i>Geranium dissectum</i>	33	0.1	0.2	0.2
	LOPE	<i>Lolium perenne</i>	33	0.1	0.2	0.2
	MAMA	<i>Madia madioides</i>	33	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	33	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	33	0.1	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	33	0.1	0.2	0.2
	STRI	<i>Stachys rigida</i>	33	0.1	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	33	0.1	0.2	0.2
	TRCA21	<i>Trisetum canescens</i>	33	0.1	0.2	0.2

***Umbellularia californica*-*Quercus agrifolia*/*Toxicodendron diversilobum* (*Corylus cornuta*) Association**

**California Bay - Coast Live Oak / Poison Oak (Hazelnut) Association**

**Mapping Code: 1115**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Umbellularia californica*-*Quercus agrifolia*/*Toxicodendron diversilobum* (*Corylus cornuta*) Woodland form an intermittent tree layer (40-58%, mean 51.2%), with hardwoods at 5-20m tall (40-58%, mean 49.8%) and conifers at 15-20m tall (0-7%, mean 1.4%). The shrub layer is open (0.2-12%, mean 5.8%) with low shrubs at 0.5-1m and tall shrubs at 1-5m tall. The herbaceous layer is open to intermittent (5-55%, mean 29.8%) at 0-0.5m tall. Total vegetation cover is 55-75%, mean 62.2%.

In this association, *Umbellularia californica* and *Quercus agrifolia* co-dominate in the overstory tree layer at moderate cover. *Pseudotsuga menziesii* is present sometimes in the overstory or regenerating in the understory. The understory tree and shrub layers are characterized by *Corylus cornuta* and *Toxicodendron diversilobum* at low cover. The herbaceous layer usually has a moderate cover of native species including *Sanicula crassicaulis*, *Satureja douglasii*, *Pteridium aquilinum*, and *Polystichum munitum*.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 413-876 ft., mean 648 ft.

Aspect: variable

Slope: somewhat steep to steep, range 15-33 degrees, mean 24.2 degrees

Topography: usually lower slope, infrequently bottom or mid slope, undulating or convex

Small Rock Cover: range 0.5-5%, mean 2.8%

Large Rock Cover: range 0-1%, mean 0.4%

Litter Cover: range 64-83%, mean 72.3%

Bare Ground: range 15-29%, mean 22.3%

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam, moderately fine sandy clay loam, moderately fine silty clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed and at Soulajule Reservoir. They are found on dry to mesic, steep slopes, usually in lower elevations of the study area. They appear similar to the *Umbellularia californica*-*Quercus agrifolia* Association but have a more mesic, coastal representation with poison oak, hazelnut, and ferns in the understory.

**SITE IMPACTS**

This association has low non-native plant cover (average 2.9%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Holcus lanatus*, *Torilis nodosa*, and *Cynosurus echinatus*. Additional site impacts include light Sudden Oak Death Syndrome in one stand and light foot traffic/trampling in one stand.

**SENSITIVE SPECIES**

*Elymus californicus* was found in 1 of 5 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-1-3. Global rank is G3, and State rank is S3.3. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=5)**

**Rapid Assessment(s):** MMWD0102, MMWD0333, MMWD0334, MMWD0380, MMWD0388 **Releve(s):** none

**Rank:** G4 S4

**GLOBAL DISTRIBUTION**

Northern Central Coast (known from San Francisco Bay area), and has potential to occur across the Central Coast and North Coast; though full distribution is not known

## REFERENCES

NatureServe et al. 2003a

### ***Umbellularia californica*-*Quercus agrifolia*/*Toxicodendron diversilobum* (*Corylus cornuta*) Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	<b>QUAG-T</b>	<b><i>Quercus agrifolia</i></b>	<b>100</b>	<b>23.4</b>	<b>19</b>	<b>26</b>
	<b>UMCA-T</b>	<b><i>Umbellularia californica</i></b>	<b>100</b>	<b>21.0</b>	<b>15</b>	<b>30</b>
	PSME-T	<i>Pseudotsuga menziesii</i>	20	1.2	6	6
	QUKE-T	<i>Quercus kelloggii</i>	20	0.2	1	1
<b>Tree Understory</b>						
	<b>COCOC</b>	<b><i>Corylus cornuta</i> var. <i>californica</i></b>	<b>80</b>	<b>3.6</b>	<b>0.2</b>	<b>10</b>
	AECA	<i>Aesculus californica</i>	60	5.0	1	19
	PSME-L	<i>Pseudotsuga menziesii</i>	40	0.1	0.2	0.2
<b>Shrub</b>						
	<b>TODI</b>	<b><i>Toxicodendron diversilobum</i></b>	<b>80</b>	<b>3.2</b>	<b>0.2</b>	<b>8</b>
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	60	0.1	0.2	0.2
	HODI	<i>Holodiscus discolor</i>	40	0.1	0.2	0.2
	HEAR5	<i>Heteromeles arbutifolia</i>	20	0.2	1	1
	RIBES	<i>Ribes</i>	20	0.2	1	1
	RUUR	<i>Rubus ursinus</i>	20	0.2	1	1
	RHCA	<i>Rhamnus californica</i>	20	0.0	0.2	0.2
	SAME5	<i>Sambucus mexicana</i>	20	0.0	0.2	0.2
<b>Herb</b>						
	SACR2	<i>Sanicula crassicaulis</i>	80	0.3	0.2	1
	SADO5	<i>Satureja douglasii</i>	60	3.0	2	10
	PTAQ	<i>Pteridium aquilinum</i>	60	0.5	0.2	2
	ADJO	<i>Adiantum jordanii</i>	60	0.1	0.2	0.2
	SMRAA	<i>Smilacina racemosa</i> var. <i>amplexicaulis</i>	60	0.1	0.2	0.2
	POMU	<i>Polystichum munitum</i>	40	7.0	10	25
	DRAR3	<i>Dryopteris arguta</i>	40	1.0	0.2	5
	TAKE	<i>Tauschia kelloggii</i>	40	0.4	0.2	2
	TRLA6	<i>Trientalis latifolia</i>	40	0.4	0.2	2
	IRDO	<i>Iris douglasiana</i>	40	0.4	1	1
	GATR3	<i>Galium triflorum</i>	40	0.2	0.2	1
	HOLA	<i>Holcus lanatus</i>	40	0.2	0.2	1
	STRI	<i>Stachys rigida</i>	40	0.2	0.2	1
	TONO	<i>Torilis nodosa</i>	40	0.2	0.2	1
	UNKN	<i>irreconcilable unknown</i>	40	0.1	0.2	0.2
	JUNCU	<i>Juncus</i>	40	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	40	0.1	0.2	0.2
	BRLA3	<i>Bromus laevipes</i>	20	1.0	5	5
	CYEC	<i>Cynosurus echinatus</i>	20	1.0	5	5
	ELCA10	<i>Elymus californicus</i>	20	1.0	5	5

***Umbellularia californica*-*Quercus agrifolia*/*Toxicodendron diversilobum*  
(*Corylus cornuta*) Association**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>
	AVBA	<i>Avena barbata</i>	20	0.8	4	4
	BRCA5	<i>Bromus carinatus</i>	20	0.6	3	3
	IRMA	<i>Iris macrosiphon</i>	20	0.2	1	1
	STAJ	<i>Stachys ajugoides</i>	20	0.2	1	1
	WHMO	<i>Whipplea modesta</i>	20	0.2	1	1
	CAPY2	<i>Carduus pycnocephalus</i>	20	0.0	0.2	0.2
	CAGL7	<i>Carex globosa</i>	20	0.0	0.2	0.2
	CLPE	<i>Claytonia perfoliata</i>	20	0.0	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	20	0.0	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	20	0.0	0.2	0.2
	FRVE	<i>Fragaria vesca</i>	20	0.0	0.2	0.2
	GAAP2	<i>Galium aparine</i>	20	0.0	0.2	0.2
	HYGL2	<i>Hypochaeris glabra</i>	20	0.0	0.2	0.2
	LAVE2	<i>Lathyrus vestitus</i>	20	0.0	0.2	0.2
	MAGR3	<i>Madia gracilis</i>	20	0.0	0.2	0.2
	MAMA	<i>Madia madioides</i>	20	0.0	0.2	0.2
	NEPA	<i>Nemophila parviflora</i>	20	0.0	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	20	0.0	0.2	0.2
	POCA5	<i>Polygala californica</i>	20	0.0	0.2	0.2
	POLYP	<i>Polypodium</i>	20	0.0	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	20	0.0	0.2	0.2
	VIAM	<i>Vicia americana</i>	20	0.0	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	20	0.2	1	1

***Umbellularia californica*-*Quercus chrysolepis* Association**  
**California Bay - Canyon Live Oak Association**

**Mapping Code:** 1114/1102mu

**LOCAL VEGETATION DESCRIPTION**

Stands of *Umbellularia californica*-*Quercus chrysolepis* Woodland/Forest form an intermittent to dense tree layer (41-71%, mean 52.9%), with hardwoods at 5-15m tall (2-71%, mean 45.1%) and conifers at 5-15m tall (0-52%, mean 7.7%). The shrub layer is open (0-15%, mean 6.9%) with low shrubs at 0-1m and tall shrubs at 1-5m tall. The herbaceous layer is open (2-17%, mean 9.1%) at 0-0.5m tall. Total vegetation cover is 51-80%, mean 62.6%.

In this association, *Umbellularia californica* and *Quercus chrysolepis* are co-dominant in the overstory tree layer at moderate to dense cover. *Lithocarpus densiflorus* is often regenerating in the understory. The shrub layer is characterized by a sparse cover of *Toxicodendron diversilobum* at sparse cover, and the herbaceous layer often contains a sparse cover of *Whipplea modesta*, *Iris douglasiana*, and *Polypodium* sp.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 528-2058 ft., mean 1291 ft.

Aspect: variable

Slope: gentle to very steep, range 3-63 degrees, mean 32.3 degrees

Topography: bottom to upper slope, usually undulating, sometimes convex

Small Rock Cover: range 2-27%, mean 10.7%

Large Rock Cover: range 0.2-25%, mean 5.9%

Litter Cover: range 31-90%, mean 58.6%

Bare Ground: range 4-56%, mean 22.4%

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam, moderately coarse to very fine sandy loam, moderately fine sandy clay loam, medium silt loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands occur from low to high elevations of the study area, usually on cool, mesic slopes that are moderately rocky.

**SITE IMPACTS**

This association has low non-native plant cover (average 0.9%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Cynosurus echinatus*, *Torilis arvensis*, and *Convolvulus arvensis*. Additional site impacts include light Sudden Oak Death Syndrome in two stands, moderate Sudden Oak Death Syndrome in one stand, and heavy Sudden Oak Death Syndrome in three stands.

**SAMPLES USED TO DESCRIBE ASSOCIATION** (n=7)

**Rapid Assessment(s):** MMWD0169, MMWD0173, MMWD0199, MMWD0288, MMWD0299, MMWD0302, MMWD0368 **Releve(s):** none

**Rank:** G3 S3?

**GLOBAL DISTRIBUTION**

Northern outer Central Coast (known from Mt. Tamalpais area including Bolinas Ridge portion of Golden Gate NRA); though full distribution is not known

**REFERENCES**

NatureServe et al. 2003a

***Umbellularia californica*-*Quercus chrysolepis* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	QUCH2-T	<i>Quercus chrysolepis</i>	100	23.9	12	45
	UMCA-T	<i>Umbellularia californica</i>	100	20.4	5	30
	ARME-T	<i>Arbutus menziesii</i>	57	3.1	2	8
	PSME-T	<i>Pseudotsuga menziesii</i>	29	0.6	1	3
	QUAG-T	<i>Quercus agrifolia</i>	29	0.6	1	3
<b>Tree Understory</b>						
	LIDE3-M	<i>Lithocarpus densiflorus</i>	57	3.0	1	12
	PSME-L	<i>Pseudotsuga menziesii</i>	43	0.1	0.2	0.2
<b>Shrub</b>						
	TODI	<i>Toxicodendron diversilobum</i>	100	0.5	0.2	1
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	57	0.3	0.2	1
	ROCA2	<i>Rosa californica</i>	43	0.3	0.2	2
	SYMO	<i>Symphoricarpos mollis</i>	43	0.1	0.2	0.2
	QUWI2-L	<i>Quercus wislizeni</i>	29	1.7	0.2	12
	MIAU	<i>Mimulus aurantiacus</i>	29	0.2	0.2	1
	VAOV2	<i>Vaccinium ovatum</i>	29	0.2	0.2	1
	ROGY	<i>Rosa gymnocarpa</i>	29	0.1	0.2	0.2
<b>Herb</b>						
	WHMO	<i>Whipplea modesta</i>	57	0.6	0.2	2
	IRDO	<i>Iris douglasiana</i>	57	0.5	0.2	1
	POLYP	<i>Polypodium</i>	57	0.3	0.2	1
	CYGR	<i>Cynoglossum grande</i>	43	1.8	0.2	12
	STRI	<i>Stachys rigida</i>	43	0.1	0.2	0.2
	CAGL7	<i>Carex globosa</i>	29	0.3	0.2	2
	IRMA	<i>Iris macrosiphon</i>	29	0.2	0.2	1
	ADJO	<i>Adiantum jordanii</i>	29	0.1	0.2	0.2
	CAREX	<i>Carex</i>	29	0.1	0.2	0.2
	LAVE2	<i>Lathyrus vestitus</i>	29	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	29	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	29	0.1	0.2	0.2
	POMU	<i>Polystichum munitum</i>	29	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	Moss	43	0.6	0.2	3

## SHRUBLAND VEGETATION DESCRIPTIONS

### ***Adenostoma fasciculatum* Alliance or Habitat**

This alliance was represented by three associations in the study area, including an association on serpentinite soils and two other associations on marine sedimentary and metamorphic rocks. Additional variation was seen in two plots, including one with *Baccharis pilularis* sub-dominant with *Adenostoma fasciculatum* (MMWD0269) and another with a mixture of chaparral and coastal scrub species intermixed with *Adenostoma fasciculatum* (MMWD0348).

### ***Adenostoma fasciculatum*/Annual Grass-Forb Association**

#### **Chamise / Annual Grass - Forb Association**

**Mapping Code: 3115 / 3114mu**

#### **LOCAL VEGETATION DESCRIPTION**

One stand of *Adenostoma fasciculatum*/Annual grass-forb Shrubland forms an intermittent shrub layer (55%), where *Adenostoma fasciculatum* dominates. Shrubs occur in one stratum that is 1-2m tall. The herbaceous layer is intermittent (40%) at 0-0.5m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 55%.

In one stand sampled, *Adenostoma fasciculatum* dominates the overstory shrub layer at moderate cover. The herbaceous layer is characterized by moderate cover of forbs and grasses such as *Hypochaeris glabra*, *Vulpia myuros*, *V. bromoides*, *Bromus diandrus*, and *Chlorogalum pomeridianum*. The tree layer is sparse and may include *Quercus agrifolia*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 692 ft.

Aspect: variable

Slope: steep, 29 degrees

Topography: mid slope, convex or rounded

Small Rock Cover: 30%

Large Rock Cover: 0.2%

Litter Cover: 25%

Bare Ground: 41%

Parent Material: shale

Soil Texture: medium to very fine sandy loam

One stand of this association was sampled in the Mt. Tamalpais Watershed. The association is a commonly found chaparral with relatively pure *Adenostoma fasciculatum* with an abundant herbaceous understory. It is found usually on neutral slopes (more mesic situations than *Adenostoma fasciculatum*-*Mimulus aurantiacus* Association). It is adjacent to grasslands, coastal sage scrub, and oak woodlands.

#### **SITE IMPACTS**

The stand representing this association has moderate non-native plant cover (average 44.6%) relative to native cover. Non-native species that occur with the highest abundance include *Hypochaeris glabra*, *Vulpia myuros* and *V. bromoides*. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0002 **Releve(s):** none

**Rank:** G4 S4

## GLOBAL DISTRIBUTION

Northern Central Coast, Sierra Nevada foothills; though full distribution is not known

## REFERENCES

Evens et al. 2004

### *Adenostoma fasciculatum*/Annual grass-forb Association

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Understory</b>						
	QUAG-L	<i>Quercus agrifolia</i>	100	0.2	0.2	0.2
<b>Shrub</b>						
	<b>ADFA</b>	<b><i>Adenostoma fasciculatum</i></b>	<b>100</b>	<b>35.0</b>	<b>35</b>	<b>35</b>
	LOSC2	<i>Lotus scoparius</i>	100	0.2	0.2	0.2
	MIAU	<i>Mimulus aurantiacus</i>	100	0.2	0.2	0.2
<b>Herb</b>						
	<b>HYGL2</b>	<b><i>Hypochaeris glabra</i></b>	<b>100</b>	<b>25.0</b>	<b>25</b>	<b>25</b>
	<b>VUBR</b>	<b><i>Vulpia bromoides</i></b>	<b>100</b>	<b>7.0</b>	<b>7</b>	<b>7</b>
	<b>VUMY</b>	<b><i>Vulpia myuros</i></b>	<b>100</b>	<b>7.0</b>	<b>7</b>	<b>7</b>
	<b>BRDI3</b>	<b><i>Bromus diandrus</i></b>	<b>100</b>	<b>2.0</b>	<b>2</b>	<b>2</b>
	CHPO3	<i>Chlorogalum pomeridianum</i>	100	2.0	2	2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	100	1.0	1	1
	UNKN	<i>irreconcilable unknown</i>	100	1.0	1	1
	LOWR2	<i>Lotus wrangelianus</i>	100	1.0	1	1
	AICA	<i>Aira caryophyllea</i>	100	0.2	0.2	0.2
	CAPY2	<i>Carduus pycnocephalus</i>	100	0.2	0.2	0.2
	CASTI2	<i>Castilleja</i>	100	0.2	0.2	0.2
	DICA14	<i>Dichelostemma capitatum</i>	100	0.2	0.2	0.2
	METO	<i>Melica torreyana</i>	100	0.2	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	100	0.2	0.2	0.2
<b>Cryptogam</b>						
	LICHEN	<i>Lichen</i>	100	8.0	8	8
	MOSS	<i>Moss</i>	100	2.0	2	2



***Adenostoma fasciculatum*-*Arctostaphylos glandulosa*-*Ceanothus jepsonii*/*Calamagrostis ophitidis* Association**

**Chamise-Eastwood Manzanita-Jepson's Ceanothus / Serpentine Reed Grass Association**

**Mapping Code: 3190**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Adenostoma fasciculatum*-*Arctostaphylos glandulosa*-*Ceanothus jepsonii*/*Calamagrostis ophitidis* Shrubland form an intermittent shrub layer (47-65%, mean 54.7%). Shrubs occur in a single stratum and are 0-2m tall. The herbaceous layer is open (1-12%, mean 5%) at 0-0.5m tall. Trees sometimes occur in the understory (0-2%, mean 0.7%) with conifers at 0-0.5m tall (0-2%, mean 0.7%). Total vegetation cover is 50-65%, mean 56.7%.

In this association, *Adenostoma fasciculatum* dominates, while *Arctostaphylos glandulosa* and *Ceanothus jepsonii* or *C. cuneatus* are characteristically present. The herbaceous layer is open and usually contains natives such as *Chlorogalum pomeridianum*, *Zigadenus fremontii*, *Lotus wrangelianus*, *Calamagrostis ophitidis*, etc. The tree layer is sparse and may contain *Cupressus sargentii* or *Pseudotsuga menziesii*.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1352-2128 ft., mean 1811 ft.

Aspect: variable

Slope: flat to somewhat steep, range 0-20 degrees, mean 10 degrees

Topography: mid slope to ridge top, linear to undulating

Small Rock Cover: range 19-28%, mean 23.5%

Large Rock Cover: range 1-2%, mean 1.6%

Litter Cover: range 4-61%, mean 32.5%

Bare Ground: range 7-73%, mean 40%

Parent Material: usually serpentine

Soil Texture: moderately fine clay loam, or sandy clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. They are on serpentinite soils or adjacent to serpentine where more serpentine-specific chaparral and woodlands are found (e.g., *Cupressus sargentii* and *Arctostaphylos hookeri* ssp. *montana* alliances). This association correlates with the *Adenostoma fasciculatum* - *Arctostaphylos glandulosa* - *Ceanothus jepsonii* / *Calamagrostis ophitidis* Association defined in the key of Point Reyes vegetation (but lacks a description).

**SITE IMPACTS**

This association has low non-native plant cover (average 1.7%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Bromus hordeaceus* and *Aira caryophyllaea*. Additional site impacts include light erosion/runoff in one of the stands.

**SENSITIVE SPECIES**

*Calamagrostis ophitidis* was found in 1 of 3 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-1-3. Global rank is G3, and State rank is S3.3. Federal and state listing is None (CNPS 2005).

*Navarretia rosulata* was found in 1 of 3 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 2-2-3. Global rank is G2?, and State rank is S2?. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** none **Releve(s):** MMWD0110, MMWD0166, MMWD0193

**Rank:** G2 S2?

**GLOBAL DISTRIBUTION**

Northern Central Coast (restricted to Mt. Tamalpais area)

## REFERENCES

NatureServe et al. 2003a

### ***Adenostoma fasciculatum*-*Arctostaphylos glandulosa*-*Ceanothus jepsonii*/*Calamagrostis ophitidis* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Understory</b>						
	CUSA3-L	<i>Cupressus sargentii</i>	33	0.7	2	2
	PSME-L	<i>Pseudotsuga menziesii</i>	33	0.1	0.2	0.2
<b>Shrub</b>						
	<b>ADFA</b>	<b><i>Adenostoma fasciculatum</i></b>	<b>100</b>	<b>44.7</b>	<b>42</b>	<b>47</b>
	CECU	<i>Ceanothus cuneatus</i>	100	3.0	1	5
	<b>ARGL3</b>	<b><i>Arctostaphylos glandulosa</i></b>	<b>100</b>	<b>1.7</b>	<b>0.2</b>	<b>3</b>
	ARHOM	<i>Arctostaphylos hookeri</i> subsp. <i>montana</i>	67	3.1	0.2	9
	HEAR5	<i>Heteromeles arbutifolia</i>	67	0.1	0.2	0.2
	PIMO5	<i>Pickeringia montana</i>	67	0.1	0.2	0.2
	QUUDU4	<i>Quercus durata</i>	33	1.0	3	3
	ERCO25	<i>Eriophyllum confertiflorum</i>	33	0.1	0.2	0.2
<b>Herb</b>						
	CHPO3	<i>Chlorogalum pomeridianum</i>	67	0.4	0.2	1
	ZIFR	<i>Zigadenus fremontii</i>	67	0.4	0.2	1
	AICA	<i>Aira caryophyllea</i>	67	0.1	0.2	0.2
	LOWR2	<i>Lotus wrangelianus</i>	67	0.1	0.2	0.2
	VUBR	<i>Vulpia bromoides</i>	67	0.1	0.2	0.2
	BRHO2	<i>Bromus hordeaceus</i>	33	0.3	1	1
	POACXX	<i>Poaceae</i>	33	0.3	1	1
	LOMAT	<i>Lomatium</i>	33	0.1	0.4	0.4
	AGHE2	<i>Agoseris heterophylla</i>	33	0.1	0.2	0.2
	<b>CAOP2</b>	<b><i>Calamagrostis ophitidis</i></b>	<b>33</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>
	CAUM	<i>Calochortus umbellatus</i>	33	0.1	0.2	0.2
	CAFO2	<i>Castilleja foliolosa</i>	33	0.1	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	33	0.1	0.2	0.2
	EPMI	<i>Epilobium minutum</i>	33	0.1	0.2	0.2
	FICA2	<i>Filago californica</i>	33	0.1	0.2	0.2
	FIGA	<i>Filago gallica</i>	33	0.1	0.2	0.2
	GMPU2	<i>Gnaphalium purpureum</i>	33	0.1	0.2	0.2
	KOMA	<i>Koeleria macrantha</i>	33	0.1	0.2	0.2
	MAEX	<i>Madia exigua</i>	33	0.1	0.2	0.2
	NAPU4	<i>Nassella pulchra</i>	33	0.1	0.2	0.2
	NAVAR	<i>Navarretia</i>	33	0.1	0.2	0.2
	PEDE	<i>Pedicularis densiflora</i>	33	0.1	0.2	0.2
	PIPER2	<i>Piperia</i>	33	0.1	0.2	0.2
	PIEL2	<i>Piperia elegans</i>	33	0.1	0.2	0.2
	PITR3	<i>Piperia transversa</i>	33	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	33	0.1	0.2	0.2
	SALA7	<i>Sanicula laciniata</i>	33	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	33	0.7	2	2

***Adenostoma fasciculatum-Mimulus aurantiacus* Association**  
**Chamise - Orange Bush Monkeyflower Association**

**Mapping Code: 3115/3114mu**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Adenostoma fasciculatum-Mimulus aurantiacus* Shrubland form an intermittent to dense shrub layer (52-80%, mean 67.8%). Shrubs frequently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 0.5-5m tall. The herbaceous layer is open (2-9%, mean 5.2%) at 0-0.5m tall. Trees sometimes occur as emergents (0-2%, mean 0.3%) with hardwoods at 2-5m tall (0-2%, mean 0.3%). Total vegetation cover is 52-76%, mean 67.5%.

In this association, *Adenostoma fasciculatum* is dominant at moderate to high cover, and *Mimulus aurantiacus* is characteristically present at low cover. The herbaceous layer is variable and open often with *Chlorogalum pomeridianum*, *Anagallis arvensis*, *Galium porrigens* var. *porrigens*, and *Pentagramma triangularis*. *Quercus agrifolia* is regenerating in the tree layer.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 667-1180 ft., mean 807 ft.  
Aspect: most often SW, infrequently SE or variable  
Slope: moderate to steep, range 8-45 degrees, mean 28.2 degrees  
Topography: lower to upper slope, convex or rounded  
Small Rock Cover: range 0.2-32%, mean 10%  
Large Rock Cover: range 0-5%, mean 1.8%  
Litter Cover: range 15-60%, mean 37.4%  
Bare Ground: range 23-79%, mean 47.8%  
Parent Material: Franciscan melange  
Soil Texture: usually moderately fine sandy clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. The association is a commonly found chaparral on relatively dry south-facing slopes with varying cover of *Mimulus aurantiacus* with the *Adenostoma fasciculatum*. Adjacent vegetation include oak woodlands with *Quercus agrifolia* and *Aesculus californica* and grasslands with various species.

**SITE IMPACTS**

This association has low non-native plant cover (average 0.6%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Anagallis arvensis* and *Cynosurus echinatus*. Additional site impacts include light erosion/runoff in one of the stands.

**SENSITIVE SPECIES**

*Eriogonum luteolum* var. *caninum* was found in 1 of 6 surveys of this plant community. MMWD regionally considers this species as Rare. CNPS ranks this species as List 3 with R-E-D Code is ?-2-3. Global rank is G5T3Q, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

*Navarretia rosulata* was found in 1 of 6 surveys of this plant community. MMWD regionally considers this species as Rare. CNPS ranks this species as List 1B with R-E-D Code is 2-2-3. Global rank is G2?, and State rank is S2?. Federal and state listing is None (CNPS 2005).

*Streptanthus glandulosus* subsp. *pulchellus* was found in 1 of 6 surveys of this plant community. MMWD regionally considers this species as Rare. CNPS ranks this species as List 1B with R-E-D Code is 3-2-3. Global rank is G4T1, and State rank is S1.2. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=6)**

**Rapid Assessment(s):** MMWD0221, MMWD0227, MMWD0276, MMWD0330, MMWD0331, MMWD0346 **Releve(s):** none

Rank: G4 S4

## GLOBAL DISTRIBUTION

Outer Central Coast, outer South Coast

## REFERENCES

Keeler-Wolf and Evens 2006, NatureServe et al. 2003a, NatureServe 2005

### *Adenostoma fasciculatum*-*Mimulus aurantiacus* Association

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree	Understory					
	QUAG-M	<i>Quercus agrifolia</i>	33	1.2	2	5
Shrub						
	ADFA	<i>Adenostoma fasciculatum</i>	100	54.8	37	70
	MIAU	<i>Mimulus aurantiacus</i>	100	5.2	1	15
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	83	0.4	0.2	1
	HEAR5	<i>Heteromeles arbutifolia</i>	67	1.7	0.2	4
	CECU	<i>Ceanothus cuneatus</i>	50	1.8	3	5
	TODI	<i>Toxicodendron diversilobum</i>	33	1.2	0.2	7
	ARGL3	<i>Arctostaphylos glandulosa</i>	33	0.9	0.2	5
	ARCA11	<i>Artemisia californica</i>	33	0.1	0.2	0.2
Herb						
	ANAR	<i>Anagallis arvensis</i>	67	0.1	0.2	0.2
	CHPO3	<i>Chlorogalum pomeridianum</i>	67	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	67	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	67	0.1	0.2	0.2
	PEAN2	<i>Pellaea andromedifolia</i>	50	0.2	0.2	1
	AICA	<i>Aira caryophyllaea</i>	33	0.1	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	33	0.1	0.2	0.2
	DUCY	<i>Dudleya cymosa</i>	33	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	33	0.1	0.2	0.2
	SALA7	<i>Sanicula laciniata</i>	33	0.1	0.2	0.2
Cryptogam						
	LICHEN	<i>Lichen</i>	100	6.3	0.2	20
	MOSS	<i>Moss</i>	50	0.6	0.2	3

## ***Adenostoma fasciculatum*-*Arctostaphylos glandulosa* Alliance or Habitat**

This alliance is represented by two associations in the study area, which are generally found on non-serpentine substrates. Additional variation is exhibited in one plot (MMWD0232) in the study area. It is classified at the alliance level, in which *Adenostoma fasciculatum* and *Arctostaphylos glandulosa* co-dominate with *Ceanothus thyrsiflorus*.

### ***Adenostoma fasciculatum*-*Arctostaphylos glandulosa* Association**

#### **Chamise - Eastwood Manzanita Association**

**Mapping Code: 3112**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Adenostoma fasciculatum*-*Arctostaphylos glandulosa* Shrubland form an intermittent shrub layer (48.5-66%, mean 59.8%). Shrubs frequently occur in two different strata, with low shrubs at 0.5-2m tall and tall shrubs at 2-5m tall. The herbaceous layer is open (5-25%, mean 12.7%) at 0-0.5m tall. Trees sometimes occur as emergents (1-3%, mean 0.3%) with hardwoods at 0-5m tall (0-1%, mean 0.3%) and conifers at 0-5m tall (0-3%, mean 1.0%). Total vegetation cover is 60-73%, mean 67.7%.

In this association, *Adenostoma fasciculatum* and *Arctostaphylos glandulosa* co-dominate in the shrub layer at moderate to high cover. The herbaceous layer is open, often with *Bromus hordeaceus*, *Chlorogalum pomeridianum*, *Pedicularis densiflora*, *Navarretia* spp., and *Aster radulinus*. Trees are sometimes regenerating, including *Umbellularia californica* or *Pseudotsuga menziesii*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1145-1930 ft., mean 1602 ft.

Aspect: variable

Slope: flat to somewhat steep, range 0-22 degrees, mean 13 degrees

Topography: upper slope to ridge top, undulating or linear pattern

Small Rock Cover: range 2-15%, mean 7.3%

Large Rock Cover: range 0-3%, mean 1.1%

Litter Cover: range 40-85%, mean 56%

Bare Ground: range 10-50%, mean 33.3%

Parent Material: serpentine and Franciscan melange

Soil Texture: medium loam to very fine sandy loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands are usually on sedimentary and metamorphic substrates in the study area across the middle to upper elevations of Mt. Tamalpais.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 2%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Bromus hordeaceus* and *Aira caryophyllea*. There are no additional site impacts.

#### **SENSITIVE SPECIES**

*Calochortus umbellatus* was found in 1 of 3 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-2-3. Global rank is G3, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

*Navarretia rosulata* was found in 1 of 3 surveys of this plant community. NPS ranks this species as List 1B with R-E-D Code is 2-2-3. Global rank is G2?, and State rank is S2?. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION** (n=3)

**Rapid Assessment(s):** MMWD0120, MMWD0194, MMWD0236 **Releve(s):** none

**Rank:** G4 S4

**GLOBAL DISTRIBUTION**

Central Coast, South Coast, montane Transverse Ranges, montane Peninsular Ranges

**REFERENCES**

Borchert et al. 2004, Ertter and Bowerman 2002, Gordon and White 1994, Keeler-Wolf and Evens 2006, Sawyer and Keeler-Wolf 1995

***Adenostoma fasciculatum*-*Arctostaphylos glandulosa* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Understory</b>						
	PSME-M	<i>Pseudotsuga menziesii</i>	33	1.0	3	3
	UMCA-M	<i>Umbellularia californica</i>	33	0.3	1	1
<b>Shrub</b>						
	<b>ADFA</b>	<b><i>Adenostoma fasciculatum</i></b>	<b>100</b>	<b>28.3</b>	<b>20</b>	<b>40</b>
	<b>ARGL3</b>	<b><i>Arctostaphylos glandulosa</i></b>	<b>100</b>	<b>22.0</b>	<b>10</b>	<b>46</b>
	HEAR5	<i>Heteromeles arbutifolia</i>	100	1.4	0.2	2
	CECU	<i>Ceanothus cuneatus</i>	67	3.0	3	6
	TODI	<i>Toxicodendron diversilobum</i>	67	1.1	0.2	3
	LOSC2	<i>Lotus scoparius</i>	67	0.1	0.2	0.2
	PIMO5	<i>Pickeringia montana</i>	67	0.1	0.2	0.2
	GAEL	<i>Garrya elliptica</i>	33	1.0	3	3
	ERCO25	<i>Eriophyllum confertiflorum</i>	33	0.1	0.2	0.2
	MIAU	<i>Mimulus aurantiacus</i>	33	0.1	0.2	0.2
	QUWI2-M	<i>Quercus wislizeni</i>	33	0.1	0.2	0.2
<b>Herb</b>						
	BRHO2	<i>Bromus hordeaceus</i>	67	1.1	0.2	3
	CHPO3	<i>Chlorogalum pomeridianum</i>	67	1.0	1	2
	NAVAR	<i>Navarretia</i>	67	0.4	0.2	1
	PEDE	<i>Pedicularis densiflora</i>	67	0.4	0.2	1
	ASRA	<i>Aster radulinus</i>	67	0.1	0.2	0.2
	LODA	<i>Lomatium dasycarpum</i>	33	0.3	1	1
	ZIFR	<i>Zigadenus fremontii</i>	33	0.3	1	1
	AGHE2	<i>Agoseris heterophylla</i>	33	0.1	0.2	0.2
	AICA	<i>Aira caryophyllea</i>	33	0.1	0.2	0.2
	CAUM	<i>Calochortus umbellatus</i>	33	0.1	0.2	0.2
	CASTI2	<i>Castilleja</i>	33	0.1	0.2	0.2
	CAFO2	<i>Castilleja foliolosa</i>	33	0.1	0.2	0.2
	ERRE12	<i>Erigeron reductus</i>	33	0.1	0.2	0.2
	ERNU3	<i>Eriogonum nudum</i>	33	0.1	0.2	0.2
	FRAF2	<i>Fritillaria affinis</i>	33	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	33	0.1	0.2	0.2
	LOUT	<i>Lomatium utriculatum</i>	33	0.1	0.2	0.2
	MOPU2	<i>Monardella purpurea</i>	33	0.1	0.2	0.2
	PIPER2	<i>Piperia</i>	33	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	33	0.1	0.2	0.2
	SALA7	<i>Sanicula laciniata</i>	33	0.1	0.2	0.2
	VIOC	<i>Viola ocellata</i>	33	0.1	0.2	0.2
	VUMI	<i>Vulpia microstachys</i>	33	0.1	0.2	0.2
<b>Cryptogam</b>						
	LICHEN	<i>Lichen</i>	33	0.7	2	2
	MOSS	<i>Moss</i>	33	0.3	1	1

***Adenostoma fasciculatum*-*Arctostaphylos glandulosa*-*Quercus wislizeni* Association**  
**Chamise - Eastwood Manzanita - Interior Live oak Association**

**Mapping Code: 3113**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Adenostoma fasciculatum*-*Arctostaphylos glandulosa*-*Quercus wislizeni* Shrubland form an intermittent to dense shrub layer (38-72%, mean 62.7%). Shrubs frequently occur in two different strata, with low shrubs at 0.5-2m tall and tall shrubs at 1-5m tall. The herbaceous layer is open to intermittent (0.2-36%, mean 8.7%) at 0-0.5m tall. Trees infrequently occur as emergents (0-10%, mean 2.5%) with hardwoods at 2-10m tall (0-10%, mean 2.5%). Total vegetation cover is 60-75%, mean 70.5%.

In this association, *Adenostoma fasciculatum* and *Arctostaphylos glandulosa* co-dominate in the shrub layer, and *Quercus wislizeni* is sub-dominant as a shrub or emergent as a tree. The herb layer is usually open, often with *Hypericum concinnum*, while the tree layer is sparse to none.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1171-2279 ft., mean 1670 ft.

Aspect: variable

Slope: gentle to very steep, range 3-60 degrees, mean 37.2 degrees

Topography: mid slope to ridge top, usually convex or rounded, sometimes linear or even

Small Rock Cover: range 0.2-32%, mean 10.1%

Large Rock Cover: range 0-10%, mean 2.5%

Litter Cover: range 32-88%, mean 65.8%

Bare Ground: range 4-32%, mean 19%

Parent Material: Franciscan melange

Soil Texture: usually moderately fine clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. It is common non-serpentine chaparral along the middle of Mt. Tamalpais on up to near the summit ridge.

**SITE IMPACTS**

This association has low non-native plant cover (average 0.2%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Bromus hordeaceus*, *Vulpia bromoides* and *Filago gallica*. Additional site impacts include light erosion/runoff and light Sudden Oak Death Syndrome, each in a single stand.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=6)**

**Rapid Assessment(s):** MMWD0206, MMWD0281, MMWD0307, MMWD0309, MMWD0310, MMWD0344 **Releve(s):** none

**Rank:** G3 S3?

**GLOBAL DISTRIBUTION**

Northern Central Coast (known from Mt. Tamalpais and Point Reyes National Seashore area); though full distribution is not known

**REFERENCES**

NatureServe et al. 2003a



***Adenostoma fasciculatum*-*Arctostaphylos glandulosa*-*Quercus wislizeni* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree						
	QUWI2-T	<i>Quercus wislizeni</i>	18	2.5	15	15
Shrub						
	ARGL3	<i>Arctostaphylos glandulosa</i>	100	37.0	28	45
	ADFA	<i>Adenostoma fasciculatum</i>	100	24.0	20	35
	MIAU	<i>Mimulus aurantiacus</i>	83	0.6	0.2	1
	HEAR5	<i>Heteromeles arbutifolia</i>	67	0.7	0.2	3
	QUWI2-M	<i>Quercus wislizeni</i>	50	4.8	9	10
	QUWI2-L	<i>Quercus wislizeni</i>	33	1.3	3	5
	PIMO5	<i>Pickeringia montana</i>	33	1.0	1	5
	CECU	<i>Ceanothus cuneatus</i>	33	0.3	1	1
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	33	0.1	0.2	0.2
	TODI	<i>Toxicodendron diversilobum</i>	33	0.1	0.2	0.2
Herb						
	HYCO3	<i>Hypericum concinnum</i>	50	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	33	0.2	0.2	1
	CHPO3	<i>Chlorogalum pomeridianum</i>	33	0.1	0.2	0.2
Cryptogam						
	LICHEN	<i>Lichen</i>	50	0.7	0.2	3
	MOSS	<i>Moss</i>	33	0.2	0.2	1

### ***Adenostoma fasciculatum*-*Ceanothus cuneatus* Alliance or Habitat**

This alliance is represented by two samples, which were classified at the alliance level. The samples are similar to the *Adenostoma fasciculatum*-*Ceanothus cuneatus* Association and Alliance classified in southern California, but they also have more mesic coastal species occurring in the shrub layer at low cover values (e.g., *Garrya elliptica*).

### ***Adenostoma fasciculatum*-*Ceanothus cuneatus* Alliance Chamise - Wedgeleaf *Ceanothus* Alliance**

**Mapping Code: 3114mu**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Adenostoma fasciculatum*-*Ceanothus cuneatus* Alliance Shrubland form a dense shrub layer (70-71%, mean 70.5%). Shrubs frequently occur in two different strata, with low shrubs at 0.5-2m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (4-6%, mean 5%) at 0-0.5m tall. Trees sometimes occur as emergents (0-5%, mean 2.5%) with hardwoods at 2-5m tall (0-5%, mean 2.5%). Total vegetation cover is 70-74%, mean 72%.

In this association, *Adenostoma fasciculatum* and *Ceanothus cuneatus* co-dominate in the overstory shrub layer at dense cover. The herbaceous layer is variable and open, including *Anagallis arvensis*, *Melica torreyana*, *Pentagramma triangularis*, and *Galium porrigens* var. *porrigens*. Trees may be regenerating, including *Quercus agrifolia*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 822-1047 ft., mean 935 ft.

Aspect: flat or SW

Slope: flat to somewhat steep, range 0-23 degrees, mean 11.5 degrees

Topography: lower to mid slope, linear or even to undulating

Small Rock Cover: range 3-43%, mean 23%

Large Rock Cover: range 0.2-2%, mean 1.1%

Litter Cover: range 15-25%, mean 20%

Bare Ground: range 37-70%, mean 53.5%

Parent Material: Franciscan melange

Soil Texture: moderately coarse to very fine sandy loam

Stands of this alliance were sampled in the Mt. Tamalpais Watershed. Stands are on relatively exposed slopes or flats in the middle elevations of Mt. Tamapais on sedimentary substrate.

#### **SITE IMPACTS**

This alliance has low non-native plant cover (average 0.6%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Anagallis arvensis* and *Cynosurus echinatus*. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** MMWD0325, MMWD0362 **Releve(s):** none

**Rank:** G5 S5 (alliance level)

#### **GLOBAL DISTRIBUTION**

Inner North Coast, Central Coast, montane Transverse Ranges, South Coast, montane Peninsular Ranges, Sierra Nevada

#### **REFERENCES**

Evens et al. 2004, Gordon and White 1994, Keeler-Wolf and Evens 2006, Sawyer and Keeler-Wolf 1995

***Adenostoma fasciculatum*-*Ceanothus cuneatus* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Understory						
	QUAG-M	<i>Quercus agrifolia</i>	50	1.0	2	2
Shrub						
	<b>ADFA</b>	<b><i>Adenostoma fasciculatum</i></b>	<b>100</b>	<b>31.5</b>	<b>23</b>	<b>40</b>
	<b>CECU</b>	<b><i>Ceanothus cuneatus</i></b>	<b>100</b>	<b>24.0</b>	<b>22</b>	<b>26</b>
	GAEL	<i>Garrya elliptica</i>	100	1.5	1	2
	MIAU	<i>Mimulus aurantiacus</i>	100	1.1	0.2	2
	HEAR5	<i>Heteromeles arbutifolia</i>	100	0.6	0.2	1
	TODI	<i>Toxicodendron diversilobum</i>	100	0.6	0.2	1
	BAPI	<i>Baccharis pilularis</i>	100	0.2	0.2	0.2
	ARGL3	<i>Arctostaphylos glandulosa</i>	50	8.0	16	16
	QUWI2-M	<i>Quercus wislizeni</i>	50	2.5	5	5
	QUUDU4	<i>Quercus durata</i>	50	0.5	1	1
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	50	0.1	0.2	0.2
Herb						
	ANAR	<i>Anagallis arvensis</i>	100	0.2	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	100	0.2	0.2	0.2
	METO	<i>Melica torreyana</i>	100	0.2	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	100	0.2	0.2	0.2
	STRI	<i>Stachys rigida</i>	50	0.5	1	1
	AICA	<i>Aira caryophyllea</i>	50	0.1	0.2	0.2
	BREL	<i>Brodiaea elegans</i>	50	0.1	0.2	0.2
	BRLA3	<i>Bromus laevipes</i>	50	0.1	0.2	0.2
	COAR4	<i>Convolvulus arvensis</i>	50	0.1	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	50	0.1	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	50	0.1	0.2	0.2
	FECA	<i>Festuca californica</i>	50	0.1	0.2	0.2
	HIOC	<i>Hierochloe occidentalis</i>	50	0.1	0.2	0.2
	KOMA	<i>Koeleria macrantha</i>	50	0.1	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	50	0.1	0.2	0.2
Cryptogam						
	LICHEN	<i>Lichen</i>	50	5.0	10	10

### ***Arctostaphylos canescens* Alliance or Habitat**

This alliance is represented by a single association in the study area, as a mixture of chaparral species with *Arctostaphylos canescens*. The alliance also has been observed in the North Coast Ranges (J. Sawyer per. comm.) and in Oregon (Kagan et al. 2004)

### ***Arctostaphylos canescens*-*Arctostaphylos glandulosa*-*Adenostoma fasciculatum* Association Silverleaf Manzanita - Eastwood Manzanita - Chamise Association**

**Mapping Code: 3140**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Arctostaphylos canescens*-*Arctostaphylos glandulosa*-*Adenostoma fasciculatum* Shrubland form an intermittent to dense shrub layer (33-77%, mean 59.5%). Shrubs frequently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (0.2-2%, mean 0.7%) at 0-0.5m tall. Trees occasionally occur as emergents (0-7%, mean 1.8%) with conifers at 2-5m tall (0-7%, mean 1.8%). Total vegetation cover is 40-77%, mean 61.3%.

In this association, where *Arctostaphylos canescens* usually dominates while *Arctostaphylos glandulosa* and *Adenostoma fasciculatum* are characteristically present and sometimes may be co-dominant. The herbaceous layer is usually sparse, with *Castilleja foliolosa* often present. The tree layer is open, sometimes including *Pseudotsuga menziesii*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1702-1937 ft., mean 1830 ft.

Aspect: variable

Slope: somewhat steep to steep, range 24-45 degrees, mean 33.5 degrees

Topography: mid to upper slope, usually convex or rounded

Small Rock Cover: range 20-58%, mean 43%

Large Rock Cover: range 0.2-1%, mean 0.5%

Litter Cover: range 5-60%, mean 31.7%

Bare Ground: range 10-41%, mean 22.3%

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. They usually occur as small stands within a larger chaparral matrix on convex, mid to upper slopes on sedimentary substrate, though they may be directly adjacent to chaparral on serpentine substrates.

#### **SITE IMPACTS**

This association has no non-native plant cover. Additional site impacts include light erosion/runoff in two stands and light vandalism/dumping/litter in one stand.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=4)**

**Rapid Assessment(s):** MMWD0300, MMWD0301, MMWD0370, MMWD0372 **Releve(s):** none

**Rank:** G3 S3?

#### **GLOBAL DISTRIBUTION**

Northern Central Coast and possibly inner and middle North Coast; though full distribution is not known

#### **REFERENCES**

None

***Arctostaphylos canescens*-*Arctostaphylos glandulosa*-*Adenostoma fasciculatum* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	PSME-T	<i>Pseudotsuga menziesii</i>	25	2.3	9	9
<b>Tree Understory</b>						
	PSME-L	<i>Pseudotsuga menziesii</i>	25	0.1	0.2	0.2
	QUCH2-M	<i>Quercus chrysolepis</i>	25	0.1	0.2	0.2
<b>Shrub</b>						
	<b>ARCA5</b>	<b><i>Arctostaphylos canescens</i></b>	<b>100</b>	<b>36.5</b>	<b>15</b>	<b>70</b>
	<b>ARGL3</b>	<b><i>Arctostaphylos glandulosa</i></b>	<b>100</b>	<b>12.5</b>	<b>1</b>	<b>33</b>
	<b>ADFA</b>	<b><i>Adenostoma fasciculatum</i></b>	<b>100</b>	<b>8.8</b>	<b>1</b>	<b>22</b>
	QUWI2-M	<i>Quercus wislizeni</i>	50	0.6	0.2	2
	QUPAS2	<i>Quercus parvula</i> var. <i>shrevei</i>	25	1.0	4	4
	ERCA6	<i>Eriodictyon californicum</i>	25	0.1	0.2	0.2
	LOSC2	<i>Lotus scoparius</i>	25	0.1	0.2	0.2
	PIMO5	<i>Pickeringia montana</i>	25	0.1	0.2	0.2
	QUWI2-L	<i>Quercus wislizeni</i>	25	0.1	0.2	0.2
	TODI	<i>Toxicodendron diversilobum</i>	25	0.1	0.2	0.2
<b>Herb</b>						
	CAFO2	<i>Castilleja foliolosa</i>	50	0.3	0.2	1
	ZIFR	<i>Zigadenus fremontii</i>	25	0.3	1	1
	HYCO3	<i>Hypericum concinnum</i>	25	0.1	0.2	0.2
	MOPU2	<i>Monardella purpurea</i>	25	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	25	0.1	0.2	0.2
<b>Cryptogam</b>						
	LICHEN	<i>Lichen</i>	75	0.3	0.2	1
	MOSS	<i>Moss</i>	75	0.2	0.2	0.2

### ***Arctostaphylos glandulosa* Alliance or Habitat**

This alliance is represented by a single association in the study area, with relatively pure *Arctostaphylos glandulosa* overstory shrub canopy and sparse understory. Additional variation is represented in a plot (MMWD0399) with an abundant understory of *Festuca californica*.

### ***Arctostaphylos glandulosa* Association**

#### **Eastwood Manzanita Association**

**Mapping Code: 3150**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Arctostaphylos glandulosa* Shrubland form an intermittent to dense shrub layer (60-75%, mean 67.3%). Shrubs occasionally occur in two different strata, with low shrubs at 0.5-1m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (0.2-1%, mean 0.8%) at 0-0.5m tall. Trees sometimes occur as emergents (0-2%, mean 0.5%) with hardwoods at 2-5m tall (0-1%, mean 0.3%) and conifers at 10-15m tall (0-1%, mean 0.3%). Total vegetation cover is 60-75%, mean 67.3%.

In this association, *Arctostaphylos glandulosa* is the primary dominant the overstory shrub layer while *Adenostoma fasciculatum* is often present at low cover. The herbaceous and tree layers are variable and sparse.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 813-1334 ft., mean 1059 ft.

Aspect: often SW, but variable

Slope: gentle to somewhat steep, range 5-21 degrees, mean 15 degrees

Topography: lower to upper slope, convex or rounded to undulating

Small Rock Cover: range 0.2-2%, mean 0.9%

Large Rock Cover: none

Litter Cover: range 85-94%, mean 90.5%

Bare Ground: range 3-10%, mean 5.3%

Parent Material: Franciscan melange

Soil Texture: medium to very fine, sandy loam, or sandy clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands are commonly found in the mid slopes of Mt. Tamalpais that often have exposed, southerly exposures on marine sedimentary substrate.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 0.1%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Aira caryophyllea* and *Convolvulus arvensis*. Additional site impacts include light erosion/runoff in one stand.

#### **SENSITIVE SPECIES**

*Arctostaphylos hookeri* subsp. *montana* was found in 1 of 4 surveys of this plant community. MMWD regionally considers this species as Rare. CNPS ranks this species as List 1B with R-E-D Code is 3-1-3. Global rank is G3T2, and State rank is S2.2. Federal and state listing is None (CNPS 2005).

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=4)**

**Rapid Assessment(s):** MMWD0164, MMWD0222, MMWD0360, MMWD0364 **Releve(s):** none

**Rank:** G4 S4

#### **GLOBAL DISTRIBUTION**

Outer North Coast, outer Central Coast, montane Transverse Ranges, montane Peninsular Ranges

## REFERENCES

Gordon and White 1994, Klein and Evens 2005

### *Arctostaphylos glandulosa* Association

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	PSME-T	<i>Pseudotsuga menziesii</i>	25	0.3	1	1
	QUWI2-T	<i>Quercus wislizeni</i>	25	0.3	1	1
<b>Tree Understory</b>						
	PSME-M	<i>Pseudotsuga menziesii</i>	25	0.1	0.2	0.2
<b>Shrub</b>						
	<b>ARGL3</b>	<b><i>Arctostaphylos glandulosa</i></b>	<b>100</b>	<b>59.0</b>	<b>54</b>	<b>61</b>
	ADFA	<i>Adenostoma fasciculatum</i>	75	1.8	0.2	4
	CECU	<i>Ceanothus cuneatus</i>	50	1.5	2	4
	PIMO5	<i>Pickeringia montana</i>	50	0.8	1	2
	DERI	<i>Dendromecon rigida</i>	50	0.3	0.2	1
	HEAR5	<i>Heteromeles arbutifolia</i>	50	0.1	0.2	0.2
	TODI	<i>Toxicodendron diversilobum</i>	50	0.1	0.2	0.2
	QUWI2-M	<i>Quercus wislizeni</i>	25	1.3	5	5
	QUUDU4	<i>Quercus durata</i>	25	0.8	3	3
	ARHOM	<i>Arctostaphylos hookeri</i> subsp. <i>montana</i>	25	0.5	2	2
	CHCH7-M	<i>Chrysolepis chrysophylla</i>	25	0.3	1	1
	ERCA6	<i>Eriodictyon californicum</i>	25	0.1	0.2	0.2
	MIAU	<i>Mimulus aurantiacus</i>	25	0.1	0.2	0.2
<b>Herb</b>						
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	25	6.3	25	25
	AICA	<i>Aira caryophyllea</i>	25	0.1	0.2	0.2
	CAGL7	<i>Carex globosa</i>	25	0.1	0.2	0.2
	CHPO3	<i>Chlorogalum pomeridianum</i>	25	0.1	0.2	0.2
	COAR4	<i>Convolvulus arvensis</i>	25	0.1	0.2	0.2
	LOWR2	<i>Lotus wrangelianus</i>	25	0.1	0.2	0.2
	SALA7	<i>Sanicula laciniata</i>	25	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	25	0.1	0.2	0.2
	STAJ	<i>Stachys ajugoides</i>	25	0.1	0.2	0.2
<b>Cryptogam</b>						
	LICHEN	<i>Lichen</i>	100	1.0	0.2	2
	MOSS	<i>Moss</i>	75	1.0	0.2	3

### ***Arctostaphylos hookeri* subsp. *montana* Alliance or Habitat**

This alliance is restricted to Mount Tamalpais on rocky, serpentinite soils found in less than 50 stands on the mountain. It has been classified into two associations, in which a shrubland of the endemic *Arctostaphylos hookeri* subsp. *montana* with *Ceanothus jepsonii* occurs and a mixed shrubland of *A. h.* subsp. *montana*, *Adenostoma fasciculatum*, and other chaparral species occurs. A variety of other serpentine-related species occur including *Calamagrostis ophitidis*, *Calochortus umbellatus*, and *Eriogonum luteolum* var. *caninum*. Additional variation is seen in two stands (MMWD0051 and MMWD0202) sampled and classified at the alliance level, in which *Ceanothus jepsonii* and *Arctostaphylos glandulosa* were a strong dominants with *A. h.* subsp. *montana*.

### ***Arctostaphylos hookeri* subsp. *montana* Association**

#### **Mt. Tamalpais Manzanita Association**

**Mapping Code: 3120**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Arctostaphylos hookeri* subsp. *montana* Shrubland form an open to intermittent shrub layer (7.0-55%, mean 35.8%). Shrubs infrequently occur in two different strata, with low shrubs at 0.5-2m tall and tall shrubs at 0-5m tall. The herbaceous layer is open to intermittent (3-55%, mean 14.8%) at 0-0.5m tall. Trees infrequently occur as emergents (0-5%, mean 0.8%) with hardwoods at 2-10m tall (0-2%, mean 0.2%) and conifers at 0.5-2m tall (0-5%, mean 0.6%). Total vegetation cover is 12-72%, mean 50.5%.

In this association, *Arctostaphylos hookeri* subsp. *montana* primarily dominates the overstory shrub layer, while sometimes *Ceanothus jepsonii* may be present and infrequently co-dominant. *Adenostoma fasciculatum*, if present, is much less in cover than the *Arctostaphylos*. The herb layer is diverse and usually open with *Melica torreyana* characteristically present and *Vulpia microstachys*, *Calamagrostis ophitidis*, *Calochortus umbellatus*, and *Chlorogalum pomeridianum* often present. The tree layer is sparse, infrequently with *Pseudotsuga menziesii*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1130-2063 ft., mean 1548 ft.  
Aspect: variable (usually neutral or NE)  
Slope: flat to steep, 0-28 degrees, mean 14.1 degrees  
Topography: mid to upper slope, microtopography is variable  
Small Rock Cover: range 3-60%, mean 34%  
Large Rock Cover: range 0.2-35%, mean 13.5%  
Litter Cover: range 0.2-73%, mean 25.5%  
Bare Ground: range 6.0-40%, mean 21.5%  
Parent Material: serpentinite, Franciscan melange  
Soil Texture: usually moderately fine sandy clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. This association is the more mesic expression of the alliance, found on northerly or neutral slopes on generally rocky serpentinite substrates.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 0.1%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Aira caryophyllea* and *Bromus hordeaceus*. Additional site impacts are light to moderate erosion/runoff in three stands and light vandalism/dumping/litter in one stand.

#### **SENSITIVE SPECIES**



*Arctostaphylos hookeri* subsp. *montana* was found in 11 of 11 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 3-1-3. Global rank is G3T2, and State rank is S2.2. Federal and state listing is None (CNPS 2005).

*Calamagrostis ophitidis* was found in 6 of 11 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-1-3. Global rank is G3, and State rank is S3.3. Federal and state listing is None (CNPS 2005).

*Calochortus umbellatus* was found in 6 of 11 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-2-3. Global rank is G3, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

*Lessingia micradenia* var. *micradenia* was found in 1 of 11 surveys of this plant community. CNPS ranks this subspecies as List 1B with R-E-D Code is 3-2-3. Global rank is G2T1, and State rank is S1.1. Federal and state listing is None (CNPS 2005).

*Navaretia rosulata* was found in 2 of 11 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 2-2-3. Global rank is G2?, and State rank is S2?. Federal and state listing is None (CNPS 2005).

*Streptanthus batrachopus* was found in 1 of 11 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 3-1-3. Global rank is G1, and State rank is S1.2. Federal and state listing is None (CNPS 2005).

*Streptanthus glandulosus* subsp. *pulchellus* was found in 1 of 11 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 3-2-3. Global rank is G4T1, and State rank is S1.2. Federal and state listing is None (CNPS 2005).

*Eriogonum luteolum* var. *caninum* was found in 3 of 11 surveys of this plant community. CNPS ranks this species as List 3 with R-E-D Code is ?-2-3. Global rank is G5T3Q, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=11)**

**Rapid Assessment(s):** MMWD0080, MMWD0303 **Releve(s):** MMWD0016, MMWD0017, MMWD0049, MMWD0053, MMWD0074, MMWD0076, MMWD0118, MMWD0121, MMWD0197

**Rank:** G2 S2

#### **GLOBAL DISTRIBUTION**

Northern outer Central Coast (restricted to Mt. Tamalpais area)

#### **REFERENCES**

NatureServe et al. 2003a

***Arctostaphylos hookeri* subsp. *montana* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	ARHOM	<i>Arctostaphylos hookeri</i> subsp. <i>montana</i>	100	33.7	5	55
	CEJE	<i>Ceanothus jepsonii</i>	73	3.2	0.2	28
	ADFA	<i>Adenostoma fasciculatum</i>	55	1.9	0.2	10
	HEAR5	<i>Heteromeles arbutifolia</i>	27	0.7	0.2	5
	MIAU	<i>Mimulus aurantiacus</i>	27	0.2	0.2	2
Herb						
	METO	<i>Melica torreyana</i>	82	0.4	0.2	1
	VUMI	<i>Vulpia microstachys</i>	64	0.1	0.2	0.2
	CAOP2	<i>Calamagrostis ophitidis</i>	55	0.7	0.2	2
	CAUM	<i>Calochortus umbellatus</i>	55	0.3	0.2	1
	CHPO3	<i>Chlorogalum pomeridianum</i>	55	0.2	0.2	1
	EPMI	<i>Epilobium minutum</i>	45	0.2	0.2	1
	ASDE6	<i>Aspidotis densa</i>	45	0.1	0.2	0.2
	ERRE12	<i>Erigeron reductus</i>	45	0.1	0.2	0.2
	MOPU2	<i>Monardella purpurea</i>	45	0.1	0.2	0.2
	CLEX2	<i>Claytonia exigua</i>	36	0.1	0.2	0.2
	NAVAR	<i>Navarretia</i>	36	0.1	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	36	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	27	0.1	0.2	1
	PLER3	<i>Plantago erecta</i>	27	0.1	0.2	1
	CACO35	<i>Calystegia collina</i>	27	0.1	0.2	0.2
	ERLUC	<i>Eriogonum luteolum</i> var. <i>caninum</i>	27	0.1	0.2	0.2
	MINUA	<i>Minuartia</i>	27	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	27	0.1	0.2	0.2

## ***Arctostaphylos hookeri* subsp. *montana*-*Adenostoma fasciculatum* Association**

### **Mt. Tamalpais Manzanita - Chamise Association**

**Mapping Code: 3120**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Arctostaphylos hookeri* subsp. *montana*-*Adenostoma fasciculatum* Shrubland form an intermittent to dense shrub layer (35-85%, mean 50.3%). Shrubs frequently occur in two different strata, with low shrubs at 0-1m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (3-15%, mean 7.6%) at 0-1m tall. Trees occasionally occur as emergents (0-9%, mean 2.8%) with hardwoods at 1-5m tall (0-0.2%, mean 0.1%) and conifers at 2-5m tall (0-9%, mean 2.7%). Total vegetation cover is 43-85%, mean 56.1%.

In this association, *Arctostaphylos hookeri* subsp. *montana* co-dominates with *Adenostoma fasciculatum* in the overstory shrub layer. *Heteromeles arbutifolia* is characteristically present, and *Quercus durata* is often present. The herbaceous layer is diverse and open, with *Chlorogalum pomeridianum*, *Calamagrostis ophitidis*, and *Agrostis* sp. characteristically present and with *Melica torreyana*, *Iris* sp., and *Sisyrinchium bellum* often present. The tree layer is sparse to open, with *Pseudotsuga menziesii* sometimes regenerating.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1092-1354 ft., mean 1227 ft.

Aspect: SW

Slope: gentle to somewhat steep, range 2-25 degrees, mean 11 degrees

Topography: mid slope to ridge top, convex or rounded

Small Rock Cover: range 2-66%, mean 26.4%

Large Rock Cover: range 0-20%, mean 7.3%

Litter Cover: range 5-60%, mean 31.3%

Bare Ground: range 4-60%, mean 35.4%

Parent Material: serpentine

Soil Texture: moderately coarse to fine sandy loam or clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. This association is a more xeric expression of the *Arctostaphylos hookeri* subsp. *montana* alliance, occurring primarily on southwest exposures on generally rocky serpentinite surfaces.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 0.7%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Aira caryophyllea*, *Torilis* sp., and *Vulpia bromoides*. Additional site impacts includes light Douglas fir encroachment in two stands.

#### **SENSITIVE SPECIES**

*Arctostaphylos hookeri* subsp. *montana* was found in 7 of 7 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 3-1-3. Global rank is G3T2, and State rank is S2.2. Federal listing and state listing is None (CNPS 2005).

*Calamagrostis ophitidis* was found in 5 of 7 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-1-3. Global rank is G3, and State rank is S3.3. Federal and state listing is None (CNPS 2005).

*Calochortus umbellatus* was found in 3 of 7 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-2-3. Global rank is G3, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

*Eriogonum luteolum* var. *caninum* was found in 2 of 7 surveys of this plant community. CNPS ranks this species as List 3 with R-E-D Code is ?-2-3. Global rank is G5T3Q, and State rank is S3.2. Federal and

state listing is None (CNPS 2005).

*Navarretia rosulata* was found in 2 of 7 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 2-2-3. Global rank is G2?, and State rank is S2?. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=7)**

**Rapid Assessment(s):** none **Releve(s):** MMWD0064, MMWD0065, MMWD0140, MMWD0165, MMWD0167, MMWD0347, MMWD0352

**Rank:** G2 S2

**GLOBAL DISTRIBUTION**

Northern outer Central Coast (restricted to Mt. Tamalpais area)

**REFERENCES**

None

**Arctostaphylos hookeri subsp. montana-Adenostoma fasciculatum Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	PSME-T	<i>Pseudotsuga menziesii</i>	29	1.9	4	9
<b>Tree Understory</b>						
	PSME-L	<i>Pseudotsuga menziesii</i>	29	0.1	0.2	0.2
	PSME-M	<i>Pseudotsuga menziesii</i>	29	0.1	0.2	0.2
<b>Shrub</b>						
	<b>ARHOM</b>	<b>Arctostaphylos hookeri subsp. montana</b>	<b>100</b>	<b>23.3</b>	<b>16</b>	<b>35</b>
	<b>ADFA</b>	<b>Adenostoma fasciculatum</b>	<b>100</b>	<b>16.1</b>	<b>2</b>	<b>40</b>
	HEAR5	<i>Heteromeles arbutifolia</i>	100	4.5	0.2	19
	QUUDU4	<i>Quercus durata</i>	71	4.3	1	20
	ERCA6	<i>Eriodictyon californicum</i>	57	1.2	0.2	5.2
	GAEL	<i>Garrya elliptica</i>	57	0.5	0.2	3
	CEJE	<i>Ceanothus jepsonii</i>	43	0.5	0.2	2
	CECU	<i>Ceanothus cuneatus</i>	43	0.3	0.2	1
	TODI	<i>Toxicodendron diversilobum</i>	43	0.2	0.2	1
	ARGL3	<i>Arctostaphylos glandulosa</i>	29	0.7	2.2	3
	ERST9	<i>Eriophyllum staechadifolium</i>	29	0.2	0.2	1
	LOHI2	<i>Lonicera hispidula</i>	29	0.1	0.2	0.2
<b>Herb</b>						
	CHPO3	<i>Chlorogalum pomeridianum</i>	100	0.2	0.2	0.2
	CAOP2	<i>Calamagrostis ophitidis</i>	86	0.7	0.2	2
	AGROS2	<i>Agrostis</i>	86	0.4	0.2	1
	METO	<i>Melica torreyana</i>	71	0.8	0.2	4
	IRIS	<i>Iris</i>	71	0.1	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	71	0.1	0.2	0.2
	NAPU4	<i>Nassella pulchra</i>	57	0.2	0.2	1
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	57	0.1	0.2	0.2
	VUMI	<i>Vulpia microstachys</i>	57	0.1	0.2	0.2
	FECA	<i>Festuca californica</i>	43	1.3	0.2	6
	ACMI2	<i>Achillea millefolium</i>	43	0.1	0.2	0.2
	AICA	<i>Aira caryophyllea</i>	43	0.1	0.2	0.2
	CAUM	<i>Calochortus umbellatus</i>	43	0.1	0.2	0.2
	NAVAR	<i>Navarretia</i>	43	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	43	0.1	0.2	0.2
	MAEX	<i>Madia exigua</i>	29	0.2	0.2	1
	ASDE6	<i>Aspidotis densa</i>	29	0.1	0.2	0.2
	BREL	<i>Brodiaea elegans</i>	29	0.1	0.2	0.2
	CALU9	<i>Calochortus luteus</i>	29	0.1	0.2	0.2
	CALYS	<i>Calystegia</i>	29	0.1	0.2	0.2

### ***Arctostaphylos nummularia* Alliance or Habitat**

This alliance is represented by two associations in the study area, in which *Arctostaphylos nummularia* occurs mixed other sclerophyll shrubs typically in high cover values. Stands are found close to the coast on marine sedimentary substrates with shallow soils (kept moist/wet by the coastal fog) in Marin County, they are often surrounded by forest stands on adjacent deeper soils. Similar stands are found in the Santa Cruz Mountains of Santa Cruz and San Mateo Counties (Hect et al. 1973). Additional variation is represented in one plot (MMWD0192) that has a relatively pure dominance of *A. nummularia* in a small stand within a forest opening of *Pseudotsuga menziesii*.

### ***Arctostaphylos nummularia*-*Arctostaphylos glandulosa* Association**

#### **Sensitive Manzanita - Eastwood Manzanita Association**

**Mapping Code: 3130**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Arctostaphylos nummularia*-*Arctostaphylos glandulosa* Shrubland form a dense shrub layer (69-71%, mean 70%). Shrubs frequently occur in two different strata, with low shrubs at 1-2m tall and tall shrubs at 2-5m tall. The herbaceous layer is open (2-3%, mean 2.5%) at 0-0.5m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 71-72%, mean 71.5%.

In this association, *Arctostaphylos glandulosa* is sub-dominant to co-dominant with *Arctostaphylos nummularia* in the overstory shrub layer at high cover. The herbaceous layer is characterized by native species such as *Satureja douglasii* at low cover. The tree layer is sparse to low in cover.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1137-1471 ft., mean 1304 ft.

Aspect: SE

Slope: 20 degrees (data from one plot)

Topography: mid slope, undulating pattern

Small Rock Cover: 2% (data from one plot)

Large Rock Cover: 0.2% (data from one plot)

Litter Cover: 25% (data from one plot)

Bare Ground: 70% (data from one plot)

Parent Material: Franciscan melange

Soil Texture: medium loam or moderately fine sandy clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands are found near the coast on gentle to moderate slopes in the middle elevations of Mt. Tamalpais. They occur near the coast in forest openings and in interfaces between forests (including *Pseudotsuga menziesii* alliance) and other chaparral (including *Arctostaphylos glandulosa* and *Adenostoma fasciculatum* alliances).

#### **SITE IMPACTS**

This association has no non-native plant cover in the stands sampled. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** MMWD0203, MMWD0373 **Releve(s):** none

**Rank:** G2 S2?

#### **GLOBAL DISTRIBUTION**

Northern outer Central Coast (including Mt. Tamalpais); though full distribution is not known

## REFERENCES

None

### *Arctostaphylos nummularia*-*Arctostaphylos glandulosa* Association

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Understory	QUCH2-L	<i>Quercus chrysolepis</i>	50	1.5	3	3
Shrub						
	ARNU3	<i>Arctostaphylos nummularia</i>	100	36.5	30	43
	ARGL3	<i>Arctostaphylos glandulosa</i>	100	20.5	20	21
	ADFA	<i>Adenostoma fasciculatum</i>	100	2.1	0.2	4
	QUWI2-L	<i>Quercus wislizeni</i>	50	2.5	5	5
	CHCH7-M	<i>Chrysolepis chrysophylla</i>	50	0.5	1	1
	MIAU	<i>Mimulus aurantiacus</i>	50	0.1	0.2	0.2
	TODI	<i>Toxicodendron diversilobum</i>	50	0.1	0.2	0.2
	VAOV2	<i>Vaccinium ovatum</i>	50	0.1	0.2	0.2
Herb						
	SADO5	<i>Satureja douglasii</i>	100	0.6	0.2	1
	IRDO	<i>Iris douglasiana</i>	50	0.1	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	50	0.1	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	50	0.1	0.2	0.2

***Arctostaphylos nummularia*-*Vaccinium ovatum*(-*Chrysolepis chrysophylla*) Association**  
**Sensitive Manzanita - Black Huckleberry (- Chinquapin) Association**

**Mapping Code: 3130**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Arctostaphylos nummularia*-*Vaccinium ovatum*(-*Chrysolepis chrysophylla*) Shrubland form a dense shrub layer (72-83%, mean 76.3%). Shrubs frequently occur in two different strata, with low shrubs at 1-2m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (1-6%, mean 4.3%) at 0-0.5m tall. Trees infrequently occur as emergents (0-0.2%, mean 0.1%) with hardwoods at 2-5m tall (0-0.2%, mean 0.1%). Total vegetation cover is 68-77%, mean 73%.

In this association, *Arctostaphylos nummularia* is dominant while *Vaccinium ovatum* and *Arctostaphylos glandulosa* are characteristically present the overstory shrub layer at high cover. The herbaceous and tree layers are low in cover without any specific characteristic species.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1491-1633 ft., mean 1561 ft.

Aspect: NE or variable

Slope: moderate to somewhat steep, range 10-21 degrees, mean 15.5 degrees

Topography: upper slope to ridge top, usually convex or rounded

Small Rock Cover: range 0.5-5%, mean 2.9%

Large Rock Cover: range 0-1%, mean 0.1%

Litter Cover: range 85-93%, mean 89.5%

Bare Ground: range 4-10%, mean 6.5%

Parent Material: Franciscan melange

Soil Texture: moderately fine sandy clay loam or sandy loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands occur near the coast on moderate to steep slopes in middle to upper elevations of Mt. Tamalpais. They occur within forest openings and in interfaces between forests (including *Pseudotsuga menziesii* and *Chrysolepis chrysophylla* alliances) and other chaparral (including *Adenostoma fasciculatum* and *Arctostaphylos glandulosa* alliances). This association appears to be a more mesic expression than the *A. nummularia* - *A. glandulosa* Association. Further, many stands have had altered fire regimes.

**SITE IMPACTS**

This association has no non-native plant cover in the sampled stands. Additional site impacts include light erosion/runoff in one stand.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=4)**

**Rapid Assessment(s):** MMWD0402, MMWD0403, MMWD0413, MMWD0414 **Releve(s):** none

**Rank:** G2 S2?

**GLOBAL DISTRIBUTION**

Northern outer Central Coast (known from Bolinas Ridge, Golden Gate NRA, and Mt Tamalpais area); though full distribution is not known

**REFERENCES**

NatureServe et al. 2003a



***Arctostaphylos nummularia*-*Vaccinium ovatum*(-*Chrysolepis chrysophylla*) Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	PIMU	<i>Pinus muricata</i>	25	0.5	2	2
<b>Tree Understory</b>						
	QUAG-M	<i>Quercus agrifolia</i>	25	0.1	0.2	0.2
<b>Shrub</b>						
	ARNU3	<b><i>Arctostaphylos nummularia</i></b>	<b>100</b>	<b>52.0</b>	<b>31</b>	<b>60</b>
	VAOV2	<b><i>Vaccinium ovatum</i></b>	<b>100</b>	<b>9.0</b>	<b>1</b>	<b>15</b>
	ARGL3	<i>Arctostaphylos glandulosa</i>	100	8.8	3	18
	CHCH7-M	<b><i>Chrysolepis chrysophylla</i></b>	<b>50</b>	<b>5.3</b>	<b>0.2</b>	<b>21</b>
	QUWI2-M	<i>Quercus wislizeni</i>	50	1.3	0.2	5
	ERCA6	<i>Eriodictyon californicum</i>	50	0.1	0.2	0.2
	PIMO5	<i>Pickeringia montana</i>	25	0.3	1	1
	HEAR5	<i>Heteromeles arbutifolia</i>	25	0.1	0.2	0.2
	MIAU	<i>Mimulus aurantiacus</i>	25	0.1	0.2	0.2
	QUPAS2	<i>Quercus parvula</i> var. <i>shrevei</i>	25	0.1	0.2	0.2
<b>Cryptogam</b>						
	LICHEN	<i>Lichen</i>	100	4.0	1	5
	MOSS	<i>Moss</i>	50	0.1	0.2	0.2

### ***Artemisia californica* Alliance or Habitat**

This alliance is represented in the study area by a single association that is commonly found in the Central Coast and coastal mountain slopes of Southern California.

### ***Artemisia californica-Mimulus aurantiacus* Association California Sagebrush - Bush Monkeyflower Association**

**Mapping Code: 3311**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Artemisia californica-Mimulus aurantiacus* Shrubland form an open to intermittent shrub layer (20-66%, mean 39.2%). Shrubs sometimes occur in two different strata, with low shrubs at 0.5-2m tall and tall shrubs at 0-5m tall. The herbaceous layer is open (7-31%, mean 15.2%) at 0-1m tall. The tree layer is open or absent (no values recorded). Total vegetation cover is 32-66%, mean 51.6%.

In this association, *Mimulus aurantiacus* is sub-dominant to co-dominant with *Artemisia californica* in the overstory shrub layer at low to moderate cover. The herbaceous layer is characterized by an open cover of annual grasses and ferns, including *Avena barbata*, *Cynosurus echinatus*, *Pellaea andromedifolia*, and *Pentagramma triangularis*. The tree layer is sparse or absent.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 368-1384 ft., mean 897 ft.  
Aspect: frequently SW, occasionally SE  
Slope: steep to abrupt, range 27-75 degrees, mean 47.6 degrees  
Topography: mid to upper slope, variable from linear or even to undulating  
Small Rock Cover: 71% (data from one plot)  
Large Rock Cover: 2% (data from one plot)  
Litter Cover: 5% (data from one plot)  
Bare Ground: 16% (data from one plot)  
Parent Material: Franciscan melange  
Soil Texture: moderately coarse to very fine sandy loam

Stands of this association were sampled in the Mt. Tamalpais Watershed.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 17.6%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Avena barbata*, *Cynosurus echinatus*, and *Bromus hordeaceus*. There are no additional site impacts.

#### **SENSITIVE SPECIES**

*Eriogonum luteolum* var. *caninum* was found in 1 of 5 surveys of this plant community. CNPS ranks this species as List 3 with R-E-D Code is ?-2-3. Global rank is G5T3Q, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=5)**

**Rapid Assessment(s):** MMWD0073, MMWD0093, MMWD0100, MMWD0358, MMWD0365 **Releve(s):** none

**Rank:** G4 S4

#### **GLOBAL DISTRIBUTION**

Central Coast and Southern California

## REFERENCES

Keeler-Wolf and Evens 2006, NatureServe et al 2003a

### *Artemisia californica*-*Mimulus aurantiacus* Association

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	QUAG-T	<i>Quercus agrifolia</i>	20	0.0	0.2	0.2
<b>Tree Understory</b>						
	UMCA-L	<i>Umbellularia californica</i>	20	0.1	0.5	0.5
<b>Shrub</b>						
	<b>ARCA11</b>	<b><i>Artemisia californica</i></b>	<b>100</b>	<b>15.8</b>	<b>10</b>	<b>23</b>
	<b>MIAU</b>	<b><i>Mimulus aurantiacus</i></b>	<b>100</b>	<b>11.0</b>	<b>3</b>	<b>15</b>
	BAPI	<i>Baccharis pilularis</i>	80	1.6	1	3
	CECU	<i>Ceanothus cuneatus</i>	40	5.1	0.5	25
	TODI	<i>Toxicodendron diversilobum</i>	40	0.4	0.2	2
	CEDED	<i>Ceanothus dentatus</i> var. <i>dickeyi</i>	20	3.0	15	15
	RHCR	<i>Rhamnus crocea</i>	20	1.4	7	7
	QUWI2-M	<i>Quercus wislizeni</i>	20	0.2	1	1
	ADFA	<i>Adenostoma fasciculatum</i>	20	0.0	0.2	0.2
	ERCA6	<i>Eriodictyon californicum</i>	20	0.0	0.2	0.2
	ERST9	<i>Eriophyllum staechadifolium</i>	20	0.0	0.2	0.2
<b>Herb</b>						
	AVBA	<i>Avena barbata</i>	100	1.5	0.2	5
	CYEC	<i>Cynosurus echinatus</i>	60	0.6	1	1
	PEAN2	<i>Pellaea andromedifolia</i>	60	0.2	0.2	0.5
	PETR7	<i>Pentagramma triangularis</i>	60	0.1	0.2	0.2
	BRHO2	<i>Bromus hordeaceus</i>	40	2.2	0.2	11
	HYGL2	<i>Hypochaeris glabra</i>	40	0.3	0.5	1
	CHPO3	<i>Chlorogalum pomeridianum</i>	40	0.2	0.2	1
	DUCY	<i>Dudleya cymosa</i>	40	0.2	0.2	1
	STGL8	<i>Streptanthus glandulosus</i>	40	0.2	0.2	1
	CAPY2	<i>Carduus pycnocephalus</i>	40	0.1	0.2	0.5
	ESCA2	<i>Eschscholzia californica</i>	40	0.1	0.2	0.5
	AGHE2	<i>Agoseris heterophylla</i>	40	0.1	0.2	0.2
	AICA	<i>Aira caryophylla</i>	40	0.1	0.2	0.2
	ANAR	<i>Anagallis arvensis</i>	40	0.1	0.2	0.2
	ERNU3	<i>Eriogonum nudum</i>	40	0.1	0.2	0.2
	LUNA3	<i>Lupinus nanus</i>	40	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	40	0.1	0.2	0.2
	BRMA	<i>Briza maxima</i>	20	2.2	11	11
	BRDI2	<i>Brachypodium distachyon</i>	20	0.8	4	4
	MECA2	<i>Melica californica</i>	20	0.6	3	3
	MOPU2	<i>Monardella purpurea</i>	20	0.4	2	2
	BRDI3	<i>Bromus diandrus</i>	20	0.2	1	1
	FICA2	<i>Filago californica</i>	20	0.2	1	1
	HORDE	<i>Hordeum</i>	20	0.2	1	1

**Artemisia californica-Mimulus aurantiacus Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
	BRCA5	<i>Bromus carinatus</i>	20	0.1	0.5	0.5
	CAPU18	<i>Calystegia purpurata</i>	20	0.1	0.5	0.5
	FIGA	<i>Filago gallica</i>	20	0.1	0.5	0.5
	SACO6	<i>Salvia columbariae</i>	20	0.1	0.5	0.5
	BREL	<i>Brodiaea elegans</i>	20	0.0	0.2	0.2
	BRMA3	<i>Bromus madritensis</i>	20	0.0	0.2	0.2
	CASU10	<i>Castilleja subinclusa</i>	20	0.0	0.2	0.2
	CLPU2	<i>Clarkia purpurea</i>	20	0.0	0.2	0.2
	DAPU3	<i>Daucus pusillus</i>	20	0.0	0.2	0.2
	ELEL5	<i>Elymus elymoides</i>	20	0.0	0.2	0.2
	EPILO	<i>Epilobium</i>	20	0.0	0.2	0.2
	ERLUC	<i>Eriogonum luteolum</i> var. <i>caninum</i>	20	0.0	0.2	0.2
	GADI	<i>Galium divaricatum</i>	20	0.0	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	20	0.0	0.2	0.2
	HOCA3	<i>Horkelia californica</i>	20	0.0	0.2	0.2
	HYCO3	<i>Hypericum concinnum</i>	20	0.0	0.2	0.2
	IRMA	<i>Iris macrosiphon</i>	20	0.0	0.2	0.2
	KOMA	<i>Koeleria macrantha</i>	20	0.0	0.2	0.2
	LINAN2	<i>Linanthus</i>	20	0.0	0.2	0.2
	LODA	<i>Lomatium dasycarpum</i>	20	0.0	0.2	0.2
	NAPU4	<i>Nassella pulchra</i>	20	0.0	0.2	0.2
	PEKE	<i>Perideridia kelloggii</i>	20	0.0	0.2	0.2
	POCA5	<i>Polygala californica</i>	20	0.0	0.2	0.2
	POLYP	<i>Polypodium</i>	20	0.0	0.2	0.2
	SIGA	<i>Silene gallica</i>	20	0.0	0.2	0.2
	STAJ	<i>Stachys ajugoides</i>	20	0.0	0.2	0.2
	TRCI	<i>Trifolium ciliolatum</i>	20	0.0	0.2	0.2

### ***Baccharis pilularis* Alliance or Habitat**

This alliance is characterized by five associations in the study area. Two associations have abundant herbaceous understory with relatively pure *Baccharis pilularis* overstory, and three have varied understory and mixed shrub overstory. As a species, *Baccharis pilularis* has a broad environmental tolerance. It has an ability to quickly re-establish into stands after disturbance; for example, it can invade in grassland stands after fire.

### ***Baccharis pilularis*/Native Grass (Mixed) Association**

#### **Coyote Brush / Native Grass (Mixed) Association**

**Mapping Code: 3222**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Baccharis pilularis*/Native Grass (Mixed) Shrubland form an open to intermittent shrub layer (11-55%, mean 35.5%). Shrubs occasionally occur in two different strata, with low shrubs at 0.5-1m tall and tall shrubs at 0.5-5m tall. The herbaceous layer is open to intermittent (13-60%, mean 39%) at 0-0.5m tall. Trees infrequently occur as emergents (0-1%, mean 0.2%) with hardwoods at 5-10m tall (0-1%, mean 0.2%). Total vegetation cover is 53-85%, mean 67.7%.

In this association, *Baccharis pilularis* dominates the overstory shrub layer at low to moderate cover. The herbaceous layer is characterized by native grasses such as *Elymus glaucus*, *Nassella pulchra*, *Festuca idahoensis*, and *Melica californica*, mixed with non-native grasses such as *Bromus hordeaceus*, *Holcus lanatus*, and *Cynosurus echinatus*. Various forbs may also be present in the stands. The tree layer is sparse or absent.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 305-1527 ft., mean 884 ft.

Aspect: variable, but most often NW

Slope: flat to somewhat steep, range 0-22 degrees, mean 12 degrees

Topography: mid slope to ridge top, concave or depression, less often convex or rounded

Small Rock Cover: range 0-0.2%, mean 0.1%

Large Rock Cover: none

Litter Cover: range 32-94%, mean 63%

Bare Ground: range 4-65%, mean 34.5%

Parent Material: Franciscan melange

Soil Texture: medium to very fine sandy loam or moderately fine clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed, at Nicasio Reservoir, and at Soulajule Reservoir. This is a commonly found at lower to mid elevations adjacent to broadleaf evergreen woodlands and herbaceous stands. Recent fire was accounted in at least one stand sampled. This association is equivalent to the *Baccharis pilularis* - Native Grassland Association (preliminary) defined in NatureServe et al. 2003a.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 24.1%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Carduus pycnocephalus*, *Bromus hordeaceus*, and *Holcus lanatus*. Additional site impacts include heavy road/trail construction/maintenance in one stand.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=6)**

**Rapid Assessment(s):** MMWD0011, MMWD0019, MMWD0082, MMWD0256, MMWD0367, MMWD0377 **Releve(s):** none

Rank: G3 S3

## GLOBAL DISTRIBUTION

Outer Central Coast and possibly North Coast; though full distribution is not known

## REFERENCES

NatureServe et al. 2003a

### *Baccharis pilularis*/Native Grass (Mixed) Association

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	<b>BAPI</b>	<b><i>Baccharis pilularis</i></b>	<b>100</b>	<b>33.3</b>	<b>9</b>	<b>51</b>
	TODI	<i>Toxicodendron diversilobum</i>	67	0.5	0.2	1
	RUUR	<i>Rubus ursinus</i>	50	1.0	0.2	4
Herb						
	CAPY2	<i>Carduus pycnocephalus</i>	83	0.2	0.2	0.2
	<b>ELGL</b>	<b><i>Elymus glaucus</i></b>	<b>67</b>	<b>1.2</b>	<b>0.2</b>	<b>6</b>
	<b>CHPO3</b>	<b><i>Chlorogalum pomeridianum</i></b>	<b>67</b>	<b>0.3</b>	<b>0.2</b>	<b>1</b>
	BRHO2	<i>Bromus hordeaceus</i>	50	3.7	1	15
	HOLA	<i>Holcus lanatus</i>	50	1.0	0.2	4
	CYEC	<i>Cynosurus echinatus</i>	50	0.6	0.2	3
	ACMI2	<i>Achillea millefolium</i>	50	0.4	0.2	2
	SADO5	<i>Satureja douglasii</i>	50	0.4	0.2	2
	<b>NAPU4</b>	<b><i>Nassella pulchra</i></b>	<b>50</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>
	<b>FEID</b>	<b><i>Festuca idahoensis</i></b>	<b>33</b>	<b>3.3</b>	<b>10</b>	<b>10</b>
	PLLA	<i>Plantago lanceolata</i>	33	2.0	0.2	12
	BRMA	<i>Briza maxima</i>	33	1.2	0.2	7
	VUBR	<i>Vulpia bromoides</i>	33	1.0	0.2	6
	<b>MECA2</b>	<b><i>Melica californica</i></b>	<b>33</b>	<b>0.8</b>	<b>2</b>	<b>3</b>
	PTAQ	<i>Pteridium aquilinum</i>	33	0.5	1	2
	RACA2	<i>Ranunculus californicus</i>	33	0.4	0.2	2
	AICA	<i>Aira caryophyllea</i>	33	0.2	0.2	1
	LOPE	<i>Lolium perenne</i>	33	0.2	0.2	1
	CAREX	<i>Carex</i>	33	0.1	0.4	0.4
	ANAR	<i>Anagallis arvensis</i>	33	0.1	0.2	0.2
	FRVE	<i>Fragaria vesca</i>	33	0.1	0.2	0.2
	GEDI	<i>Geranium dissectum</i>	33	0.1	0.2	0.2
	RUCR	<i>Rumex crispus</i>	33	0.1	0.2	0.2
	STRI	<i>Stachys rigida</i>	33	0.1	0.2	0.2

***Baccharis pilularis*/Native Grass (*Nassella pulchra*) Association**  
**Coyote Brush / Native Grass (Purple Needlegrass) Association**

**Mapping Code: 3222**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Baccharis pilularis*/Native Grass (*Nassella pulchra*) Shrubland form an open shrub layer (10-30%, mean 19.4%), where *Baccharis pilularis* dominates. Shrubs frequently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 0.5-5m tall. The herbaceous layer is open to dense (21-80%, mean 59.2%) at 0-0.5m tall. Trees infrequently occur as emergents (0-0.2%, mean 0.1%) with hardwoods at 5-10m tall (0-0.2%, mean 0.1%). Total vegetation cover is 51-83%, mean 73.8%.

In this association, *Baccharis pilularis* dominates the overstory shrub layer at low to moderate cover. The herbaceous layer is characterized by *Nassella pulchra* as the most abundant native grass mixed with non-native grasses such as *Bromus hordeaceus*, *B. diandrus*, *Briza maxima*, *Avena barbata*, and *Cynosurus echinatus*. Various forbs may also be present in the stands. The tree layer is sparse or absent.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 278-861 ft., mean 569 ft.

Aspect: variable

Slope: flat to somewhat steep, range 0-15 degrees, mean 7.8 degrees

Topography: bottom to ridge top, often convex or rounded, but variable

Small Rock Cover: range 2-2%, mean 2% (data from two plots)

Large Rock Cover: range 0-0%, mean 0% (data from two plots)

Litter Cover: range 43-60%, mean 51.5% (data from two plots)

Bare Ground: range 35-51%, mean 43% (data from two plots)

Parent Material: Franciscan melange

Soil Texture: most often moderately fine clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed, at Nicasio Reservoir, and at Soulajule Reservoir. This is a commonly found at lower to mid elevations adjacent to broadleaf evergreen or deciduous woodlands and herbaceous stands. Recent fire was accounted in at least one stand sampled. This association is similar to the *Baccharis pilularis*/Native Grass (Mixed) Association, but it usually has a finer textured soil and higher degree of annual non-native species along with the strong *Nassella pulchra* component in the understory.

**SITE IMPACTS**

This association has moderate non-native plant cover (average 46.3%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Bromus hordeaceus*, *Briza maxima*, and *Carduus pycnocephalus*. There are no additional site impacts.

**SENSITIVE SPECIES**

*Hemizonia congesta* was found in 1 of 5 surveys of this plant community. *H. congesta* subsp. *leucocephala* has the potential occur in the region in this habitat. CNPS ranks this subspecies as List 3 with R-E-D Code is ?-?-3. Global rank is G5T2T3, and State rank is S2S3. Federal and state listing is None. This subspecies may not occur where sampled; however, dried plants may be indistinguishable from subsp. *congesta*, and both the subspecies intergrade (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=5)**

**Rapid Assessment(s):** MMWD0005, MMWD0008, MMWD0083, MMWD0239, MMWD0382 **Releve(s):** none

**Rank:** G3 S3?

**GLOBAL DISTRIBUTION**

Central Coast; though full distribution is not known

## REFERENCES

NatureServe et al. 2003a, Shuford and Timossi 1989

### *Baccharis pilularis* Native Grass (*Nassella pulchra*) Association

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	<b>BAPI</b>	<b><i>Baccharis pilularis</i></b>	<b>100</b>	<b>17.0</b>	<b>10</b>	<b>20</b>
	TODI	<i>Toxicodendron diversilobum</i>	80	0.7	0.2	2
	RUUR	<i>Rubus ursinus</i>	40	0.1	0.2	0.2
	CECU	<i>Ceanothus cuneatus</i>	20	1.6	8	8
	CETH	<i>Ceanothus thyrsiflorus</i>	20	0.4	2	2
	HEAR5	<i>Heteromeles arbutifolia</i>	20	0.0	0.2	0.2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	20	0.0	0.2	0.2
Herb						
	<b>NAPU4</b>	<b><i>Nassella pulchra</i></b>	<b>100</b>	<b>8.0</b>	<b>4</b>	<b>20</b>
	BRHO2	<i>Bromus hordeaceus</i>	80	5.4	0.2	15
	BRMA	<i>Briza maxima</i>	60	3.6	3	10
	ELGL	<i>Elymus glaucus</i>	60	3.2	0.2	15
	CAPY2	<i>Carduus pycnocephalus</i>	60	0.5	0.5	1
	CHPO3	<i>Chlorogalum pomeridianum</i>	60	0.3	0.2	1
	VISA	<i>Vicia sativa</i>	60	0.2	0.2	0.5
	AVBA	<i>Avena barbata</i>	40	4.6	3	20
	BRDI3	<i>Bromus diandrus</i>	40	4.0	5	15
	CYEC	<i>Cynosurus echinatus</i>	40	4.0	2	18
	PLLA	<i>Plantago lanceolata</i>	40	2.2	1	10
	SCPE	<i>Scandix pecten-veneris</i>	40	0.5	0.5	2
	SIMA2	<i>Sidalcea malviflora</i>	40	0.3	0.5	1
	LIBI5	<i>Linum bienne</i>	40	0.2	0.2	1
	LOMI	<i>Lotus micranthus</i>	40	0.2	0.2	1
	PETR7	<i>Pentagramma triangularis</i>	40	0.2	0.5	0.5
	SADO5	<i>Satureja douglasii</i>	40	0.2	0.5	0.5
	AICA	<i>Aira caryophyllea</i>	40	0.1	0.2	0.2
	LOPE	<i>Lolium perenne</i>	40	0.1	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	40	0.1	0.2	0.2
	HOLA	<i>Holcus lanatus</i>	20	4.0	20	20
	BRDI2	<i>Brachypodium distachyon</i>	20	1.0	5	5
	HYGL2	<i>Hypochaeris glabra</i>	20	1.0	5	5
	HYRA3	<i>Hypochaeris radicata</i>	20	1.0	5	5
	VUMY	<i>Vulpia myuros</i>	20	1.0	5	5
	HECO7	<i>Hemizonia congesta</i>	20	0.6	3	3
	DACA3	<i>Danthonia californica</i>	20	0.4	2	2
	GEDI	<i>Geranium dissectum</i>	20	0.4	2	2
	KOMA	<i>Koeleria macrantha</i>	20	0.4	2	2
	IRMA	<i>Iris macrosiphon</i>	20	0.2	1	1
	MEPO3	<i>Medicago polymorpha</i>	20	0.2	1	1



***Baccharis pilularis*/Native Grass (*Nassella pulchra*) Association**

Stratum Herb	Code	Species Name	Con	Avg	Min	Max
	BRMI2	<i>Briza minor</i>	20	0.2	1	1
	BRLA3	<i>Bromus laevipes</i>	20	0.2	1	1
	CAOV4	<i>Camissonia ovata</i>	20	0.2	1	1
	ERBO	<i>Erodium botrys</i>	20	0.2	1	1
	PTAQ	<i>Pteridium aquilinum</i>	20	0.2	1	1
	MEAR	<i>Medicago arabica</i>	20	0.1	0.5	0.5
	ACMI2	<i>Achillea millefolium</i>	20	0.0	0.2	0.2
	AGHE2	<i>Agoseris heterophylla</i>	20	0.0	0.2	0.2
	ANAR	<i>Anagallis arvensis</i>	20	0.0	0.2	0.2
	BREL	<i>Brodiaea elegans</i>	20	0.0	0.2	0.2
	CADE8	<i>Carex densa</i>	20	0.0	0.2	0.2
	CIVU	<i>Cirsium vulgare</i>	20	0.0	0.2	0.2
	DAPU3	<i>Daucus pusillus</i>	20	0.0	0.2	0.2
	GAAP2	<i>Galium aparine</i>	20	0.0	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	20	0.0	0.2	0.2
	LUBI	<i>Lupinus bicolor</i>	20	0.0	0.2	0.2
	RUCR	<i>Rumex crispus</i>	20	0.0	0.2	0.2
	STRI	<i>Stachys rigida</i>	20	0.0	0.2	0.2
	TRBI	<i>Trifolium bifidum</i>	20	0.0	0.2	0.2
	TRDU2	<i>Trifolium dubium</i>	20	0.0	0.2	0.2
	TRLA16	<i>Triteleia laxa</i>	20	0.0	0.2	0.2
	WYAN	<i>Wyethia angustifolia</i>	20	0.0	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	20	0.0	0.2	0.2

***Baccharis pilularis*-*Artemisia californica*-*Toxicodendron diversilobum*/*Monardella villosa*  
Association**

**Coyote Brush - California Sagebrush - Poison Oak / Coyote-Mint Association**

**Mapping Code: 3221**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Baccharis pilularis*-*Artemisia californica*-*Toxicodendron diversilobum*/*Monardella villosa* Shrubland form an open to intermittent shrub layer (17-52%, mean 29.7%). Shrubs occasionally occur in two different strata, with low shrubs at 0.5-1m tall and tall shrubs at 0.5-2m tall. The herbaceous layer is open (10-25%, mean 15%) at 0-0.5m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 27-62%, mean 43%.

In this association, where *Baccharis pilularis* and *Artemisia californica* are co-dominant and *Toxicodendron diversilobum* is characteristically present in the overstory shrub layer. The herbaceous layer contains a variety of forbs and grasses such as *Anagallis arvensis*, *Avena barbata*, *Melica torreyana*, *Brachypodium distachyon*, and *Monardella villosa* at low cover.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 367-1370 ft., mean 767 ft.

Aspect: SE or SW

Slope: steep to very steep, range 40-65 degrees, mean 48.3 degrees

Topography: bottom to mid slope, convex or rounded to undulating

Small Rock Cover: range 6-7%, mean 6.5%

Large Rock Cover: 2%

Litter Cover: range 53-75%, mean 64%

Bare Ground: range 15-35%, mean 25%

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam or sandy clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed and at Soulajule Reservoir. They are found in a variety of slopes (lower to upper) and typically on exposed southerly exposures close to the coast. Stands of *Baccharis pilularis* co-dominant with *Artemisia californica* have been considered within a mixed alliance (Borchert et al. 2004) found within the Monterey Ranger District; however, this association is classified conservatively into the *Baccharis pilularis* Alliance (per NatureServe et al. 2003a). Further, stands in Santa Clara County classified as the *Baccharis pilularis*-*Artemisia californica*-*Heteromeles arbutifolia* Shrubland Association are very similar to the association in this report.

**SITE IMPACTS**

This association has low non-native plant cover (average 11.3%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Anagallis arvensis*, *Avena barbata*, and *Carduus pycnocephalus*. There are no additional site impacts.

**SENSITIVE SPECIES**

*Salvia columbariae* was found in 1 of 3 surveys of this plant community. MMWD regionally considers this species as Locally Rare. This species has no State, Federal, or Global listing status (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** MMWD0040, MMWD0386, MMWD0394 **Releve(s):** none

**Rank:** G4 S4

**GLOBAL DISTRIBUTION**

Central Coast (most likely from Marin to Monterey Counties)

**REFERENCES**

Borchert et al. 2004, Evens and San 2004, NatureServe et al. 2003a

***Baccharis pilularis*-*Artemisia californica*-*Toxicodendron diversilobum*/*Monardella villosa*  
Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	ARCA11	<i>Artemisia californica</i>	100	17.3	7	30
	BAPI	<i>Baccharis pilularis</i>	100	11.7	8	17
	MIAU	<i>Mimulus aurantiacus</i>	100	3.7	1	5
	TODI	<i>Toxicodendron diversilobum</i>	100	2.3	1	3
Herb						
	ANAR	<i>Anagallis arvensis</i>	100	0.8	0.2	2
	AVBA	<i>Avena barbata</i>	100	0.7	0.2	1
	CAPY2	<i>Carduus pycnocephalus</i>	67	0.1	0.2	0.2
	DAPU3	<i>Daucus pusillus</i>	67	0.1	0.2	0.2
	ERNU3	<i>Eriogonum nudum</i>	67	0.1	0.2	0.2
	LIBI5	<i>Linum bienne</i>	67	0.1	0.2	0.2
	NAPU4	<i>Nassella pulchra</i>	67	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	33	1.0	3	3
	BRDI2	<i>Brachypodium distachyon</i>	33	0.7	2	2
	BRMA3	<i>Bromus madritensis</i>	33	0.7	2	2
	ERBO	<i>Erodium botrys</i>	33	0.3	1	1
	HORDE	<i>Hordeum</i>	33	0.3	1	1
	PLLA	<i>Plantago lanceolata</i>	33	0.3	1	1
	TRIFO	<i>Trifolium</i>	33	0.3	1	1
	ZIFR	<i>Zigadenus fremontii</i>	33	0.3	1	1
	BREL	<i>Brodiaea elegans</i>	33	0.1	0.2	0.2
	CENTA	<i>Centaurea</i>	33	0.1	0.2	0.2
	CLPU2	<i>Clarkia purpurea</i>	33	0.1	0.2	0.2
	COLLO	<i>Collomia</i>	33	0.1	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	33	0.1	0.2	0.2
	DELPH	<i>Delphinium</i>	33	0.1	0.2	0.2
	DUDLE	<i>Dudleya</i>	33	0.1	0.2	0.2
	DUCY	<i>Dudleya cymosa</i>	33	0.1	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	33	0.1	0.2	0.2
	FIGA	<i>Filago gallica</i>	33	0.1	0.2	0.2
	GALIU	<i>Galium</i>	33	0.1	0.2	0.2
	GAAP2	<i>Galium aparine</i>	33	0.1	0.2	0.2
	HYGL2	<i>Hypochaeris glabra</i>	33	0.1	0.2	0.2
	JUPA2	<i>Juncus patens</i>	33	0.1	0.2	0.2
	LOWR2	<i>Lotus wrangelianus</i>	33	0.1	0.2	0.2
	LUPIN	<i>Lupinus</i>	33	0.1	0.2	0.2
	MAGR3	<i>Madia gracilis</i>	33	0.1	0.2	0.2
	MIGU	<i>Mimulus guttatus</i>	33	0.1	0.2	0.2
	MOVI2	<i>Monardella villosa</i>	33	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	33	0.1	0.2	0.2
	PHACE	<i>Phacelia</i>	33	0.1	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	33	0.1	0.2	0.2
	SACO6	<i>Salvia columbariae</i>	33	0.1	0.2	0.2
	TRPR2	<i>Trifolium pratense</i>	33	0.1	0.2	0.2

***Baccharis pilularis*-*Ceanothus thyrsiflorus* Association**  
**Coyote Brush - Blue Blossom Association**

**Mapping Code: 3223**

**LOCAL VEGETATION DESCRIPTION**

One stand of *Baccharis pilularis*-*Ceanothus thyrsiflorus* Shrubland forms a dense shrub layer (70%). Shrubs occur in two different strata, with low shrubs at 0.5-1m tall and tall shrubs at 2-5m tall. The herbaceous layer is open (10%) at 0-0.5m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 70%.

In one stand sampled, *Baccharis pilularis* and *Ceanothus thyrsiflorus* co-dominate in the overstory shrub layer at high cover. *Rubus ursinus* and *Toxicodendron diversilobum* also are present but in relatively lower cover. The herbaceous layer is open with a variety of forb and grass species including *Fragaria vesca*, *Plantago lanceolata*, and *Elymus glaucus*.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 346-346 ft., mean 346 ft.

Aspect: NE

Slope: steep, 31 degrees

Topography: ridge top, convex or rounded

Small Rock Cover: 12%

Large Rock Cover: 1%

Litter Cover: 69%

Bare Ground: 15%

Parent Material: Franciscan melange

Soil Texture: moderately fine sandy clay loam

One stand of this association was sampled at Soulajule Reservoir. The association is found at low elevations on steep slopes with northerly exposures. This association has success at re-establishing after fire disturbances.

**SITE IMPACTS**

The stand representing this association has low non-native plant cover (average 1.7%) relative to native cover. Non-native species that occur with the highest abundance include *Plantago lanceolata*, *Aira caryophyllea* and *Cynosurus echinatus*. There are no additional site impacts.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0395 **Releve(s):** none

**Rank:** G3 S3?

**GLOBAL DISTRIBUTION**

Outer Central Coast (known from Point Reyes National Seashore, Golden Gate NRA, and Mt. Tamalpais; and likely to occur from Marin to Monterey Counties); though full distribution is not known

**REFERENCES**

NatureServe et al. 2003a, Shuford and Timossi 1989

***Baccharis pilularis*-*Ceanothus thyrsiflorus* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	BAPI	<i>Baccharis pilularis</i>	100	35.0	35	35
	CETH	<i>Ceanothus thyrsiflorus</i>	100	35.0	35	35
	RUUR	<i>Rubus ursinus</i>	100	10.0	10	10
	TODI	<i>Toxicodendron diversilobum</i>	100	10.0	10	10
	HODI	<i>Holodiscus discolor</i>	100	2.0	2	2
Herb						
	FRVE	<i>Fragaria vesca</i>	100	1.0	1	1
	PLLA	<i>Plantago lanceolata</i>	100	1.0	1	1
	ACMO2	<i>Achyrachaena mollis</i>	100	0.2	0.2	0.2
	AICA	<i>Aira caryophylla</i>	100	0.2	0.2	0.2
	CHPO3	<i>Chlorogalum pomeridianum</i>	100	0.2	0.2	0.2
	COLLO	<i>Collomia</i>	100	0.2	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	100	0.2	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	100	0.2	0.2	0.2
	ESCA2	<i>Eschscholzia californica</i>	100	0.2	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	100	0.2	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	100	0.2	0.2	0.2
	MAEX	<i>Madia exigua</i>	100	0.2	0.2	0.2
	NAVAR	<i>Navarretia</i>	100	0.2	0.2	0.2
	PHAQ	<i>Phalaris aquatica</i>	100	0.2	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	100	0.2	0.2	0.2

## ***Baccharis pilularis*-*Toxicodendron diversilobum* Association**

### **Coyote Brush - Poison Oak Association**

**Mapping Code: 3223**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Baccharis pilularis*-*Toxicodendron diversilobum* Shrubland form an open to intermittent shrub layer (27-62%, mean 40.3%). Shrubs frequently occur in two different strata, with low shrubs at 0-1m tall and tall shrubs at 0-5m tall. The herbaceous layer is open to intermittent (13-43%, mean 23.3%) at 0-0.5m tall. Trees sometimes occur as emergents (0-3%, mean 1.3%) with hardwoods at 2-15m tall (0-3%, mean 1.3%). Total vegetation cover is 41-75%, mean 63.7%.

In this association, *Baccharis pilularis* is dominant and *Toxicodendron diversilobum* is characteristically present and sub-dominant to co-dominant in the overstory shrub layer. The herbaceous layer is characterized by a variety of forbs and grasses, including *Anagallis arvensis*, *Bromus hordeaceus*, *Pellaea andromedifolia*, *Festuca californica*, *Briza maxima*, and *Avena barbata*. The tree layer is sparse, with *Quercus agrifolia* sometimes present.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 711-1297 ft., mean 919 ft.

Aspect: variable

Slope: somewhat steep to steep, range 22-27 degrees, mean 23.7 degrees

Topography: mid slope to ridge top, convex or rounded to undulating

Small Rock Cover: range 0.2-2%, mean 1.1%

Large Rock Cover: range 0-0.2%, mean 0.1%

Litter Cover: range 30-88%, mean 59%

Bare Ground: range 10-64%, mean 37%

Parent Material: Franciscan melange

Soil Texture: medium to very fine sandy loam, moderately fine clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed and at Soulajule Reservoir. Stands are found in a variety of settings from gentle to moderately steep slopes of all aspects and all upland slope positions. They are typically adjacent to grassland stands or evergreen woodlands of *Quercus agrifolia* and *Umbellularia californica*.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 15.5%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Anagallis arvensis*, *Bromus hordeaceus*, and *Briza maxima*. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** MMWD0072, MMWD0078, MMWD0384 **Releve(s):** none

**Rank:** G4 S4

#### **GLOBAL DISTRIBUTION**

#### **REFERENCES**

NatureServe et al. 2003a

***Baccharis pilularis*-*Toxicodendron diversilobum* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	QUAG-T	<i>Quercus agrifolia</i>	33	2.7	8	8
	PSME-T	<i>Pseudotsuga menziesii</i>	33	0.3	1	1
<b>Tree Understory</b>						
	QUAG-M	<i>Quercus agrifolia</i>	33	0.1	0.2	0.2
<b>Shrub</b>						
	<b>BAPI</b>	<b><i>Baccharis pilularis</i></b>	<b>100</b>	<b>22.7</b>	<b>16</b>	<b>30</b>
	<b>TODI</b>	<b><i>Toxicodendron diversilobum</i></b>	<b>100</b>	<b>6.7</b>	<b>5</b>	<b>10</b>
	MIAU	<i>Mimulus aurantiacus</i>	67	4.0	6	6
	ARCA11	<i>Artemisia californica</i>	33	0.3	1	1
	HEAR5	<i>Heteromeles arbutifolia</i>	33	0.3	1	1
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	33	0.2	0.5	0.5
<b>Herb</b>						
	ANAR	<i>Anagallis arvensis</i>	100	0.5	0.2	1
	BRHO2	<i>Bromus hordeaceus</i>	67	1.0	1	2
	PEAN2	<i>Pellaea andromedifolia</i>	67	0.4	0.2	1
	DICA14	<i>Dichelostemma capitatum</i>	67	0.2	0.2	0.5
	FRVE	<i>Fragaria vesca</i>	67	0.2	0.2	0.5
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	67	0.2	0.2	0.5
	PETR7	<i>Pentagramma triangularis</i>	67	0.2	0.2	0.5
	DAPU3	<i>Daucus pusillus</i>	67	0.1	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	67	0.1	0.2	0.2
	FECA	<i>Festuca californica</i>	33	6.7	20	20
	BRMA	<i>Briza maxima</i>	33	2.0	6	6
	AVBA	<i>Avena barbata</i>	33	1.0	3	3
	CYEC	<i>Cynosurus echinatus</i>	33	0.7	2	2
	HOLA	<i>Holcus lanatus</i>	33	0.7	2	2
	LIBI5	<i>Linum bienne</i>	33	0.7	2	2
	PLLA	<i>Plantago lanceolata</i>	33	0.7	2	2
	PTAQ	<i>Pteridium aquilinum</i>	33	0.7	2	2
	THCA4	<i>Thermopsis californica</i>	33	0.7	2	2
	BRDI3	<i>Bromus diandrus</i>	33	0.3	1	1
	CHPO3	<i>Chlorogalum pomeridianum</i>	33	0.3	1	1
	RUCR	<i>Rumex crispus</i>	33	0.3	1	1
	GEDI	<i>Geranium dissectum</i>	33	0.2	0.5	0.5
	IRDO	<i>Iris douglasiana</i>	33	0.2	0.5	0.5
	LUBI	<i>Lupinus bicolor</i>	33	0.2	0.5	0.5
	MECA2	<i>Melica californica</i>	33	0.2	0.5	0.5
	ACMI2	<i>Achillea millefolium</i>	33	0.1	0.2	0.2
	AICA	<i>Aira caryophyllea</i>	33	0.1	0.2	0.2
	ANMA	<i>Anaphalis margaritacea</i>	33	0.1	0.2	0.2
	ASTEXX	<i>Asteraceae</i>	33	0.1	0.2	0.2
	CAPY2	<i>Carduus pycnocephalus</i>	33	0.1	0.2	0.2
	CENTA2	<i>Centaurium</i>	33	0.1	0.2	0.2
	CIVU	<i>Cirsium vulgare</i>	33	0.1	0.2	0.2
	RACA2	<i>Ranunculus californicus</i>	33	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	33	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	33	0.2	0.5	0.5





## ***Ceanothus thyrsiflorus* Alliance or Habitat**

This alliance is represented in two associations within the study area. While only three stands were sampled, they are classified within existing associations found in adjacent lands of Point Reyes and Golden Gate NRA. *Ceanothus thyrsiflorus* is an obligate seeding species that germinates and dominates in areas for 10+ years after fire. Stands primarily originate from burned forest landscapes of *Pinus muricata* or *Pseudotsuga menziesii* or from burned coastal scrub and grassland of *Baccharis pilularis* and various herb species.

### ***Ceanothus thyrsiflorus*-*Rubus ursinus* Association**

#### **Blue Blossom - California Blackberry Association**

**Mapping Code: 3170**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Ceanothus thyrsiflorus*-*Rubus ursinus* Shrubland form an intermittent shrub layer (45-51%, mean 48%). Shrubs frequently occur in two different strata, with low shrubs at 1-2m tall and tall shrubs at 2-10m tall. The herbaceous layer is intermittent (33-60%, mean 46.5%) at 0-0.5m tall. Trees sometimes occur as emergents (0.4-5%, mean 2.7%) with hardwoods at 5-10m tall (0.2-5%, mean 2.6%) and conifers at 2-5m tall (0-0.2%, mean 0.1%). Total vegetation cover is 75-86%, mean 80.5%.

In this association, *Ceanothus thyrsiflorus* co-dominates with *Rubus ursinus* in the overstory shrub layer at moderate cover. *Toxicodendron diversilobum* may also be co-dominant in some stands. The herbaceous layer is characterized by ferns, forbs and grasses such as *Pteridium aquilinum*, *Satureja douglasii*, *Agrostis* sp., *Urtica dioica*, and *Polystichum munitum*. The tree layer is open and may contain hardwoods *Quercus wislizeni* or *Umbellularia californica* or conifers *Pseudotsuga menziesii* or *Pinus muricata*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 471-1044 ft., mean 758 ft.

Aspect: variable

Slope: moderate to steep, range 6-30 degrees, mean 18 degrees

Topography: bottom to upper slope, concave or depression to undulating

Small Rock Cover: range 0-7%, mean 3.5%

Large Rock Cover: none

Litter Cover: range 83-96%, mean 89.5%

Bare Ground: range 2-8%, mean 5%

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam or sandy clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed and at Soulajule Reservoir. The association is the drier type of alliance in the study area, and it occurs along the cool coastal strip of northern Central California.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 0.3%) relative to native cover. The only non-native species observed in stands of this association was *Holcus lanatus*. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** MMWD0234, MMWD0381 **Releve(s):** none

**Rank:** G3 S3?

## GLOBAL DISTRIBUTION

outer Central Coast (known from Point Reyes National Seashore, Golden Gate NRA, and Mt. Tamalpais areas, and likely to occur from Marin to Monterey Counties); though full distribution is not known

## REFERENCES

NatureServe et al. 2003a

### *Ceanothus thyrsiflorus*-*Rubus ursinus* Association

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	UMCA-T	<i>Umbellularia californica</i>	50	2.5	5	5
	ARME-T	<i>Arbutus menziesii</i>	50	0.1	0.2	0.2
<b>Tree Understory</b>						
	QUWI2-M	<i>Quercus wislizeni</i>	50	11.0	22	22
	PSME-M	<i>Pseudotsuga menziesii</i>	50	0.1	0.2	0.2
<b>Shrub</b>						
	<b>CETH</b>	<b><i>Ceanothus thyrsiflorus</i></b>	<b>100</b>	<b>36.5</b>	<b>23</b>	<b>50</b>
	<b>RUUR</b>	<b><i>Rubus ursinus</i></b>	<b>100</b>	<b>20.0</b>	<b>10</b>	<b>30</b>
	MIAU	<i>Mimulus aurantiacus</i>	100	1.1	0.2	2
	TODI	<i>Toxicodendron diversilobum</i>	50	12.5	25	25
	BAPI	<i>Baccharis pilularis</i>	50	0.1	0.2	0.2
	ROGY	<i>Rosa gymnocarpa</i>	50	0.1	0.2	0.2
	RUPA	<i>Rubus parviflorus</i>	50	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	50	0.1	0.2	0.2
<b>Herb</b>						
	PTAQ	<i>Pteridium aquilinum</i>	100	6.5	3	10
	SADO5	<i>Satureja douglasii</i>	100	1.0	1	1
	AGROS2	<i>Agrostis</i>	100	0.2	0.2	0.2
	URDI	<i>Urtica dioica</i>	50	4.0	8	8
	POMU	<i>Polystichum munitum</i>	50	1.0	2	2
	UNKN	<i>irreconcilable unknown</i>	50	0.6	1.2	1.2
	COMA2	<i>Conium maculatum</i>	50	0.1	0.2	0.2
	GAAP2	<i>Galium aparine</i>	50	0.1	0.2	0.2
	HOLA	<i>Holcus lanatus</i>	50	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	50	0.1	0.2	0.2

***Ceanothus thyrsiflorus*-*Vaccinium ovatum*-*Rubus parviflorus* Association**  
**Blue Blossom - Black Huckleberry - Thimbleberry Association**

**Mapping Code: 3170**

**LOCAL VEGETATION DESCRIPTION**

One stand of *Ceanothus thyrsiflorus*-*Vaccinium ovatum*-*Rubus parviflorus* Shrubland forms an intermittent shrub layer (45%). Shrubs occur in two different strata, with low shrubs at 1-2m tall and tall shrubs at 2-5m tall. The herbaceous layer is open (6%) at 0-0.5m tall. Trees occur as emergents with hardwoods at 2-5m tall (8%). Total vegetation cover is 50%.

In one stand sampled, *Ceanothus thyrsiflorus* dominates the overstory shrub layer at moderate cover while *Vaccinium ovatum* is present with a variety of other shrubs such as *Mimulus aurantiacus*, *Toxicodendron diversilobum*, and *Rubus ursinus*. The herbaceous layer is relatively open with *Pteridium aquilinum* most abundant. The tree layer is regenerating with *Quercus wislizeni* and *Arbutus menziesii*.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1400 ft.

Aspect: NE

Slope: moderate, 10 degrees

Topography: lower slope, convex or rounded

Small Rock Cover: 2%

Large Rock Cover: none

Litter Cover: 74%

Bare Ground: 20%

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam

One stand of this association was sampled in the Mt. Tamalpais Watershed. It is the higher elevation and more mesic association (e.g., on northerly slopes) in the study area. The association is a temporally defined type (fire - following), apparently of limited distribution (NatureServe et al 2003a).

**SITE IMPACTS**

The stand representing this association has low non-native plant cover (average 0.9%) relative to native cover. Non-native species that occur with the highest abundance include *Cynosurus echinatus* and *Carduus pycnocephalus*. There are no additional site impacts.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0366 **Releve(s):** none

**Rank:** G3 S3?

**GLOBAL DISTRIBUTION**

northern Central Coast, and likely to occur in North Coast; though full distribution is not known

**REFERENCES**

NatureServe et al. 2003a

***Ceanothus thyrsiflorus*-*Vaccinium ovatum*-*Rubus parviflorus* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Understory						
	ARME-M	<i>Arbutus menziesii</i>	100	0.2	0.2	0.2
Shrub						
	<b>CETH</b>	<b><i>Ceanothus thyrsiflorus</i></b>	<b>100</b>	<b>25.0</b>	<b>25</b>	<b>25</b>
	QUWI2-M	<i>Quercus wislizeni</i>	100	8.0	8	8
	<b>VAOV2</b>	<b><i>Vaccinium ovatum</i></b>	<b>100</b>	<b>3.0</b>	<b>3</b>	<b>3</b>
	MIAU	<i>Mimulus aurantiacus</i>	100	2.0	2	2
	TODI	<i>Toxicodendron diversilobum</i>	100	2.0	2	2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	100	1.0	1	1
	BAPI	<i>Baccharis pilularis</i>	100	0.2	0.2	0.2
	ROCA2	<i>Rosa californica</i>	100	0.2	0.2	0.2
	RUUR	<i>Rubus ursinus</i>	100	0.2	0.2	0.2
Herb						
	PTAQ	<i>Pteridium aquilinum</i>	100	3.0	3	3
	CAPY2	<i>Carduus pycnocephalus</i>	100	0.2	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	100	0.2	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	100	0.2	0.2	0.2
	UNKN	<i>irreconcilable unknown</i>	100	0.2	0.2	0.2
	KOMA	<i>Koeleria macrantha</i>	100	0.2	0.2	0.2
	STRI	<i>Stachys rigida</i>	100	0.2	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	100	0.2	0.2	0.2

## **Broom (*Cytisus*, *Genista*, *Ulex*) Alliance or Habitat**

This alliance is an non-native, invasive type, which is represented by a single association with *Genista monspessulana* dominant in the overstory. As a species, *Genista monspessulana* is aggressively invasive. It can come into broadleaf evergreen stands and dominate the understory within a few years of its invasion, and it also can invade open grasslands habitats. Management/suppression of this invasive species has proven difficult because it produces prolific seed and quickly establishes in the region.

### ***Genista monspessulana* Association French Broom Association**

**Mapping Code: 3210**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Genista monspessulana* Shrubland form an intermittent to dense shrub layer (36-70%, mean 50.5%). Shrubs usually occur in two different strata, with low shrubs at 0.5-2m tall and tall shrubs at 0.5-5m tall. The herbaceous layer is open (5-15%, mean 9.3%) at 0-0.5m tall. Trees often occur as emergents (0-6%, mean 3%) with hardwoods at 2-15m tall (0-3%, mean 1%) and conifers at 2-20m tall (0-4%, mean 2%). Total vegetation cover is 51-72%, mean 59%.

In this association, *Genista monspessulana* dominates the overstory shrub layer usually at moderate cover. *Baccharis pilularis* and *Toxicodendron diversilobum* are also frequent shrubs at low cover. The herbaceous layer is diverse, with *Cynosurus echinatus* and *Pentagramma triangularis* most frequently occurring. The tree layer is sparse to open, with hardwoods such as *Umbellularia californica* and *Quercus agrifolia* and conifers such as *Pseudotsuga menziesii* and *Sequoia sempervirens*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 419-585 ft., mean 506 ft.

Aspect: variable but most often NE or NW

Slope: moderate to steep, range 7-35 degrees, mean 21.8 degrees

Topography: mid slope to ridge top, usually convex or rounded, sometimes undulating

Small Rock Cover: range 4-18%, mean 9.7%

Large Rock Cover: range 0-7%, mean 3%

Litter Cover: range 12-50%, mean 27.3%

Bare Ground: range 30-71%, mean 57.3%

Parent Material: Franciscan melange

Soil Texture: moderately fine sandy clay loam, fine clay or medium to very fine sandy loam

Stands of this alliance were sampled in the Mt. Tamalpais Watershed and at SoulaJule Reservoir. This association has the ability to overtake native stands of vegetation in the region, and active steps to manage broom invasions have been occurring.

#### **SITE IMPACTS**

This alliance has high non-native plant cover (average 67.1%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Genista monspessulana*, *Cytisus scoparius*, *Cynosurus echinatus*, and *Carduus pycnocephalus*. Additional site impacts include heavy erosion/runoff in one stand, light Sudden Oak Death Syndrome in one stand, and light vandalism/dumping/litter in one stand.

#### **SENSITIVE SPECIES**

*Hemizonia congesta* was found in 1 of 5 surveys of this plant community. *H. congesta* subsp. *leucocephala* has the potential occur in the region in this habitat. CNPS ranks this subspecies as List 3 with R-E-D Code is ?-?-3. Global rank is G5T2T3, and State rank is S2S3. Federal and state listing is None. This subspecies may not occur where sampled; however, dried plants may be indistinguishable from subsp. *congesta*, and both the subspecies intergrade (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=4)****Rapid Assessment(s):** MMWD0253, MMWD0254, MMWD0272, MMWD0396 **Releve(s):** none**Rank:** Not applicable, stands are considered exotic.**GLOBAL DISTRIBUTION**

Range provided for alliance, which could be range of association: southern outer North Coast, inner North Coast, Central Coast, Central Valley, foothills of Cascade Ranges and Klamath Ranges, Sierra Nevada foothills, Southern California, montane Transverse Ranges, montane Peninsular Ranges, Channel Islands of California

**REFERENCES**

Sawyer and Keeler-Wolf 1995

***Genista monspessulana* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	PSME-T	<i>Pseudotsuga menziesii</i>	50	1.3	2	3
	SESE3	<i>Sequoia sempervirens</i>	50	1.3	2	3
	UMCA-T	<i>Umbellularia californica</i>	25	0.8	3	3
	ARME-T	<i>Arbutus menziesii</i>	25	0.1	0.2	0.2
<b>Tree Understory</b>						
	ACACI	<i>Acacia</i>	25	0.3	1	1
	PSME-M	<i>Pseudotsuga menziesii</i>	25	0.3	1	1
	ARME-M	<i>Arbutus menziesii</i>	25	0.1	0.2	0.2
	QUAG-L	<i>Quercus agrifolia</i>	25	0.1	0.2	0.2
	QUAG-M	<i>Quercus agrifolia</i>	25	0.1	0.2	0.2
<b>Shrub</b>						
	<b>GEMO2</b>	<b><i>Genista monspessulana</i></b>	<b>100</b>	<b>36.3</b>	<b>15</b>	<b>65</b>
	BAPI	<i>Baccharis pilularis</i>	100	6.3	2	15
	TODI	<i>Toxicodendron diversilobum</i>	75	0.2	0.2	0.2
	CETH	<i>Ceanothus thyrsiflorus</i>	50	5.8	3	20
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	50	0.1	0.2	0.2
	CYSC4	<i>Cytisus scoparius</i>	25	2.8	11	11
	ARCA11	<i>Artemisia californica</i>	25	0.1	0.2	0.2
	HEAR5	<i>Heteromeles arbutifolia</i>	25	0.1	0.2	0.2
<b>Herb</b>						
	CYEC	<i>Cynosurus echinatus</i>	75	0.3	0.2	1
	PETR7	<i>Pentagramma triangularis</i>	75	0.2	0.2	0.2
	CAPY2	<i>Carduus pycnocephalus</i>	50	0.3	0.2	1
	AICA	<i>Aira caryophyllea</i>	50	0.1	0.2	0.2
	DRAR3	<i>Dryopteris arguta</i>	50	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	50	0.1	0.2	0.2
	HYGL2	<i>Hypochaeris glabra</i>	50	0.1	0.2	0.2
	TRIFO	<i>Trifolium</i>	25	1.0	4	4
	PLLA	<i>Plantago lanceolata</i>	25	0.5	2	2

**Genista monspessulana Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
	HESE	<i>Heterotheca sessiliflora</i>	25	0.3	1	1
	PTAQ	<i>Pteridium aquilinum</i>	25	0.3	1	1
	ADJO	<i>Adiantum jordanii</i>	25	0.1	0.2	0.2
	AIEL2	<i>Aira elegantissima</i>	25	0.1	0.2	0.2
	ANMA	<i>Anaphalis margaritacea</i>	25	0.1	0.2	0.2
	BRDI2	<i>Brachypodium distachyon</i>	25	0.1	0.2	0.2
	BRMA	<i>Briza maxima</i>	25	0.1	0.2	0.2
	BRMI2	<i>Briza minor</i>	25	0.1	0.2	0.2
	BREL	<i>Brodiaea elegans</i>	25	0.1	0.2	0.2
	BRDI3	<i>Bromus diandrus</i>	25	0.1	0.2	0.2
	BRHO2	<i>Bromus hordeaceus</i>	25	0.1	0.2	0.2
	BRLA3	<i>Bromus laevipes</i>	25	0.1	0.2	0.2
	CLEX2	<i>Claytonia exigua</i>	25	0.1	0.2	0.2
	FICA2	<i>Filago californica</i>	25	0.1	0.2	0.2
	GED1	<i>Geranium dissectum</i>	25	0.1	0.2	0.2
	HECO7	<i>Hemizonia congesta</i>	25	0.1	0.2	0.2
	HOLA	<i>Holcus lanatus</i>	25	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	25	0.1	0.2	0.2
	KOMA	<i>Koeleria macrantha</i>	25	0.1	0.2	0.2
	LIBI5	<i>Linum bienne</i>	25	0.1	0.2	0.2
	LOPE	<i>Lolium perenne</i>	25	0.1	0.2	0.2
	MOPU2	<i>Monardella purpurea</i>	25	0.1	0.2	0.2
	NAPU4	<i>Nassella pulchra</i>	25	0.1	0.2	0.2
	NAVAR	<i>Navarretia</i>	25	0.1	0.2	0.2
	RUCR	<i>Rumex crispus</i>	25	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	25	0.1	0.2	0.2
	TYPHA	<i>Typha</i>	25	0.1	0.2	0.2
	VIGI	<i>Vicia gigantea</i>	25	0.1	0.2	0.2
	VUBR	<i>Vulpia bromoides</i>	25	0.1	0.2	0.2
	VUMI	<i>Vulpia microstachys</i>	25	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	25	0.5	2	2

## ***Quercus durata* Alliance or Habitat**

This alliance is represented by one associations in the study area, where *Quercus durata* is mixed with *Arctostaphylos glandulosa*. Additional variation has been seen repeatedly seen in reconnaissance with *Q. durata* mixed with *Adenostoma fasciculatum* (J. Klein, per. comm.), though no samples have been taken to define this association. Moreover, one plot (MMWD0063) was classified at the alliance level where *Pickeringia montana* was co-dominant with *Quercus durata* and *Adenostoma fasciculatum*.

### ***Quercus durata*-*Arctostaphylos glandulosa* Association**

#### **Leather Oak - Eastwood Manzanita Association**

**Mapping Code: 3180**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Quercus durata*-*Arctostaphylos glandulosa* Shrubland form an intermittent to dense shrub layer (43-80%, mean 61.5%). Shrubs sometimes occur in two different strata, with low shrubs at 0.5-1m tall and tall shrubs at 1-5m tall. The herbaceous layer is open (17-17%, mean 17%) at 0-0.5m tall. Trees occasionally occur as emergents (0-0.2%, mean 0.1%) with hardwoods at 2-5m tall (0-0.2%, mean 0.1%). Total vegetation cover is 60-83%, mean 71.5%.

In this association, *Quercus durata* and *Arctostaphylos glandulosa* are co-dominant in the overstory shrub layer at moderate cover. Other shrubs such as *Adenostoma fasciculatum*, *Arctostaphylos hookeri* subsp. *montana*, and *Heteromeles arbutifolia* may be present at relatively low cover. The herbaceous layer is characterized by native perennials such as *Festuca californica*, *Calamagrostis ophitidis*, *Chlorogalum pomeridianum*, *Melica torreyana*, and *Monardella purpurea* at low cover. The tree layer is absent to sparse, including regenerating *Umbellularia californica*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 932-1104 ft., mean 1018 ft.

Aspect: SE or NE

Slope: steep, 30 degrees (data for one plot)

Topography: mid to upper slope, undulating pattern

Small Rock Cover: range 7-12%, mean 9.5%

Large Rock Cover: range 3.2-20%, mean 11.7%

Litter Cover: range 40-53%, mean 46.5%

Bare Ground: range 29-30%, mean 29.5%

Parent Material: serpentine

Soil Texture: moderately fine sandy clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. They usually occur in north-facing or neutral slopes on serpentinite substrate.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 0.1%) relative to native cover. The only non-native species occurring in stands of this association is *Aira caryophyllea*. There are no additional site impacts.

#### **SENSITIVE SPECIES**

*Arctostaphylos hookeri* subsp. *montana* was found in 2 of 2 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 3-1-3. Global rank is G3T2, and State rank is S2.2. Federal and state listing is None (CNPS 2005).

*Calamagrostis ophitidis* was found in 2 of 2 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-1-3. Global rank is G3, and State rank is S3.3. Federal and state listing is



None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION** (n=2)

**Rapid Assessment(s):** none **Releve(s):** MMWD0050, MMWD0343

**Rank:** G3 S3

**GLOBAL DISTRIBUTION**

Northern Central Coast primarily on serpentine, and possibly North Coast

**REFERENCES**

NatureServe et al. 2003a

***Quercus durata*-*Arctostaphylos glandulosa* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Understory	UMCA-M	<i>Umbellularia californica</i>	50	0.1	0.2	0.2
Shrub						
	ARGL3	<i>Arctostaphylos glandulosa</i>	100	27.5	20	35
	QUDU4	<i>Quercus durata</i>	100	12.5	10	15
	ADFA	<i>Adenostoma fasciculatum</i>	100	11.1	0.2	22
	ARHOM	<i>Arctostaphylos hookeri</i> subsp. <i>montana</i>	100	7.0	4	10
	HEAR5	<i>Heteromeles arbutifolia</i>	100	4.5	1	8
	TODI	<i>Toxicodendron diversilobum</i>	100	1.1	0.2	2
	CEJE	<i>Ceanothus jepsonii</i>	50	0.1	0.2	0.2
	ERCA6	<i>Eriodictyon californicum</i>	50	0.1	0.2	0.2
	ERST9	<i>Eriophyllum staechadifolium</i>	50	0.1	0.2	0.2
	GAEL	<i>Garrya elliptica</i>	50	0.1	0.2	0.2
	LOHI2	<i>Lonicera hispidula</i>	50	0.1	0.2	0.2
Herb						
	FECA	<i>Festuca californica</i>	100	2.1	0.2	4
	CAOP2	<i>Calamagrostis ophitidis</i>	100	1.6	0.2	3
	CHPO3	<i>Chlorogalum pomeridianum</i>	100	1.1	0.2	2
	METO	<i>Melica torreyana</i>	100	1.1	0.2	2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	100	0.6	0.2	1
	IRIS	<i>Iris</i>	100	0.2	0.2	0.2
	MOPU2	<i>Monardella purpurea</i>	50	2.0	4	4
	ACMI2	<i>Achillea millefolium</i>	50	0.1	0.2	0.2
	AICA	<i>Aira caryophylla</i>	50	0.1	0.2	0.2
	ASDE6	<i>Aspidotis densa</i>	50	0.1	0.2	0.2
	BREL	<i>Brodiaea elegans</i>	50	0.1	0.2	0.2
	BRCA5	<i>Bromus carinatus</i>	50	0.1	0.2	0.2
	CLPU2	<i>Clarkia purpurea</i>	50	0.1	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	50	0.1	0.2	0.2
	EPMI	<i>Epilobium minutum</i>	50	0.1	0.2	0.2
	ERRE12	<i>Erigeron reductus</i>	50	0.1	0.2	0.2
	GAAP2	<i>Galium aparine</i>	50	0.1	0.2	0.2
	GATR3	<i>Galium triflorum</i>	50	0.1	0.2	0.2
	LOHU2	<i>Lotus humistratus</i>	50	0.1	0.2	0.2
	NAVAR	<i>Navarretia</i>	50	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	50	0.1	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	50	0.1	0.2	0.2
	VUMI	<i>Vulpia microstachys</i>	50	0.1	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	50	0.1	0.2	0.2
Cryptogam						
	LICHEN	<i>Lichen</i>	50	7.5	15	15
	MOSS	<i>Moss</i>	50	0.5	1	1

### ***Quercus wislizeni* Alliance or Habitat**

This alliance is represented by *Quercus wislizeni* dominant as overstory woodland/forest stands or as shrubland stands. Its stature may be related to fire history, development of soil, and microsite climate variables. Two associations with shrub stature occur in the study area. They are separated in descriptions from the tree-overstory associations, based on their stature.

### ***Arctostaphylos glandulosa*-*Quercus wislizeni* (Shrubland) Association** **Eastwood Manzanita - Interior Live Oak (Shrubland) Association**

**Mapping Code: 3113**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Arctostaphylos glandulosa*-*Quercus wislizeni* Shrubland form an open to dense shrub layer (25-79%, mean 58.3%), where *Arctostaphylos glandulosa* dominates and *Quercus wislizeni* is sometimes co-dominant. *Quercus wislizeni* and *Adenostoma fasciculatum* are characteristically present. Shrubs frequently occur in two different strata, with low shrubs at 0-2m tall and tall shrubs at 1-10m tall. The herbaceous layer is open (0.5-6%, mean 3.4%) at 0-0.5m tall. Trees occasionally occur as emergents (0-22%, mean 8.3%) with hardwoods at 5-15m tall (0-22%, mean 11.4%) and conifers at 10-15m tall (0.2-1%, mean 0.1%). Total vegetation cover is 45-80%, mean 65.7%.

In this association, *Arctostaphylos glandulosa* and *Quercus wislizeni* co-dominates in the overstory shrub layer usually at moderate to high cover; in cases where *Arctostaphylos glandulosa* exhibits higher cover and dominance, *Quercus wislizeni* is usually an overstory tree with greater than 10% cover. *Adenostoma fasciculatum* is also characteristically but a lower cover. The herbaceous layer is sparse to open and varied in composition, and the tree layer is usually open with minor representation of conifer and hardwood species (except in case of *Q. wislizeni* reaching tree nature).

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1030-2139 ft., mean 1376.3 ft.

Aspect: usually SE, less often NE or NW

Slope: flat to very steep, range 0-55 degrees, mean 27.9 degrees

Topography: mid to upper slope, most often an undulating pattern, sometimes convex or rounded

Small Rock Cover: range 0.2-2%, mean 1.3%

Large Rock Cover: range 0-2%, mean 0.6%

Litter Cover: range 74-91%, mean 83.3%

Bare Ground: range 5-21%, mean 13%

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam or sandy loam

Stands of this alliance were sampled in the Mt. Tamalpais Watershed. Stands are commonly found on neutral or northerly slopes along the middle to upper elevations of Mt. Tamalpais. Depending on site history (e.g., time since last fire or clearing), stands may be shrubland in nature as in this association, or they may be woodland in nature such as in the related *Quercus wislizeni*/*Arctostaphylos glandulosa* (Woodland) Association. The shrubland stands have minor representation of conifer and hardwood species in the overstory.

#### **SITE IMPACTS**

This alliance has low non-native plant cover (average 0.1%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Aira caryophyllea*, *Briza maxima*, and *Torilis arvensis*. Additional site impacts include light Sudden Oak Death Syndrome in one stand.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=6)**

**Rapid Assessment(s):** MMWD0111, MMWD0213, MMWD0231, MMWD0266, MMWD0294, MMWD0404 **Releve(s):** none

**Rank:** G3 S3?

## GLOBAL DISTRIBUTION

Central Coast (possibly restricted to Mt. Tamalpais area)

## REFERENCES

NatureServe et al. 2003a

### *Arctostaphylos glandulosa*-*Quercus wislizeni* (Shrubland) Association

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Understory</b>						
	<b>QUWI2-T</b>	<b><i>Quercus wislizeni</i></b>	<b>17</b>	<b>3.3</b>	<b>20</b>	<b>20</b>
	LIDE3-M	<i>Lithocarpus densiflorus</i>	33	0.4	0.2	2
	PSME-L	<i>Pseudotsuga menziesii</i>	33	0.4	0.2	2
<b>Shrub</b>						
	<b>ARGL3</b>	<b><i>Arctostaphylos glandulosa</i></b>	<b>100</b>	<b>23.5</b>	<b>15</b>	<b>40</b>
	<b>QUWI2-M</b>	<b><i>Quercus wislizeni</i></b>	<b>83</b>	<b>18.7</b>	<b>7</b>	<b>36</b>
	ADFA	<i>Adenostoma fasciculatum</i>	83	6.8	2	17
	TODI	<i>Toxicodendron diversilobum</i>	50	1.7	0.2	8
	HEAR5	<i>Heteromeles arbutifolia</i>	50	1.5	0.2	6
	ERCA6	<i>Eriodictyon californicum</i>	50	0.1	0.2	0.2
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	50	0.1	0.2	0.2
	CECU	<i>Ceanothus cuneatus</i>	33	1.0	2	4
	BAPI	<i>Baccharis pilularis</i>	33	0.7	0.2	4
	CHCH7-M	<i>Chrysopsis chrysophylla</i>	33	0.5	0.2	3
	MIAU	<i>Mimulus aurantiacus</i>	33	0.5	1	2
<b>Herb</b>						
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	33	0.1	0.2	0.2
	IRMA	<i>Iris macrosiphon</i>	33	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	33	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	33	0.1	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	33	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	67	0.4	0.2	1
	LICHEN	<i>Lichen</i>	50	1.0	0.2	5

***Quercus wislizeni* (Shrubland) Association**  
**Interior Live Oak (Shrubland) Association**

**Mapping Code: 3160**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Quercus wislizeni* Shrubland form an intermittent to dense shrub layer (40-86%, mean 63.7%), where *Quercus wislizeni* dominates. Shrubs sometimes occur in two different strata, with low shrubs at 0.5-2m tall and tall shrubs at 2-5m tall. The herbaceous layer is open (0.2-4%, mean 2.4%) at 0-0.5m tall. Trees occasionally occur as emergents (0-9%, mean 4%) with hardwoods at 5-10m tall (0-8%, mean 2.7%) and conifers at 5-20m tall (0-3%, mean 1.3%). Total vegetation cover is 53-86%, mean 67.3%.

In this association, *Quercus wislizeni* association (shrubland) dominates the overstory shrub layer at moderate to high cover. The tree layer regularly includes *Arbutus menziesii*, *Umbellularia californica*, and *Pseudotsuga menziesii* at low cover, in which any of these species may be regenerating. The herbaceous layer has an open cover, with fern species such as *Pteridium aquilinum* and/or *Pentagramma triangularis* usually present.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: range 1339-2131 ft., mean 1735 ft.

Aspect: NE or SE

Slope: somewhat steep to steep, range 20-36 degrees, mean 25.7 degrees

Topography: mid slope, undulating pattern

Small Rock Cover: range 3-5%, mean 3.7%

Large Rock Cover: range 0.2-1%, mean 0.5%

Litter Cover: range 63-85%, mean 74%

Bare Ground: range 10-28%, mean 19.3%

Parent Material: Franciscan melange

Soil Texture: Moderately fine clay loam or sandy clay loam

Stands of this alliance were sampled in the Mt. Tamalpais Watershed. They tend to occur in small stands that are imbedded within a larger chaparral matrix, or they occur on the forest edge next to other chaparral vegetation. Further, they are usually found on cool, steep slopes.

**SITE IMPACTS**

This alliance has no non-native plant cover in the sampled stands. Additional site impacts include one stand with moderate Sudden Oak Death Syndrome and another stand heavily affected by Sudden Oak Death Syndrome.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** MMWD0163, MMWD0212, MMWD0304 **Releve(s):** none

**Rank:** G3 S3?

**GLOBAL DISTRIBUTION**

inner North Coast, Central Coast, Cascade Ranges foothills, Sierra Nevada, montane Transverse Ranges, montane Peninsular Ranges

**REFERENCES**

Borchert et al. 2004, Gordon and White 1994, Holland 1986, Keeler-Wolf and Evens 2006, Klein and Evens 2005, Sawyer and Keeler-Wolf 1994

**Quercus wislizeni (Shrubland) Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Overstory</b>						
	ARME-T	<i>Arbutus menziesii</i>	33	1.3	4	4
	PSME-T	<i>Pseudotsuga menziesii</i>	33	1.0	3	3
<b>Tree Understory</b>						
	UMCA-M	<i>Umbellularia californica</i>	67	4.3	3	10
	LIDE3-M	<i>Lithocarpus densiflorus</i>	67	2.7	2	6
	PSME-L	<i>Pseudotsuga menziesii</i>	67	1.0	1	2
	ARME-M	<i>Arbutus menziesii</i>	33	3.3	10	10
	LIDE3-L	<i>Lithocarpus densiflorus</i>	33	0.1	0.2	0.2
<b>Shrub</b>						
	<b>QUWI2-M</b>	<b>Quercus wislizeni</b>	<b>100</b>	<b>38.3</b>	<b>29</b>	<b>56</b>
	ARGL3	<i>Arctostaphylos glandulosa</i>	100	6.7	1	10
	TODI	<i>Toxicodendron diversilobum</i>	100	2.4	0.2	5
	HEAR5	<i>Heteromeles arbutifolia</i>	67	1.7	1	4
	ROCA2	<i>Rosa californica</i>	67	0.1	0.2	0.2
	QUPAS2	<i>Quercus parvula</i> var. <i>shrevei</i>	33	6.7	20	20
	LOHIV	<i>Lonicera hispidula</i> var. <i>vacillans</i>	33	0.3	1	1
	ADFA	<i>Adenostoma fasciculatum</i>	33	0.1	0.2	0.2
	MIAU	<i>Mimulus aurantiacus</i>	33	0.1	0.2	0.2
	RHCA	<i>Rhamnus californica</i>	33	0.1	0.2	0.2
	SYMO	<i>Symphoricarpos mollis</i>	33	0.1	0.2	0.2
<b>Herb</b>						
	PTAQ	<i>Pteridium aquilinum</i>	67	0.4	0.2	1
	PETR7	<i>Pentagramma triangularis</i>	67	0.1	0.2	0.2
	POCA5	<i>Polygala californica</i>	67	0.1	0.2	0.2
	WHMO	<i>Whipplea modesta</i>	67	0.1	0.2	0.2
	IRMA	<i>Iris macrosiphon</i>	33	0.3	1	1
	CAGL7	<i>Carex globosa</i>	33	0.1	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	33	0.1	0.2	0.2
	ERNU3	<i>Eriogonum nudum</i>	33	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	33	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	33	0.1	0.2	0.2
	LUPIN	<i>Lupinus</i>	33	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	33	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	33	0.1	0.2	0.2
	TRLA6	<i>Trientalis latifolia</i>	33	0.1	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	33	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	33	0.1	0.2	0.2

### ***Rhododendron occidentale* Alliance or Habitat**

This alliance is represented by one sample in the study area; however, small stands have been observed repeatedly in different riparian locations and seeps on both serpentine and non-serpentine substrates in the study area.

### ***Rhododendron occidentale* Alliance Western Azalea Alliance**

**Mapping Code: 3420**

#### **LOCAL VEGETATION DESCRIPTION**

One stand of *Rhododendron occidentale* Alliance Shrubland forms an intermittent shrub layer (27%), where *Rhododendron occidentale* dominates. Shrubs occur in a single stratum that is 2-5m tall. The herbaceous layer is intermittent (60%) at 0.5-1m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 87%.

In the one stand sampled, *Rhododendron occidentale* is dominant in the overstory shrub layer, without any other shrub or tree species being present. The herbaceous layer is characterized by wetland species with *Carex* spp. dominant and *Juncus* sp. present.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 1968 ft.

Aspect: flat

Slope: flat, 0 degrees

Topography: bottom, linear or even

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: no data

Bare Ground: no data

Parent Material: Franciscan melange

Soil Texture: muck

One stand of this alliance was sampled in the Mt. Tamalpais Watershed, which had standing water in the plot. Stands are small wetland or riparian features, adjacent to other wetland types.

#### **SITE IMPACTS**

The stand representing this alliance has low non-native plant cover (average 0.2%) relative to native cover. The only non-native species in the stand was *Cirsium vulgare*. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0109 **Releve(s):** none

**Rank:** G3 S3?

#### **GLOBAL DISTRIBUTION**

Northern Central Coast (including Mt. Tamalpais area) and north into Oregon (in the Klamath Mountains region); though full distribution is not known

#### **REFERENCES**

Kagan et al. 2004

***Rhododendron occidentale* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	RHOC	<i>Rhododendron occidentale</i>	100	25.0	25	25
Herb						
	CAREX	<i>Carex</i>	100	60.0	60	60
	JUNCU	<i>Juncus</i>	100	2.0	1	1
	CIVU	<i>Cirsium vulgare</i>	100	0.2	0.2	0.2
	EPILO	<i>Epilobium</i>	100	0.2	0.2	0.2



## HERBACEOUS VEGETATION DESCRIPTIONS

### California Annual Grassland Alliance or Habitat

This habitat occurs across California, and it is represented in the study area in three different associations. These associations have an abundance of non-native species such as *Bromus* spp., *Aira caryophyllea*, *Briza maxima*, and *Cynosurus echinatus*. However, they usually have a richness of native species, which provide an important biodiversity component to the habitat, including *Trifolium depauperatum*, *Daucus pusillus*, *Eschscholzia californica*, *Lupinus bicolor*, and *Madia* spp. Further, one herbaceous alliance is placed in this habitat, which has an abundance of native annual forbs including *Trifolium variegatum*.

### Annual Grassland - Native - Non-native Association

**Mapping Code: 4310**

#### LOCAL VEGETATION DESCRIPTION

Stands of Annual Grassland - Native - Non-native form an open to dense herbaceous layer (20-75%, mean 48.8%) at 0-0.5m tall. The shrub layer is open (0-2%, mean 0.5%) and 0.5-1m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 22-75%, mean 49.3%.

In this association, a variety of annual species are abundant, including non-natives *Aira caryophyllea*, *Bromus hordeaceus*, *B. diandrus*, *B. madritensis*, *Erodium botrys*, *Filago gallica*, and *Vicia villosa*. However, native species are present in a diverse array, including *Daucus pusillus*, *Eschscholzia californica*, *Linanthus acicularis*, and *Lotus wrangelianus*. The shrub and tree layers are absent or sparse, including *Mimulus aurantiacus* and *Quercus wislizeni*.

#### LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: Range 683-2170 ft., mean 1336 ft.

Aspect: variable

Slope: flat to somewhat steep, range 0-20 degrees, mean 11 degrees

Topography: mid slope to ridge top, linear or convex

Small Rock Cover: 26% (data from one plot)

Large Rock Cover: 23% (data from one plot)

Litter Cover: 43% (data from one plot)

Bare Ground: 6% (data from one plot)

Parent Material: Franciscan melange

Soil Texture: moderately fine sandy or silty clay loam, medium to very fine sandy loam, medium loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. This is equivalent to the California Annual Grassland defined in NatureServe et al. (2003a) and other authors.

#### SITE IMPACTS

This association has high non-native plant cover (average 82.2%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Bromus hordeaceus*, *Erodium botrys*, and *Aira caryophyllea*. There are no additional site impacts.

#### SENSITIVE SPECIES

*Linanthus acicularis* was found in 1 of 4 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-2-3. Global rank is G3, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

#### SAMPLES USED TO DESCRIBE ASSOCIATION (n=4)

**Rapid Assessment(s):** MMWD0029, MMWD0032, MMWD0043, MMWD0318 **Releve(s):** none

**Rank:** G5 S5

## GLOBAL DISTRIBUTION

Cismontane California, transmontane California; Baja California (to intermountain west)

## REFERENCES

NatureServe et al. 2003a, Potter 2006, Sawyer and Keeler-Wolf 1995, Shuford and Timossi 1989

### Annual grassland - Native - Non-native Association

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	QUWI2-L	<i>Quercus wislizeni</i>	25	0.3	1	1
	ARGL3	<i>Arctostaphylos glandulosa</i>	25	0.1	0.2	0.2
	CECU	<i>Ceanothus cuneatus</i>	25	0.1	0.2	0.2
	MIAU	<i>Mimulus aurantiacus</i>	25	0.1	0.2	0.2
Herb	BRHO2	<i>Bromus hordeaceus</i>	100	8.8	1	25
	ERBO	<i>Erodium botrys</i>	75	0.3	0.2	1
	AICA	<i>Aira caryophyllea</i>	50	5.3	1	20
	BRDI3	<i>Bromus diandrus</i>	50	2.3	1	8
	DAPU3	<i>Daucus pusillus</i>	50	0.6	0.2	2
	FIGA	<i>Filago gallica</i>	50	0.6	0.2	2
	ESCA2	<i>Eschscholzia californica</i>	50	0.3	0.2	1
	CHPO3	<i>Chlorogalum pomeridianum</i>	50	0.1	0.2	0.2
	GAAP2	<i>Galium aparine</i>	50	0.1	0.2	0.2
	HYGL2	<i>Hypochaeris glabra</i>	50	0.1	0.2	0.2
	MECA2	<i>Melica californica</i>	50	0.1	0.2	0.2
	VIVI	<i>Vicia villosa</i>	25	9.5	38	38
	BRMA3	<i>Bromus madritensis</i>	25	6.3	25	25
	AVBA	<i>Avena barbata</i>	25	5.8	23	23
	LINAN2	<i>Linanthus</i>	25	2.5	10	10
	JUCA5	<i>Juncus capitatus</i>	25	1.3	5	5
	SOSE2	<i>Soliva sessilis</i>	25	1.3	5	5
	MEAR	<i>Medicago arabica</i>	25	0.8	3	3
	LOWR2	<i>Lotus wrangelianus</i>	25	0.5	2	2
	PLLA	<i>Plantago lanceolata</i>	25	0.5	2	2
	CAOV4	<i>Camissonia ovata</i>	25	0.3	1	1
	CAPY2	<i>Carduus pycnocephalus</i>	25	0.3	1	1
	MAGR3	<i>Madia gracilis</i>	25	0.3	1	1
	NAPU4	<i>Nassella pulchra</i>	25	0.3	1	1
	PLBR	<i>Plagiobothrys bracteatus</i>	25	0.3	1	1
	PLER3	<i>Plantago erecta</i>	25	0.3	1	1
	RACA2	<i>Ranunculus californicus</i>	25	0.3	1	1
	SIMA2	<i>Sidalcea malviflora</i>	25	0.3	1	1
	TRDE	<i>Trifolium depauperatum</i>	25	0.3	1	1
	TRDU2	<i>Trifolium dubium</i>	25	0.3	1	1

# Annual grassland - Native-non-native Association

Stratum	Code	Species Name	Con	Avg	Min	Max
	ACMO2	<i>Achyrrachaena mollis</i>	25	0.1	0.2	0.2
	ANAR	<i>Anagallis arvensis</i>	25	0.1	0.2	0.2
	ASDE6	<i>Aspidotis densa</i>	25	0.1	0.2	0.2
	BREL	<i>Brodiaea elegans</i>	25	0.1	0.2	0.2
	DICA14	<i>Dichelostemma capitatum</i>	25	0.1	0.2	0.2
	FECA	<i>Festuca californica</i>	25	0.1	0.2	0.2
	GED1	<i>Geranium dissectum</i>	25	0.1	0.2	0.2
	UNKN	<i>irreconcilable unknown</i>	25	0.1	0.2	0.2
	JUOC2	<i>Juncus occidentalis</i>	25	0.1	0.2	0.2
	LACA7	<i>Lasthenia californica</i>	25	0.1	0.2	0.2
	LIAN	<i>Linanthus androsaceus</i>	25	0.1	0.2	0.2
	LOPE	<i>Lolium perenne</i>	25	0.1	0.2	0.2
	LUBI	<i>Lupinus bicolor</i>	25	0.1	0.2	0.2
	LYHY2	<i>Lythrum hyssopifolia</i>	25	0.1	0.2	0.2
	SCPE	<i>Scandix pecten-veneris</i>	25	0.1	0.2	0.2
	SHAR2	<i>Sherardia arvensis</i>	25	0.1	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	25	0.1	0.2	0.2
	TRMA2	<i>Trifolium macraei</i>	25	0.1	0.2	0.2
	TRVA	<i>Trifolium variegatum</i>	25	0.1	0.2	0.2
	TRPU16	<i>Triphysaria pusilla</i>	25	0.1	0.2	0.2
	VUBR	<i>Vulpia bromoides</i>	25	0.1	0.2	0.2

***Briza maxima*-*Trifolium depauperatum*-*Lupinus* spp. Association**

**Big Quaking Grass - Balloon Sack Clover - Lupine Association**

**Mapping Code:**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Briza maxima*-*Trifolium depauperatum*-*Lupinus* spp. form an intermittent to dense herbaceous layer (50-70%, mean 59.8%) at 0-1m tall. The shrub layer is open (0-0.2%, mean 0.03%) and 0.5-1m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 50-70%, mean 60%.

In this association, non-native grasses are most abundant including *Briza maxima* with *Bromus diandrus* and *B. hordeaceus*. However, annual and perennial forbs are also frequently present, including *Anagallis arvensis*, *Iris macrosiphon*, *Trifolium depauperatum*, and *Lupinus bicolor*. The shrub and tree layers are absent or sparse.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 7-1076 ft., mean 714 ft.

Aspect: SW or SE

Slope: somewhat steep to steep, range 15-39 degrees, mean 24.2 degrees

Topography: lower to upper slope, convex, concave or undulating

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: no data

Bare Ground: no data

Parent Material: Franciscan melange

Soil Texture: medium to very fine sandy loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. This association is common in small to large stands off serpentine soils, including areas that have been recently burned. While big quaking grass is dominant, a variety of native forbs are intermixed in the stands.

**SITE IMPACTS**

This association has high non-native plant cover (average 89.1%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Bromus diandrus*, *Bromus hordeaceus*, *Briza maxima*, and *Hypochaeris glabra*. There are no additional site impacts.

**SENSITIVE SPECIES**

*Elymus californicus* was found in 1 of 6 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-1-3. Global rank is G3, and State rank is S3.3. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=6)**

**Rapid Assessment(s):** MMWD0006, MMWD0009, MMWD0010, MMWD0012, MMWD0013, MMWD0014 **Releve(s):** none

**Rank:** G3 S3

**GLOBAL DISTRIBUTION**

Central Coast and possibly North Coast (per. obs.); though full distribution is not known

**REFERENCES**

None

***Briza maxima*-*Trifolium depauperatum*-*Lupinus* spp. Association**

Stratum Herb	Code	Species Name	Con	Avg	Min	Max
	BRDI3	<i>Bromus diandrus</i>	100	18.0	5	35
	BRHO2	<i>Bromus hordeaceus</i>	100	12.0	6	18
	<b>BRMA</b>	<b><i>Briza maxima</i></b>	<b>100</b>	<b>11.3</b>	<b>4</b>	<b>22</b>
	HYGL2	<i>Hypochaeris glabra</i>	100	5.5	2	20
	ERBO	<i>Erodium botrys</i>	83	1.4	0.2	5
	ANAR	<i>Anagallis arvensis</i>	83	0.4	0.2	1
	<b>TRDE</b>	<b><i>Trifolium depauperatum</i></b>	<b>83</b>	<b>0.3</b>	<b>0.2</b>	<b>0.5</b>
	IRMA	<i>Iris macrosiphon</i>	67	1.5	0.2	7
	<b>LUBI</b>	<b><i>Lupinus bicolor</i></b>	<b>67</b>	<b>0.4</b>	<b>0.2</b>	<b>1</b>
	AICA	<i>Aira caryophylla</i>	67	0.4	0.2	1
	NAPU4	<i>Nassella pulchra</i>	67	0.4	0.2	1
	LOWR2	<i>Lotus wrangelianus</i>	50	0.4	0.5	1
	GAAP2	<i>Galium aparine</i>	50	0.2	0.2	0.5
	PTAQ	<i>Pteridium aquilinum</i>	33	1.0	0.2	6
	BRMA3	<i>Bromus madritensis</i>	33	0.3	1	1
	SCPE	<i>Scandix pecten-veneris</i>	33	0.2	0.2	1
	GED1	<i>Geranium dissectum</i>	33	0.1	0.2	0.5
	PLER3	<i>Plantago erecta</i>	33	0.1	0.2	0.5
	SABI3	<i>Sanicula bipinnatifida</i>	33	0.1	0.2	0.5
	SHAR2	<i>Sherardia arvensis</i>	33	0.1	0.2	0.5
	TRWI3	<i>Trifolium willdenovii</i>	33	0.1	0.2	0.5
	CAPY2	<i>Carduus pycnocephalus</i>	33	0.1	0.2	0.2
	CHPO3	<i>Chlorogalum pomeridianum</i>	33	0.1	0.2	0.2
	FIGA	<i>Filago gallica</i>	33	0.1	0.2	0.2
	LOTUS	<i>Lotus</i>	33	0.1	0.2	0.2
	MAGR3	<i>Madia gracilis</i>	33	0.1	0.2	0.2

## ***Cynosurus echinatus*-*Linum bienne*-*Brodiaea elegans* Association**

### **Bristly Dogtail - Pale Flax - Harvest Brodiaea Association**

**Mapping Code:** 4310

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Cynosurus echinatus*-*Linum bienne*-*Brodiaea elegans* form an intermittent to dense herbaceous layer (46-66%, mean 56%) at 0-0.5m tall. The shrub and tree layers are absent or open (no values recorded). Total vegetation cover is 46-66%, mean 56%.

In this association, non-native grass *Cynosurus echinatus* is most abundant in the herbaceous layer with *Avena barbata*. *Linum bienne* and *Brodiaea elegans* are characteristic forbs, and *Madia exigua* exhibits high cover in one stand. The shrub and tree layers are absent to sparse.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 364-684 ft., mean 524 ft.

Aspect: variable

Slope: moderate, range 8-11 degrees, mean 9.5 degrees

Topography: lower slope, convex

Small Rock Cover: Range 0-2%, mean 1%

Large Rock Cover: Range 0-0.2%, mean 0.1%

Litter Cover: Range 80-83%, mean 81.5%

Bare Ground: Range 15-24%, mean 19.5%

Parent Material: Franciscan melange

Soil Texture: medium silt

Stands of this association were sampled at SoulaJule Reservoir, the northern end of the study area. Jimerson et al. (2000) describe other associations with *Cynosurus echinatus* dominant as the alliance further north in the North Coast Ranges.

#### **SITE IMPACTS**

This association has high non-native plant cover (average 76.9%) relative to native cover. Non-native species that occur with the highest frequency and abundance include herbs *Cynosurus echinatus*, *Avena barbata*, *Linum bienne*, and *Lolium perenne*. Non-native *Ficus carica* also occurs at trace cover as a shrub. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** MMWD0383, MMWD0385 **Releve(s):** none

**Rank:** G4 S4?

#### **GLOBAL DISTRIBUTION**

Northern Central Coast and possibly North Coast; though full distribution is not known

#### **REFERENCES**

Jimerson et al. 2000

***Cynosurus echinatus*-*Linum bienne*-*Brodiaea elegans* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	FICA	<i>Ficus carica</i>	50	0.1	0.2	0.2
Herb						
	<b>CYEC</b>	<b><i>Cynosurus echinatus</i></b>	<b>100</b>	<b>20.5</b>	<b>15</b>	<b>26</b>
	AVBA	<i>Avena barbata</i>	100	7.5	3	12
	<b>LIBI5</b>	<b><i>Linum bienne</i></b>	<b>100</b>	<b>5.1</b>	<b>0.2</b>	<b>10</b>
	<b>BREL</b>	<b><i>Brodiaea elegans</i></b>	<b>100</b>	<b>0.2</b>	<b>0.2</b>	<b>0.2</b>
	LOPE	<i>Lolium perenne</i>	100	0.2	0.2	0.2
	MAEX	<i>Madia exigua</i>	50	11.5	23	23
	BRDI2	<i>Brachypodium distachyon</i>	50	2.5	5	5
	BRHO2	<i>Bromus hordeaceus</i>	50	2.5	5	5
	VUMI	<i>Vulpia microstachys</i>	50	1.0	2	2
	CASU19	<i>Calystegia subacaulis</i>	50	0.5	1	1
	AICA	<i>Aira caryophylla</i>	50	0.1	0.2	0.2
	ANAR	<i>Anagallis arvensis</i>	50	0.1	0.2	0.2
	CAPU18	<i>Calystegia purpurata</i>	50	0.1	0.2	0.2
	CLGR	<i>Clarkia gracilis</i>	50	0.1	0.2	0.2
	CRCA3	<i>Crepis capillaris</i>	50	0.1	0.2	0.2
	DAPU3	<i>Daucus pusillus</i>	50	0.1	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	50	0.1	0.2	0.2
	ESCA2	<i>Eschscholzia californica</i>	50	0.1	0.2	0.2
	HOLA	<i>Holcus lanatus</i>	50	0.1	0.2	0.2
	HYGL2	<i>Hypochaeris glabra</i>	50	0.1	0.2	0.2
	HYRA3	<i>Hypochaeris radicata</i>	50	0.1	0.2	0.2
	LIAN	<i>Linanthus androsaceus</i>	50	0.1	0.2	0.2
	LOWR2	<i>Lotus wrangelianus</i>	50	0.1	0.2	0.2
	NAPU4	<i>Nassella pulchra</i>	50	0.1	0.2	0.2
	PLLA	<i>Plantago lanceolata</i>	50	0.1	0.2	0.2
	RUAC3	<i>Rumex acetosella</i>	50	0.1	0.2	0.2
	TRPR2	<i>Trifolium pratense</i>	50	0.1	0.2	0.2
	WYGL	<i>Wyethia glabra</i>	50	0.1	0.2	0.2

### ***Trifolium variegatum* Alliance**

#### **Whitetip Clover Alliance**

**Mapping Code: 4211 / 4310**

#### **LOCAL VEGETATION DESCRIPTION**

One stand of *Trifolium variegatum* Alliance forms an intermittent herbaceous layer (55%) at 0-0.5m tall. The shrub and tree layers are absent or open (no values recorded). Total vegetation cover is 55%.

In this association, *Trifolium variegatum* is dominant or co-dominant with other herbs. In one stand sampled, *T. variegatum* is co-dominant with *T. fucatum*, *Hypochaeris glabra*, *Bromus hordeaceus*, and *B. diandrus*. The shrub and tree layers are absent or sparse.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 1599 ft.

Aspect: SW

Slope: moderate, 14 degrees

Topography: mid slope, convex

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: Range no data

Bare Ground: Range no data

Parent Material: Franciscan melange

Soil Texture: coarse loamy sand

One stand of this association was sampled in the Mt. Tamalpais Watershed. Stands are usually in undisturbed, mesic or temporary wetland settings.

#### **SITE IMPACTS**

The stand representing this association has high non-native plant cover (average 59.2%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Hypochaeris glabra*, *Bromus hordeaceus*, *Bromus diandrus*, and *Avena barbata*. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0022 **Releve(s):** none

**Rank:** G3 S3?

#### **GLOBAL DISTRIBUTION**

Central Coast, Central Valley, Sierra Nevada foothills; though full distribution is not known

#### **REFERENCES**

Barbour et al. 2005, Evens et al. 2004



***Trifolium variegatum* Alliance**

Stratum Herb	Code	Species Name	Con	Avg	Min	Max
	HYGL2	<i>Hypochaeris glabra</i>	100	15.0	15	15
	TRFU	<i>Trifolium fucatum</i>	100	11.0	11	11
	BRHO2	<i>Bromus hordeaceus</i>	100	10.0	10	10
	<b>TRVA</b>	<b><i>Trifolium variegatum</i></b>	<b>100</b>	<b>9.0</b>	<b>9</b>	<b>9</b>
	BRDI3	<i>Bromus diandrus</i>	100	8.0	8	8
	AVBA	<i>Avena barbata</i>	100	1.0	1	1
	LOHU2	<i>Lotus humistratus</i>	100	1.0	1	1
	LOMI	<i>Lotus micranthus</i>	100	1.0	1	1
	PLNO	<i>Plagiobothrys nothofulvus</i>	100	1.0	1	1
	SHAR2	<i>Sherardia arvensis</i>	100	1.0	1	1
	ASTEXX	<i>Asteraceae</i>	100	0.2	0.2	0.2
	ASGA	<i>Astragalus gambelianus</i>	100	0.2	0.2	0.2
	CAPY2	<i>Carduus pycnocephalus</i>	100	0.2	0.2	0.2
	CHPO3	<i>Chlorogalum pomeridianum</i>	100	0.2	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	100	0.2	0.2	0.2
	DICA14	<i>Dichelostemma capitatum</i>	100	0.2	0.2	0.2
	ESCA2	<i>Eschscholzia californica</i>	100	0.2	0.2	0.2
	NAPU4	<i>Nassella pulchra</i>	100	0.2	0.2	0.2
	VUMI	<i>Vulpia microstachys</i>	100	0.2	0.2	0.2

## **Carex Alliance or Habitat**

This habitat includes three different wetland or riparian alliances based on the dominant sedge species within the stands: *Carex barbarae*, *Carex obnupta*, and *Carex serratodens*. It also includes a type with *Carex subfusca* or *C. amplifolia* dominant.

### **Carex barbarae Alliance**

#### **Santa Barbara Sedge Alliance**

**Mapping Code: 4210**

#### **LOCAL VEGETATION DESCRIPTION**

One stand of *Carex barbarae* Alliance forms a dense herbaceous layer (75%) at 0.5-1m tall. The shrub and tree layers are absent or open (no values recorded). Total vegetation cover is 75%.

In one stand sampled, *Carex barbarae* overwhelmingly dominates the herbaceous layer at dense cover. This species may have been cultivated and amplified in stands by historic Native American influences.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 1970 ft.

Aspect: flat

Slope: flat, 0 degrees

Topography: bottom, linear

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: no data

Bare Ground: no data

Parent Material: Franciscan melange

Soil Texture: muck

One stand of this association was sampled in the Mt. Tamalpais Watershed. This alliance is typically found in riparian stands with perennial water, especially in active creek drainages.

#### **SITE IMPACTS**

The stand representing this alliance has low non-native plant cover (average 0.3%) relative to native cover. The only non-native species occurring in the stand is *Erechtites minima*. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0060 **Releve(s):** none

**Rank:** G3 S3?

#### **GLOBAL DISTRIBUTION**

Central Coast (including Mt. Tamalpais watershed) and Sierra Nevada foothills

#### **REFERENCES**

CNPS 2006 (unpublished data)

**Carex barbarae Alliance**

Stratum Herb	Code	Species Name	Con	Avg	Min	Max
	<b>CABA4</b>	<b>Carex barbarae</b>	<b>100</b>	<b>75.0</b>	<b>75</b>	<b>75</b>
	ERMI6	<i>Erechtites minima</i>	100	0.2	0.2	0.2

**Carex obnupta Alliance**  
**Slough Sedge Alliance**

**Mapping Code: 4210**

**LOCAL VEGETATION DESCRIPTION**

One stand of *Carex obnupta* Alliance form an intermittent to dense herbaceous layer (73%) at 0-0.5m tall. The shrub and tree layers are absent or open (no values recorded). Total vegetation cover is 73%.

In this alliance, *Carex obnupta* co-dominates the herbaceous layer with other graminoids, such as *Cynosurus echinatus*, *Bromus laevipes*, and *Sidalcea malviflora*. The herbaceous layer is dense, and the shrub and tree layers are open/absent.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 1752 ft.

Aspect: NW

Slope: gentle, 2 degrees

Topography: bottom or mid slope, linear to undulating

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: no data

Bare Ground: no data

Parent Material: Franciscan melange

Soil Texture: loam (class unknown)

Stands of this association were sampled in the Mt. Tamalpais Watershed. They usually occur in saturated, loamy soils on gentle slopes of all aspects. Stands prefer basins, bottoms, and plains that collect water during the rainy season, and they usually hold water through or have saturated soils most of the growing season.

**SITE IMPACTS**

This association has low non-native plant cover (28.8%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Cynosurus echinatus*, *Vicia sativa*, *Cirsium vulgare* and *Carduus pycnocephala*. There are no additional site impacts.

**SENSITIVE SPECIES**

*Calystegia collina* was found in the 1 survey of this plant community. This species could be *C.c.* subsp. *oxyphylla*. CNPS ranks this sub-species as List 4 with R-E-D Code is 1-2-3. Global rank is G4T3, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0023 **Releve(s):**

**Rank:** G4 S4 (alliance level)

**GLOBAL DISTRIBUTION**

North Coast, Central Coast, to British Columbia and Southeastern Alaska

**REFERENCES**

Christy 2004, NatureServe 2005, NatureServe et al. 2003a

**Carex obnupta Alliance**

Stratum Herb	Code	Species Name	Con	Avg	Min	Max
	<b>CAREX</b>	<b>Carex obnupta</b>	<b>100</b>	<b>12.0</b>	<b>12</b>	<b>12</b>
	CYEC	<i>Cynosurus echinatus</i>	100	16.0	16	16
	BRLA3	<i>Bromus laevipes</i>	100	14.0	14	14
	LUCO6	<i>Luzula comosa</i>	100	10.0	10	10
	SIMA2	<i>Sidalcea malviflora</i>	100	10.0	10	10
	GAAP2	<i>Galium aparine</i>	100	2.0	2	2
	VISA	<i>Vicia sativa</i>	100	2.0	2	2
	CAPY2	<i>Carduus pycnocephalus</i>	100	1.0	1	1
	CIVU	<i>Cirsium vulgare</i>	100	1.0	1	1
	AGGR	<i>Agoseris grandiflora</i>	100	0.2	0.2	0.2
	CALYS	<i>Calystegia</i>	100	0.2	0.2	0.2
	CASU19	<i>Calystegia subacaulis</i>	100	0.2	0.2	0.2
	CACA39	<i>Cardamine californica</i>	100	0.2	0.2	0.2
	CLPE	<i>Claytonia perfoliata</i>	100	0.2	0.2	0.2
	MADIA	<i>Madia</i>	100	0.2	0.2	0.2
	NEME	<i>Nemophila menziesii</i>	100	0.2	0.2	0.2
	RACA2	<i>Ranunculus californicus</i>	100	0.2	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	100	0.2	0.2	0.2
	TORIL	<i>Torilis</i>	100	0.2	0.2	0.2

## ***Carex serratodens* Alliance**

### **Twotooth Sedge Alliance**

**Mapping Code: 4210**

#### **LOCAL VEGETATION DESCRIPTION**

One stand of *Carex serratodens* Alliance forms a dense herbaceous layer (87%) at 1-2m tall. The shrub layer is open (0.2-0.2%, mean 0.2%) and 1-2m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 87%.

In this association, *Carex serratodens* is dominant to co-dominant in the herbaceous layer. In the one stand sampled, *C. serratodens* is co-dominant with *Juncus occidentalis*, while other wetland and upland species also occur in the stand. The shrub and tree layers are open or absent, with *Baccharis pilularis* at trace cover.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 1247 ft.

Aspect: SE

Slope: gentle, 5 degrees

Topography: mid slope, undulating

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: no data

Bare Ground: no data

Parent Material: Franciscan melange

Soil Texture: medium silt

One stand of this association was sampled in the Mt. Tamalpais Watershed. Stands usually occur in saturated, silty or clayey soils that have serpentinite origin or influence. They are usually on gentle plains and bottoms in broad expanses, and they typically have water available throughout the growing season (from drainage and seeps).

#### **SITE IMPACTS**

The stand representing this association has low non-native plant cover (average 5.7%) relative to native cover. Non-native species that occur with the highest abundance include *Bromus hordeaceus*, *Rumex acetosella*, *Aira caryophyllea*, and *Anagallis arvensis*. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0044 **Releve(s):** none

**Rank:** G3 S3 (alliance level)

#### **GLOBAL DISTRIBUTION**

Northern Central Coast, Sierra Nevada foothills, North Coast Ranges, and possibly South Coast Ranges (on serpentine wetland soils)

#### **REFERENCES**

CNPS 2002 (unpublished serpentine data), Evens et al. 2004, Evens et al. 2006

**Carex serratodens Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	BAP1	<i>Baccharis pilularis</i>	100	0.2	0.2	0.2
Herb						
	JUOC2	<i>Juncus occidentalis</i>	100	40.0	40	40
	<b>CASE2</b>	<b><i>Carex serratodens</i></b>	<b>100</b>	<b>26.0</b>	<b>26</b>	<b>26</b>
	GAAP2	<i>Galium aparine</i>	100	5.0	5	5
	BRLA3	<i>Bromus laevipes</i>	100	2.0	2	2
	CLPE	<i>Claytonia perfoliata</i>	100	2.0	2	2
	NAPU4	<i>Nassella pulchra</i>	100	2.0	2	2
	POACXX	<i>Poaceae</i>	100	2.0	2	2
	BRHO2	<i>Bromus hordeaceus</i>	100	1.0	1	1
	MIGU	<i>Mimulus guttatus</i>	100	1.0	1	1
	RUAC3	<i>Rumex acetosella</i>	100	1.0	1	1
	AICA	<i>Aira caryophyllea</i>	100	0.2	0.2	0.2
	ANAR	<i>Anagallis arvensis</i>	100	0.2	0.2	0.2
	CAPY2	<i>Carduus pycnocephalus</i>	100	0.2	0.2	0.2
	HOLA	<i>Holcus lanatus</i>	100	0.2	0.2	0.2
	LOWR2	<i>Lotus wrangelianus</i>	100	0.2	0.2	0.2
	MEPO3	<i>Medicago polymorpha</i>	100	0.2	0.2	0.2
	TRFU	<i>Trifolium fucatum</i>	100	0.2	0.2	0.2
	TRVA	<i>Trifolium variegatum</i>	100	0.2	0.2	0.2
	VUMI	<i>Vulpia microstachys</i>	100	0.2	0.2	0.2

***Carex subfusca*-*Carex amplifolia* Association**  
**Serrate Sedge - Leafy Sedge Association**

**Mapping Code: 4210**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Carex subfusca*-*Carex amplifolia* form a dense herbaceous layer (73-73%, mean 73%) at 0.5-1m tall. The shrub layer is open (0-1%, mean 0.5%) and 0.5-1m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 73-75%, mean 74%.

In this association, *Carex subfusca* and/or *Carex amplifolia* dominate the herbaceous layer. A variety of other herbs may be present but not as high in cover, including *Juncus patens*, *Carex gynodynamis*, and *C. tracyi*. The shrub and tree layers are sparse or absent, with shrubs such as *Rubus ursinus* and *Baccharis pilularis*.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 1507-1976 ft., mean 1742 ft.  
Aspect: none, SW and NW  
Slope: flat, mean 0 degrees  
Topography: ridge top, linear  
Small Rock Cover: no data  
Large Rock Cover: no data  
Litter Cover: no data  
Bare Ground: no data  
Parent Material: Franciscan melange  
Soil Texture: moderately fine silty clay loam, medium silt

Stands of this association were sampled in the Mt. Tamalpais Watershed. They usually have saturated, silty or clayey soils, which are usually derived from marine sedimentary substrates. Stands are usually small and occur on flat or gentle slopes. They typically have saturated soils throughout the growing season.

**SITE IMPACTS**

This association has low non-native plant cover (average 6.7%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Cirsium vulgare*, *Anagallis arvensis*, and *Torilis arvensis*. Additional site impacts include moderate foot traffic/trampling in one stand.

**SENSITIVE SPECIES**

*Cirsium hydrophilum* var. *vaseyi* was found in 1 of 2 surveys of this plant community. CNPS ranks this species as List 1B, and CNPS R-E-D Code is 3-2-3. Global rank is G1T1, and State rank is S1.2. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** MMWD0059, MMWD0081 **Releve(s):** none

**Rank:** G2 S2?

**GLOBAL DISTRIBUTION**

Northern Central Coast and possibly North Coast; though full distribution is not known

**REFERENCES**

CDFG 2003, Fiedler and Leidy 1987



**Carex subfusca-Carex amplifolia Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	RUUR	<i>Rubus ursinus</i>	50	0.5	1	1
	BAPI	<i>Baccharis pilularis</i>	50	0.1	0.2	0.2
	ROCA2	<i>Rosa californica</i>	50	0.1	0.2	0.2
	TODI	<i>Toxicodendron diversilobum</i>	50	0.1	0.2	0.2
Herb						
	JUNCU	<i>Juncus</i>	100	9.0	9	9
	GAAP2	<i>Galium aparine</i>	100	0.6	0.2	1
	RUSA	<i>Rumex salicifolius</i>	100	0.6	0.2	1
	<b>CAAM10</b>	<b><i>Carex amplifolia</i></b>	<b>50</b>	<b>15.0</b>	<b>30</b>	<b>30</b>
	<b>CASU6</b>	<b><i>Carex subfusca</i></b>	<b>50</b>	<b>13.0</b>	<b>26</b>	<b>26</b>
	JUPA2	<i>Juncus patens</i>	50	10.0	20	20
	CAGY3	<i>Carex gynodynema</i>	50	4.5	9	9
	CATR17	<i>Carex tracyi</i>	50	4.5	9	9
	FEAR3	<i>Festuca arundinacea</i>	50	4.0	8	8
	RACA2	<i>Ranunculus californicus</i>	50	3.0	6	6
	IRDO	<i>Iris douglasiana</i>	50	2.5	5	5
	ALUN	<i>Allium unifolium</i>	50	1.5	3	3
	EQTE	<i>Equisetum telmateia</i>	50	1.0	2	2
	CACA39	<i>Cardamine californica</i>	50	0.5	1	1
	CIHYV	<i>Cirsium hydrophilum</i> var. <i>vaseyi</i>	50	0.5	1	1
	CIVU	<i>Cirsium vulgare</i>	50	0.5	1	1
	CLPE	<i>Claytonia perfoliata</i>	50	0.5	1	1
	IRMA	<i>Iris macrosiphon</i>	50	0.5	1	1
	POCA5	<i>Polygala californica</i>	50	0.5	1	1
	SIMA2	<i>Sidalcea malviflora</i>	50	0.5	1	1
	STAJ	<i>Stachys ajugoides</i>	50	0.5	1	1
	ANAR	<i>Anagallis arvensis</i>	50	0.1	0.2	0.2
	CAOL	<i>Cardamine oligosperma</i>	50	0.1	0.2	0.2
	DECA18	<i>Deschampsia caespitosa</i>	50	0.1	0.2	0.2
	EPILO	<i>Epilobium</i>	50	0.1	0.2	0.2
	FECA	<i>Festuca californica</i>	50	0.1	0.2	0.2
	FRVE	<i>Fragaria vesca</i>	50	0.1	0.2	0.2
	LOFO2	<i>Lotus formosissimus</i>	50	0.1	0.2	0.2
	MYLA4	<i>Myosotis latifolia</i>	50	0.1	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	50	0.1	0.2	0.2
	TOAR	<i>Torilis arvensis</i>	50	0.1	0.2	0.2
	VIAM	<i>Vicia americana</i>	50	0.1	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	50	0.1	0.2	0.2

### **Carex densa Alliance (Carex - Juncus Habitat)**

This alliance is represented by two associations that have *Carex densa* intermixed with various *Juncus* species as co-dominants. This is a newly defined alliance based on data from this study area and from species dominance of *Carex densa* in the freshwater seep habitat defined by Fiedler and Leidy (1987).

#### **Carex densa-Lolium perenne-Juncus spp. Association**

##### **Dense Sedge - Italian Ryegrass - Rush Association**

**Mapping Code: 4210**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Carex densa-Lolium perenne-Juncus* spp. form a dense herbaceous layer (67-75%, mean 71%) at 0-1m tall. The shrub and tree layers are absent or open (no values recorded). Total vegetation cover is 67-75%, mean 71%.

In this association, *Carex densa* co-dominates with *Lolium perenne* in the herbaceous layer. Other herbs such as *Juncus occidentalis* or *J. patens* may occur along with a mixture of other riparian species such as *Zigadenus micranthus*. The shrub and tree layers are absent or open.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 157-1286 ft., mean 722 ft.

Aspect: SW or flat

Slope: flat to moderate, range 0-8 degrees, mean 4 degrees

Topography: lower slope, linear

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: no data

Bare Ground: no data

Parent Material: Franciscan melange

Soil Texture: moderately fine silty clay loam, medium to very fine sandy loam

Stands of this association were sampled in the Mt. Tamalpais Watershed and at Nicasio Reservoir. The association is usually found on flat to gentle slopes with saturated soils and freshwater seeps. Fiedler and Leidy (1987) describe a Freshwater Seep habitat that could include this association.

#### **SITE IMPACTS**

This association has moderate non-native plant cover (average 37.1%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Lolium perenne*, *Avena barbata*, and *Holcus lanatus*. There are no additional site impacts.

#### **SENSITIVE SPECIES**

*Hemizonia congesta* was found in 1 of 5 surveys of this plant community. *H. congesta* subsp. *leucocephala* has the potential occur in the region but not in this habitat. CNPS ranks this subspecies as List 3 with R-E-D Code is ?-?-3. Global rank is G5T2T3, and State rank is S2S3. Federal and state listing is None. While this subspecies may not occur where sampled, dried plants may be indistinguishable from subsp. *congesta*, and both the subspecies intergrade (CNPS 2005).

*Zigadenus micranthus* was found in 1 of 2 surveys of this plant community. This could be *Z. micranthus* var. *fontanus*. CNPS ranks this subspecies as List 4 with R-E-D Code is 1-2-3. Global rank is G4T3, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** MMWD0037, MMWD0087 **Releve(s):** none

Rank: G3 S3?

## GLOBAL DISTRIBUTION

Northern outer Central Coast (including Mt. Tamalpais and Nicasio Reservoir) and possibly North Coast; though full distribution is not known

## REFERENCES

Fiedler and Leidy 1987

### *Carex densa*-*Lolium perenne*-*Juncus* spp. Association

Stratum Herb	Code	Species Name	Con	Avg	Min	Max
	<b>CADE8</b>	<b><i>Carex densa</i></b>	<b>100</b>	<b>9.5</b>	<b>4</b>	<b>15</b>
	<b>LOPE</b>	<b><i>Lolium perenne</i></b>	<b>100</b>	<b>9.0</b>	<b>4</b>	<b>14</b>
	AVBA	<i>Avena barbata</i>	100	6.5	6	7
	RACA2	<i>Ranunculus californicus</i>	100	6.0	2	10
	HOLA	<i>Holcus lanatus</i>	100	2.6	0.2	5
	ZIMI2	<i>Zigadenus micranthus</i>	50	8.5	17	17
	BRCA5	<i>Bromus carinatus</i>	50	6.0	12	12
	<b>JUOC2</b>	<b><i>Juncus occidentalis</i></b>	<b>50</b>	<b>4.0</b>	<b>8</b>	<b>8</b>
	<b>JUPA2</b>	<b><i>Juncus patens</i></b>	<b>50</b>	<b>4.0</b>	<b>8</b>	<b>8</b>
	VIVI	<i>Vicia villosa</i>	50	2.5	5	5
	BRHO2	<i>Bromus hordeaceus</i>	50	2.0	4	4
	CHPO3	<i>Chlorogalum pomeridianum</i>	50	1.5	3	3
	DISA9	<i>Dipsacus sativus</i>	50	1.0	2	2
	GED1	<i>Geranium dissectum</i>	50	1.0	2	2
	SIBE	<i>Sisyrinchium bellum</i>	50	1.0	2	2
	ANAR	<i>Anagallis arvensis</i>	50	0.5	1	1
	CAPY2	<i>Carduus pycnocephalus</i>	50	0.1	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	50	0.1	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	50	0.1	0.2	0.2
	ERBO	<i>Erodium botrys</i>	50	0.1	0.2	0.2
	FESTU	<i>Festuca</i>	50	0.1	0.2	0.2
	HECO7	<i>Hemizonia congesta</i>	50	0.1	0.2	0.2
	HESP9	<i>Hesperis matronalis</i>	50	0.1	0.2	0.2
	LIDO2	<i>Limnanthes douglasii</i>	50	0.1	0.2	0.2
	LIBI5	<i>Linum bienne</i>	50	0.1	0.2	0.2
	LOHU2	<i>Lotus humistratus</i>	50	0.1	0.2	0.2
	LOWR2	<i>Lotus wrangelianus</i>	50	0.1	0.2	0.2
	MADIA	<i>Madia</i>	50	0.1	0.2	0.2
	MIGU	<i>Mimulus guttatus</i>	50	0.1	0.2	0.2
	MOVI2	<i>Monardella villosa</i>	50	0.1	0.2	0.2
	NAPU4	<i>Nassella pulchra</i>	50	0.1	0.2	0.2
	PLER3	<i>Plantago erecta</i>	50	0.1	0.2	0.2
	SABI3	<i>Sanicula bipinnatifida</i>	50	0.1	0.2	0.2

## ***Carex densa*- *Juncus xiphioides* Association**

### **Dense Sedge - Irisleaf Rush Association**

**Mapping Code: 4210**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Carex densa*- *Juncus xiphioides* form a dense herbaceous layer (84-88%, mean 86.7%) at 0-1m tall. The shrub layer is open (0-1%, mean 0.3%) and 0-0.5m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 85-88%, mean 87%.

In this association, *Juncus xiphioides* is characteristically present and usually co-dominant with *Carex densa* in the herbaceous layer. A variety of other herbs may be present and co-dominant in the stands, including *Wyethia glabra*, *Dipsacus sativus*, and *Carex praegracilis*. The shrub and tree layers are absent or sparse, including *Baccharis pilularis*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 145-641 ft., mean 311 ft.

Aspect: flat

Slope: flat to gentle, range 0-2 degrees, mean 0.7 degrees

Topography: usually bottom, sometimes upper slope, linear

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: no data

Bare Ground: no data

Parent Material: Franciscan melange

Soil Texture: usually muck, occasionally moderately coarse sandy loam

Stands of this association were sampled in the Mt. Tamalpais Watershed and at Nicasio Reservoir. This association is typically found on flats and bottomlands with saturated mucky soils. Stands sampled have noted disturbance from lake spillway or trail development. Fiedler and Leidy (1987) describe a Freshwater Seep habitat that could include this association.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 11.8%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Dipsacus sativus*, *Geranium dissectum*, *Holcus lanatus*, and *Mentha pulegium*. Also, *Prunus cerasifera* is a non-native shrub occurring in one stand. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** MMWD0070, MMWD0084, MMWD0085 **Releve(s):** none

**Rank:** G3 S3?

#### **GLOBAL DISTRIBUTION**

Northern outer Central Coast and possibly North Coast; though full distribution is not known

#### **REFERENCES**

Fiedler and Leidy 1987

**Carex densa-Juncus xiphioides Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Understory						
	PRCE2	<i>Prunus cerasifera</i>	33	0.1	0.2	0.2
Shrub						
	BAPI	<i>Baccharis pilularis</i>	33	0.3	1	1
	TODI	<i>Toxicodendron diversilobum</i>	33	0.1	0.2	0.2
Herb						
	<b>CAREX</b>	<b>Carex spp.</b>	<b>100</b>	<b>16.8</b>	<b>5.2</b>	<b>20</b>
	<b>JUXI</b>	<b>Juncus xiphioides</b>	<b>100</b>	<b>8.3</b>	<b>1</b>	<b>15</b>
	<b>CADE8</b>	<b>Carex densa</b>	<b>67</b>	<b>24.0</b>	<b>22</b>	<b>50</b>
	WYGL	<i>Wyethia glabra</i>	67	13.4	0.2	40
	DISA9	<i>Dipsacus sativus</i>	67	6.3	1	18
	GED1	<i>Geranium dissectum</i>	67	1.3	2	2
	HOLA	<i>Holcus lanatus</i>	67	0.7	0.2	2
	MEPU	<i>Mentha pulegium</i>	67	0.4	0.2	1
	JUNCU	<i>Juncus</i>	67	0.1	0.2	0.2
	VISA	<i>Vicia sativa</i>	67	0.1	0.2	0.2
	CAPR5	<i>Carex praegracilis</i>	33	14.7	44	44
	FERU2	<i>Festuca rubra</i>	33	0.3	1	1
	LIBI5	<i>Linum bienne</i>	33	0.3	1	1
	AICA	<i>Aira caryophylla</i>	33	0.1	0.2	0.2
	AIEL2	<i>Aira elegantissima</i>	33	0.1	0.2	0.2
	ANAR	<i>Anagallis arvensis</i>	33	0.1	0.2	0.2
	BRHO2	<i>Bromus hordeaceus</i>	33	0.1	0.2	0.2
	CACA39	<i>Cardamine californica</i>	33	0.1	0.2	0.2
	CHPO3	<i>Chlorogalum pomeridianum</i>	33	0.1	0.2	0.2
	CYER	<i>Cyperus eragrostis</i>	33	0.1	0.2	0.2
	ELMA5	<i>Eleocharis macrostachya</i>	33	0.1	0.2	0.2
	EPILO	<i>Epilobium</i>	33	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	33	0.1	0.2	0.2
	UNKN	<i>irreconcilable unknown</i>	33	0.1	0.2	0.2
	JUCA5	<i>Juncus capitatus</i>	33	0.1	0.2	0.2
	LAYIA	<i>Layia</i>	33	0.1	0.2	0.2
	PLLA	<i>Plantago lanceolata</i>	33	0.1	0.2	0.2
	RACA2	<i>Ranunculus californicus</i>	33	0.1	0.2	0.2
	RUCR	<i>Rumex crispus</i>	33	0.1	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	33	0.1	0.2	0.2
	SCMI2	<i>Scirpus microcarpus</i>	33	0.1	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	33	0.1	0.2	0.2
	STAJ	<i>Stachys ajugoides</i>	33	0.1	0.2	0.2

## **Juncus Alliance or Habitat**

This habitat is defined by the dominance of rush species; one type has *Juncus effusus* as a dominant species and another with *Juncus articulatus* and *J. covillei* co-dominant.

### **Juncus spp. (*J. articulatus*-*J. covillei*) Alliance Rush Riparian Habitat Alliance**

**Mapping Code: 4210**

#### **LOCAL VEGETATION DESCRIPTION**

One stand of *Juncus* spp. Alliance forms a dense herbaceous layer (70%) at 0.5-1m tall. The shrub and tree layers are absent or open (no values recorded). Total vegetation cover is 70%.

In one stand sampled of this alliance, *Juncus articulatus* and *J. covillei* are co-dominant in the herbaceous layer at high cover. Other herbs such as *Carex* spp. and *Cirsium hydrophilum* var. *vaseyi* occur in the stand. No shrubs or trees are recorded.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 2045 ft.

Aspect: NW

Slope: gentle, 2 degrees

Topography: mid slope, linear

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: no data

Bare Ground: no data

Parent Material: Franciscan melange

Soil Texture: muck

One stand of this alliance was sampled in the Mt. Tamalpais Watershed. It was on a very gentle slope with seasonally saturated soil.

#### **SITE IMPACTS**

The stand representing this association has low non-native plant cover (average 1.3%) relative to native cover. Non-native species that occur with the highest abundance include *Erechtites minima*, *Mentha pulegium*, and *Rumex crispus*. There are no additional site impacts.

#### **SENSITIVE SPECIES**

*Cirsium hydrophilum* var. *vaseyi* was found in the 1 survey of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 3-2-3. Global rank is G1T1, and State rank is S1.2. Federal and state listing is None (CNPS 2005).

*Lotus formosissimus* was found in the 1 survey of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-2-1. Global rank is G4, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0061 **Releve(s):** none

**Rank:** G3 S3?

#### **GLOBAL DISTRIBUTION**

Northern Central Coast and possibly North Coast; though full distribution is not known

## REFERENCES

None

### *Juncus* spp. (*J. articulatus*-*J. covillei*) Alliance

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	HELEN	<i>Helenium</i>	100	0.2	0.2	0.2
Herb						
	JUAR4	<i>Juncus articulatus</i>	100	30.0	30	30
	JUCO5	<i>Juncus covillei</i>	100	30.0	30	30
	CAREX	<i>Carex</i>	100	0.2	0.2	0.2
	CAGY3	<i>Carex gynodynema</i>	100	0.2	0.2	0.2
	CIHYV	<i>Cirsium hydrophilum</i> var. <i>vaseyi</i>	100	0.2	0.2	0.2
	EPILO	<i>Epilobium</i>	100	0.2	0.2	0.2
	ERMI6	<i>Erechtites minima</i>	100	0.2	0.2	0.2
	GATR3	<i>Galium triflorum</i>	100	0.2	0.2	0.2
	HOITA	<i>Hoita</i>	100	0.2	0.2	0.2
	HOLA	<i>Holcus lanatus</i>	100	0.2	0.2	0.2
	HYAN2	<i>Hypericum anagalloides</i>	100	0.2	0.2	0.2
	LOFO2	<i>Lotus formosissimus</i>	100	0.2	0.2	0.2
	MEPU	<i>Mentha pulegium</i>	100	0.2	0.2	0.2
	MIMO3	<i>Mimulus moschatus</i>	100	0.2	0.2	0.2
	PLSU2	<i>Plantago subnuda</i>	100	0.2	0.2	0.2
	POAN5	<i>Potentilla anserina</i>	100	0.2	0.2	0.2
	RUCR	<i>Rumex crispus</i>	100	0.2	0.2	0.2
	VEAM2	<i>Veronica americana</i>	100	0.2	0.2	0.2
Cryptogam						
	MOSS	<i>Moss</i>	100	0.2	0.2	0.2

## ***Juncus effusus* Alliance**

### **Common Rush Alliance**

**Mapping Code: 4210**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Juncus effusus* Alliance form an intermittent to dense herbaceous layer (45-82%, mean 63.5%) at 0-1m tall. The shrub and tree layers are absent or open (no values recorded). Total vegetation cover is 45-82%, mean 63.5%.

In this alliance, *Juncus effusus* is dominant or co-dominant with other graminoids such as *Carex praegracilis*, *C. subfusca* and *J. xiphioides* in the herbaceous layer. The shrub and tree layers are absent or sparse.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 1667-1931 ft., mean 1799 ft.

Aspect: flat/none

Slope: flat, range 0-0 degrees, mean 0 degrees

Topography: bottom to lower slope, linear

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: no data

Bare Ground: no data

Parent Material: Franciscan melange

Soil Texture: medium silt loam, moderately fine clay loam

Stands of this alliance were sampled in the Mt. Tamalpais Watershed. They are found on flats and bottomlands with well-developed silty or clayey loam soils. Stands typically have water throughout the growing season from natural drainage or freshwater seeps. The dominant *Juncus* in the stands is *Juncus effusus* var. *brunneus*.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 0.7%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Carduus pycnocephalus*, and *Cirsium vulgare*. There are no additional site impacts.

#### **SENSITIVE SPECIES**

*Cirsium hydrophilum* var. *vaseyi* was found in 1 of 2 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 3-2-3. Global rank is G1T1, and State rank is S1.2. Federal and state listing is None (CNPS 2005).

*Lotus formosissimus* was found in 1 of 2 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-2-1. Global rank is G4, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** MMWD0024, MMWD0056 **Releve(s):** none

**Rank:** G4 S4 (alliance level)

#### **GLOBAL DISTRIBUTION**

#### **REFERENCES**

Christy 2004, Evens and San 2005, NatureServe 2005, NatureServe et al. 2003a



***Juncus effusus* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	TODI	<i>Toxicodendron diversilobum</i>	50	0.5	1	1
Herb						
	<b>JUEF</b>	<b><i>Juncus effusus</i></b>	<b>100</b>	<b>27.5</b>	<b>10</b>	<b>45</b>
	CAREX	<i>Carex</i>	100	14.0	14	14
	LOFO2	<i>Lotus formosissimus</i>	50	7.5	15	15
	CAPR5	<i>Carex praegracilis</i>	50	2.0	4	4
	CASU6	<i>Carex subfusca</i>	50	2.0	4	4
	JUXI	<i>Juncus xiphioides</i>	50	2.0	4	4
	IRDO	<i>Iris douglasiana</i>	50	1.5	3	3
	CASE2	<i>Carex serratodens</i>	50	1.0	2	2
	CACA39	<i>Cardamine californica</i>	50	0.5	1	1
	CLPE	<i>Claytonia perfoliata</i>	50	0.5	1	1
	RUSA	<i>Rumex salicifolius</i>	50	0.5	1	1
	SIMA2	<i>Sidalcea malviflora</i>	50	0.5	1	1
	ALUN	<i>Allium unifolium</i>	50	0.1	0.2	0.2
	CAPY2	<i>Carduus pycnocephalus</i>	50	0.1	0.2	0.2
	CIHYV	<i>Cirsium hydrophilum</i> var. <i>vaseyi</i>	50	0.1	0.2	0.2
	CIVU	<i>Cirsium vulgare</i>	50	0.1	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	50	0.1	0.2	0.2
	DECA18	<i>Deschampsia caespitosa</i>	50	0.1	0.2	0.2
	FRVE	<i>Fragaria vesca</i>	50	0.1	0.2	0.2
	GAAP2	<i>Galium aparine</i>	50	0.1	0.2	0.2
	GATR3	<i>Galium triflorum</i>	50	0.1	0.2	0.2
	HYAN2	<i>Hypericum anagalloides</i>	50	0.1	0.2	0.2
	JUAR4	<i>Juncus articulatus</i>	50	0.1	0.2	0.2
	LIPAP2	<i>Lilium pardalinum</i> subsp. <i>pardalinum</i>	50	0.1	0.2	0.2
	RACA2	<i>Ranunculus californicus</i>	50	0.1	0.2	0.2
	RUCR	<i>Rumex crispus</i>	50	0.1	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	50	0.1	0.2	0.2
	STAJ	<i>Stachys ajugoides</i>	50	0.1	0.2	0.2
	SYCH4	<i>Symphotrichum chilense</i>	50	0.1	0.2	0.2
	THCA4	<i>Thermopsis californica</i>	50	0.1	0.2	0.2
	VEAM2	<i>Veronica americana</i>	50	0.1	0.2	0.2

## Perennial Grassland Alliance or Habitat

This habitat is represented by the dominance of one or more perennial species in stands. Native grasses are represented in the following alliances, which also have been described in other literature: *Festuca idahoensis*, *Hordeum brachyantherum*, and *Nassella pulchra* alliances. Native forbs and grasses are represented in three additional alliances are newly described in this report: *Festuca californica*, *Iris douglasiana* and *Thermopsis californica*. Non-native, invasive grasses and forbs also are represented with the following: *Dipsacus sativus*, *Festuca arundinacea*, and *Phalaris aquatica* Alliance.

### ***Dipsacus sativus* Association**

#### **Indian Teasel Association**

**Mapping Code: 4420**

### **LOCAL VEGETATION DESCRIPTION**

Stands of *Dipsacus sativus* Alliance form a dense herbaceous layer (80-83%, mean 81.5%) at 0.5-1m tall. The shrub and tree layers are absent or open (no values recorded). Total vegetation cover is 80-83%, mean 81.5%.

In this association, *Dipsacus sativus* primarily dominates the herbaceous layer at high cover. The herbaceous layer can often contain *Carex*, *Geranium dissectum*, *Conium maculatum*, *Holcus lanatus*, *Raphanus sativus*, *Carduus pycnocephalus*, and other grasses or forbs. The shrub layer is sparse, sometime with *Baccharis pilularis* or other shrubs.

### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 137-154 ft., mean 146 ft.

Aspect: flat

Slope: flat, range 0-0 degrees, mean 0 degrees

Topography: bottom or mid slope, linear

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: no data

Bare Ground: no data

Parent Material: Franciscan melange

Soil Texture: no data

Stands of this association were sampled at Nicasio Reservoir. Small stands with *Dipsacus sativus* are common in the region adjacent to coastal scrub and other grassland stands, especially in areas that have been cleared or disturbed recently.

### **SITE IMPACTS**

This association has high non-native plant cover (average 91.6%) relative to native cover. Non-native species occur in highest frequency and abundance, including *Dipsacus sativus*, *Geranium dissectum*, *Conium maculatum*, *Holcus lanatus*, and *Raphanus sativus*. There are no additional site impacts.

### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** MMWD0091, MMWD0092 **Releve(s):** none

**Rank:** Not applicable, stands are considered exotic.

### **GLOBAL DISTRIBUTION**

Naturalized into northern Central Coast (including Marin County) and North Coast (pers. obs.); though full distribution is not known

## REFERENCES

None

### *Dipsacus sativus* Association

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	BAPI	<i>Baccharis pilularis</i>	50	0.1	0.2	0.2
	VAOV2	<i>Vaccinium ovatum</i>	50	0.1	0.2	0.2
Herb	<b>DISA9</b>	<b><i>Dipsacus sativus</i></b>	<b>100</b>	<b>40.0</b>	<b>30</b>	<b>50</b>
	CAREX	<i>Carex</i>	100	10.0	10	10
	GED1	<i>Geranium dissectum</i>	100	2.5	2	3
	COMA2	<i>Conium maculatum</i>	100	1.6	0.2	3
	HOLA	<i>Holcus lanatus</i>	50	15.0	30	30
	RASA2	<i>Raphanus sativus</i>	50	4.0	8	8
	CAPY2	<i>Carduus pycnocephalus</i>	50	3.5	7	7
	RUAC3	<i>Rumex acetosella</i>	50	2.5	5	5
	BRCA5	<i>Bromus carinatus</i>	50	1.5	3	3
	BRHO2	<i>Bromus hordeaceus</i>	50	1.5	3	3
	LOPE	<i>Lolium perenne</i>	50	1.5	3	3
	VIVI	<i>Vicia villosa</i>	50	1.5	3	3
	BRDI3	<i>Bromus diandrus</i>	50	1.0	2	2
	MEPU	<i>Mentha pulegium</i>	50	0.5	1	1
	ANAR	<i>Anagallis arvensis</i>	50	0.1	0.2	0.2
	AVBA	<i>Avena barbata</i>	50	0.1	0.2	0.2
	SIMA3	<i>Silybum marianum</i>	50	0.1	0.2	0.2

## ***Festuca arundinacea*-*Carex densa* Association**

### **Tall Fescue - Dense Sedge Association**

**Mapping Code: 4430**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Festuca arundinacea*-*Carex densa* form a dense herbaceous layer (86-90%, mean 88%) at 0-0.5m tall. The shrub layer is open (0-0.2%, mean 0.1%) and 0-0.5m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 87-90%, mean 88.5%.

In this association, *Festuca arundinacea* is primarily dominant at high cover while *Carex densa* is characteristically present at low cover the herbaceous layer. The herbaceous layer may also have *Danthonia californica*, *Juncus articulatus*, and other graminoids or forbs. The shrub layer is sparse and may include *Eriodictyon californicum* or other shrubs. The tree layer is absent or sparse.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 1402-2013 ft., mean 1708 ft.

Aspect: flat or NW

Slope: flat, range 0-0 degrees, mean 0 degrees

Topography: bottom, ridge top, linear

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: no data

Bare Ground: no data

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam, medium silt

Stands of this association were sampled in the Mt. Tamalpais Watershed. This association is related to the Introduced coastal perennial grassland association defined by NatureServe et al (2003a), in which *Ammophila arenaria*, *Festuca arundinacea*, *Holcus lanatus*, *Lolium perenne*, or *Phalaris aquatica* is dominant. However, the *Festuca arundinacea* association in this report is separated from the *Phalaris aquatica* by because of its difference in moisture regime (*F. arundinacea* in riparian/wetland settings, *P. aquatica* in upland settings). It is likely that the *F. arundinacea* has invaded stands that have been historically *Carex densa* alliance.

#### **SITE IMPACTS**

This association has high non-native plant cover (average 69.5%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Lolium perenne*, *Vicia sativa*, *Aira caryophyllea*, and *Cirsium vulgare*. Additional site impacts include light erosion/runoff in one stand and moderate foot traffic/trampling in one stand.

#### **SENSITIVE SPECIES**

*Arctostaphylos hookeri* subsp. *montana* was found in 1 of 2 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 3-1-3. Global rank is G3T2, and State rank is S2.2. Federal and state listing is None (CNPS 2005).

*Zigadenus micranthus* was found in 1 of 2 surveys of this plant community. This could be *Z. micranthus* var. *fontanus*. CNPS ranks this subspecies as List 4 with R-E-D Code is 1-2-3. Global rank is G4T3, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** MMWD0042, MMWD0057 **Releve(s):** none

**Rank:** G3 S3?

#### **GLOBAL DISTRIBUTION**

Northern Central Coast and possibly North Coast; though full distribution is not known

## REFERENCES

NatureServe et al. 2003a

### *Festuca arundinacea*-*Carex densa* Association

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	ERCA6	<i>Eriodictyon californicum</i>	50	0.5	1	1
	ARHOM	<i>Arctostaphylos hookeri</i> subsp. <i>montana</i>	50	0.1	0.2	0.2
	CEJE	<i>Ceanothus jepsonii</i>	50	0.1	0.2	0.2
Herb	<b>FEAR3</b>	<b><i>Festuca arundinacea</i></b>	<b>100</b>	<b>57.5</b>	<b>35</b>	<b>80</b>
	<b>CADE8</b>	<b><i>Carex densa</i></b>	<b>100</b>	<b>2.0</b>	<b>2</b>	<b>2</b>
	DACA3	<i>Danthonia californica</i>	50	7.5	15	15
	UNKN	<i>irreconcilable unknown</i>	50	5.5	11	11
	JUAR4	<i>Juncus articulatus</i>	50	5.0	10	10
	LOPE	<i>Lolium perenne</i>	50	1.5	3	3
	ZIMI2	<i>Zigadenus micranthus</i>	50	1.5	3	3
	CASE2	<i>Carex serratodens</i>	50	1.0	2	2
	AGOSE	<i>Agoseris</i>	50	0.5	1	1
	CASU6	<i>Carex subfusca</i>	50	0.5	1	1
	THFEP2	<i>Thalictrum fendleri</i> var. <i>polycarpum</i>	50	0.5	1	1
	VISA	<i>Vicia sativa</i>	50	0.5	1	1
	AICA	<i>Aira caryophyllea</i>	50	0.1	0.2	0.2
	CALYS	<i>Calystegia</i>	50	0.1	0.2	0.2
	CHPO3	<i>Chlorogalum pomeridianum</i>	50	0.1	0.2	0.2
	CIVU	<i>Cirsium vulgare</i>	50	0.1	0.2	0.2
	IRDO	<i>Iris douglasiana</i>	50	0.1	0.2	0.2
	IRMA	<i>Iris macrosiphon</i>	50	0.1	0.2	0.2
	LIPAP2	<i>Lilium pardalinum</i> subsp. <i>pardalinum</i>	50	0.1	0.2	0.2
	LOMI	<i>Lotus micranthus</i>	50	0.1	0.2	0.2
	NAPU4	<i>Nassella pulchra</i>	50	0.1	0.2	0.2
	RACA2	<i>Ranunculus californicus</i>	50	0.1	0.2	0.2
	SHAR2	<i>Sherardia arvensis</i>	50	0.1	0.2	0.2

## ***Festuca californica* Alliance**

### **California Fescue Alliance**

**Mapping Code: 4510**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Festuca californica* Alliance form a dense herbaceous layer (70-80%, mean 75%) at 1-2m tall. The shrub layer is open (0-15%, mean 5.1%) and 0.5-1m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 75-85%, mean 80%.

In this association, *Festuca californica* primarily dominates the herbaceous layer at moderate to high cover, and other native grasses or forbs are often be present at low cover. However, non-native annual grasses such as *Avena barbata* or *Lolium perenne* sometimes may have near moderate cover. The shrub layer can often contain *Toxicodendron diversilobum* or *Rubus ursinus* at low cover while the tree layer is absent or sparse.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 1103-1455 ft., mean 1338 ft.

Aspect: NE and SW

Slope: somewhat steep to steep, range 15-27 degrees, mean 21.7 degrees

Topography: mid slope, undulating or convex

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: no data

Bare Ground: no data

Parent Material: Franciscan melange

Soil Texture: medium to very fine sandy loam, medium silt loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. They are usually found in small patchworks on convex mid-slopes at the interface between shrublands and other grasslands.

#### **SITE IMPACTS**

This association has low non-native plant cover (average 14.9%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Avena barbata*, *Lolium perenne*, and *Bromus diandrus*. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** MMWD0034, MMWD0036, MMWD0066 **Releve(s):** none

**Rank:** G3 S3?

#### **GLOBAL DISTRIBUTION**

northern outer Central Coast (including Point Reyes National Seashore (per. obs.) and Mt. Tamalpais area) and possibly North Coast; though full distribution is not known

#### **REFERENCES**

None

***Festuca californica* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	TODI	<i>Toxicodendron diversilobum</i>	67	5.1	0.2	15
	RUUR	<i>Rubus ursinus</i>	67	2.0	1	5
	BAPI	<i>Baccharis pilularis</i>	33	0.1	0.2	0.2
Herb						
	<b>FECA</b>	<b><i>Festuca californica</i></b>	<b>100</b>	<b>61.7</b>	<b>35</b>	<b>75</b>
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	100	0.7	0.2	1
	THCA4	<i>Thermopsis californica</i>	100	0.2	0.2	0.2
	BRCA5	<i>Bromus carinatus</i>	67	0.7	1	1
	ACMI2	<i>Achillea millefolium</i>	67	0.4	0.2	1
	RACA2	<i>Ranunculus californicus</i>	67	0.4	0.2	1
	SADO5	<i>Satureja douglasii</i>	67	0.1	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	67	0.1	0.2	0.2
	AVBA	<i>Avena barbata</i>	33	8.3	25	25
	LOPE	<i>Lolium perenne</i>	33	3.3	10	10
	STAJ	<i>Stachys ajugoides</i>	33	1.3	4	4
	CLPE	<i>Claytonia perfoliata</i>	33	0.7	2	2
	BRDI3	<i>Bromus diandrus</i>	33	0.3	1	1
	CAPY2	<i>Carduus pycnocephalus</i>	33	0.3	1	1
	HOLA	<i>Holcus lanatus</i>	33	0.3	1	1
	JUAR4	<i>Juncus articulatus</i>	33	0.3	1	1
	VICIA	<i>Vicia</i>	33	0.3	1	1
	VIVI	<i>Vicia villosa</i>	33	0.3	1	1
	ANAR	<i>Anagallis arvensis</i>	33	0.1	0.2	0.2
	CASU19	<i>Calystegia subacaulis</i>	33	0.1	0.2	0.2
	CASE2	<i>Carex serratodens</i>	33	0.1	0.2	0.2
	COSP	<i>Collinsia sparsiflora</i>	33	0.1	0.2	0.2
	GAAP2	<i>Galium aparine</i>	33	0.1	0.2	0.2
	GICL	<i>Gilia clivorum</i>	33	0.1	0.2	0.2
	LUCO6	<i>Luzula comosa</i>	33	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	33	0.1	0.2	0.2
	SIMA2	<i>Sidalcea malviflora</i>	33	0.1	0.2	0.2
	TRIFO	<i>Trifolium</i>	33	0.1	0.2	0.2
	VISA	<i>Vicia sativa</i>	33	0.1	0.2	0.2
	ZIFR	<i>Zigadenus fremontii</i>	33	0.1	0.2	0.2

## ***Festuca idahoensis*-*Bromus carinatus* Association**

### **Idaho Fescue - California Brome Association**

**Mapping Code:** 4510

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Festuca idahoensis*-*Bromus carinatus* form an intermittent to dense herbaceous layer (60-88%, mean 72.7%) at 0-0.5m tall. The shrub and tree layers are absent or open (no values recorded). Total vegetation cover is 60-88%, mean 72.7%.

In this association, *Festuca idahoensis* and *Bromus carinatus* are characteristically present and usually co-dominant; however, annual herbs sometimes may be similar or higher in cover, including *Vicia villosa* and *Bromus hordeaceus*. The shrub layer and tree layers are absent or sparse.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 175-1154 ft., mean 523 ft.

Aspect: NE, NW, or variable

Slope: moderate to somewhat steep, range 10-20 degrees, mean 13.7 degrees

Topography: bottom to upper slope, undulating or concave

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: no data

Bare Ground: no data

Parent Material: Franciscan melange

Soil Texture: moderately fine silty clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed and at Nicasio Reservoir. They are small and patchy in distribution on mesic moderately steep slopes off serpentine, especially on north-facing protected slopes. Some stands are adjacent to riparian or wetland vegetation.

#### **SITE IMPACTS**

This association has moderate non-native plant cover (average 41.9%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Lolium perenne*, *Vicia villosa*, *Bromus hordeaceus*, and *Vulpia myuros*. There are no additional site impacts.

#### **SENSITIVE SPECIES**

*Calochortus umbellatus* was found in 1 of 3 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-2-3. Global rank is G3, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** MMWD0047, MMWD0086, MMWD0088 **Releve(s):** none

**Rank:** G3 S3?

#### **GLOBAL DISTRIBUTION**

Northern outer Central Coast (including Mt. Tamalpais and Nicasio Reservoir) and possibly North Coast; though full distribution is not known

#### **REFERENCES**

None



***Festuca idahoensis*-*Bromus carinatus* Association**

Stratum Herb	Code	Species Name	Con	Avg	Min	Max
	<b>FEID</b>	<b><i>Festuca idahoensis</i></b>	<b>100</b>	<b>14.7</b>	<b>4</b>	<b>25</b>
	<b>BRCA5</b>	<b><i>Bromus carinatus</i></b>	<b>100</b>	<b>11.7</b>	<b>5</b>	<b>19</b>
	LOPE	<i>Lolium perenne</i>	100	1.4	0.2	3
	VIVI	<i>Vicia villosa</i>	67	15.1	0.2	45
	BRHO2	<i>Bromus hordeaceus</i>	67	7.0	10	11
	VUMY	<i>Vulpia myuros</i>	67	2.0	1	5
	GED1	<i>Geranium dissectum</i>	67	1.7	2	3
	NAPU4	<i>Nassella pulchra</i>	67	0.4	0.2	1
	AICA	<i>Aira caryophyllea</i>	67	0.1	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	67	0.1	0.2	0.2
	BRLA3	<i>Bromus laevipes</i>	33	3.3	10	10
	PLER3	<i>Plantago erecta</i>	33	1.7	5	5
	CASE2	<i>Carex serratodens</i>	33	1.0	3	3
	CAPY2	<i>Carduus pycnocephalus</i>	33	0.7	2	2
	RUAC3	<i>Rumex acetosella</i>	33	0.7	2	2
	VISA	<i>Vicia sativa</i>	33	0.7	2	2
	MOVI2	<i>Monardella villosa</i>	33	0.3	1	1
	RUCR	<i>Rumex crispus</i>	33	0.3	1	1
	WYGL	<i>Wyethia glabra</i>	33	0.3	1	1
	ACMI2	<i>Achillea millefolium</i>	33	0.1	0.2	0.2
	AIEL2	<i>Aira elegantissima</i>	33	0.1	0.2	0.2
	AMME	<i>Amsinckia menziesii</i>	33	0.1	0.2	0.2
	ANAR	<i>Anagallis arvensis</i>	33	0.1	0.2	0.2
	AVBA	<i>Avena barbata</i>	33	0.1	0.2	0.2
	CAUM	<i>Calochortus umbellatus</i>	33	0.1	0.2	0.2
	CHPO3	<i>Chlorogalum pomeridianum</i>	33	0.1	0.2	0.2
	ELEL5	<i>Elymus elymoides</i>	33	0.1	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	33	0.1	0.2	0.2
	ESCA2	<i>Eschscholzia californica</i>	33	0.1	0.2	0.2
	HESP9	<i>Hesperis matronalis</i>	33	0.1	0.2	0.2
	HOLA	<i>Holcus lanatus</i>	33	0.1	0.2	0.2
	HOBR2	<i>Hordeum brachyantherum</i>	33	0.1	0.2	0.2
	UNKN	<i>irreconcilable unknown</i>	33	0.1	0.2	0.2
	KOMA	<i>Koeleria macrantha</i>	33	0.1	0.2	0.2
	LIBI5	<i>Linum bienne</i>	33	0.1	0.2	0.2
	LUBI	<i>Lupinus bicolor</i>	33	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	33	0.1	0.2	0.2
	RACA2	<i>Ranunculus californicus</i>	33	0.1	0.2	0.2
	SIMA2	<i>Sidalcea malviflora</i>	33	0.1	0.2	0.2
	SOAS	<i>Sonchus asper</i>	33	0.1	0.2	0.2
	TRBI	<i>Trifolium bifidum</i>	33	0.1	0.2	0.2
	TRMI5	<i>Trifolium microdon</i>	33	0.1	0.2	0.2

***Festuca idahoensis*-*Festuca rubra* Association**  
**Idaho Fescue - Red Fescue Association**

**Mapping Code: 4510**

**LOCAL VEGETATION DESCRIPTION**

One stand of *Festuca idahoensis*-*Festuca rubra* forms a dense herbaceous layer (73%) at 0.5-1m tall. The shrub layer is open (0.2%) and 0-0.5m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 73%.

In this association, *Festuca idahoensis* and *Festuca rubra* are characteristically present with either or both dominant. In one stand sampled of this association, *F. idahoensis* was dominant with *F. californica* and *F. rubra* was sub-dominant. Other situations occur in the area where *F. rubra* is more dominant on sheltered, somewhat steep slopes. The herbaceous layer also contains a variety of other native or non-native herbs such as *Bromus hordeaceus* and *Pentagramma triangularis*. The shrub layer is sparse and may contain species such as *Eriophyllum confertiflorum* or *Mimulus aurantiacus* while the tree layer is absent or sparse.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 1097 ft.

Aspect: NE

Slope: somewhat steep, 22 degrees

Topography: mid slope, undulating

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: no data

Bare Ground: no data

Parent Material: Franciscan melange

Soil Texture: medium loam

One stand of this association was sampled in the Mt. Tamalpais Watershed. Additional reconnaissance has confirmed this association of *Festuca rubra* in a matrix with *Festuca idahoensis*, especially on steep, protected north-facing slopes.

**SITE IMPACTS**

The stand representing this association has low non-native plant cover (average 17.7%) relative to native cover. Non-native species that occur with the highest abundance include *Bromus diandrus*, *Avena barbata*, and *Vicia villosa*. There are no additional site impacts.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0015 **Releve(s):** none

**Rank:** G3 S3?

**GLOBAL DISTRIBUTION**

northern outer Central Coast (including Mt. Tamalpais area) and possibly North Coast; though full distribution is not known

**REFERENCES**

None

***Festuca idahoensis*-*Festuca rubra* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	ERCO25	<i>Eriophyllum confertiflorum</i>	100	2.0	2	2
	MIAU	<i>Mimulus aurantiacus</i>	100	0.2	0.2	0.2
Herb						
	<b>FEID</b>	<b><i>Festuca idahoensis</i></b>	<b>100</b>	<b>17.0</b>	<b>17</b>	<b>17</b>
	FECA	<i>Festuca californica</i>	100	14.0	14	14
	BRDI3	<i>Bromus diandrus</i>	100	8.0	8	8
	<b>FERU2</b>	<b><i>Festuca rubra</i></b>	<b>100</b>	<b>4.0</b>	<b>4</b>	<b>4</b>
	PETR7	<i>Pentagramma triangularis</i>	100	2.0	2	2
	AVBA	<i>Avena barbata</i>	100	1.0	1	1
	KOMA	<i>Koeleria macrantha</i>	100	1.0	1	1
	PLER3	<i>Plantago erecta</i>	100	1.0	1	1
	DICA14	<i>Dichelostemma capitatum</i>	100	0.2	0.2	0.2
	IRMA	<i>Iris macrosiphon</i>	100	0.2	0.2	0.2
	UNKN	<i>irreconcilable unknown</i>	100	0.2	0.2	0.2
	LOWR2	<i>Lotus wrangelianus</i>	100	0.2	0.2	0.2
	MECA2	<i>Melica californica</i>	100	0.2	0.2	0.2
	RACA2	<i>Ranunculus californicus</i>	100	0.2	0.2	0.2
	TRDE	<i>Trifolium depauperatum</i>	100	0.2	0.2	0.2
	TRWI3	<i>Trifolium willdenovii</i>	100	0.2	0.2	0.2
	VIVI	<i>Vicia villosa</i>	100	0.2	0.2	0.2

## ***Hordeum brachyantherum* Alliance**

### **Meadow Barley Alliance**

**Mapping Code: 4620/4210**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Hordeum brachyantherum* Alliance form a dense herbaceous layer (range and mean 75%) at 0-1m tall. The shrub and tree layers are absent or open (no values recorded). Total vegetation cover is 75-75%, mean 75%.

In this alliance, *Hordeum brachyantherum* exhibits the highest cover and is usually dominant. However, a variety of other graminoids or forbs can occur, including natives *Trifolium fucatum*, *Ranunculus californicus*, *Juncus* spp. and *Danthonia californica*, as well as non-natives *Holcus lanatus*, *Lolium perenne*, and *Vulpia myuros*. The shrub and tree layers are absent or sparse.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 1303-1303 ft., mean 1303 ft.

Aspect: NW, SW

Slope: flat to gentle, range 0-5 degrees, mean 2.5 degrees

Topography: upper slope to ridge top, linear or undulating

Small Rock Cover: 12% (data from one plot)

Large Rock Cover: 1% (data from one plot)

Litter Cover: 25% (data from one plot)

Bare Ground: 35% (data from one plot)

Parent Material: Franciscan melange

Soil Texture: medium silt, medium loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands may be found on or off serpentine in nearly flat wetland settings, associated with other wetland types.

#### **SITE IMPACTS**

This association has moderate non-native plant cover (average 31%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Medicago polymorpha*, *Lolium perenne*, *Holcus lanatus*, and *Vulpia myuros*. There are no additional site impacts.

#### **SENSITIVE SPECIES**

*Astragalus breweri* was found in 1 of 2 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-2-3. Global rank is G3, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

*Hemizonia congesta* was found in 1 of 5 surveys of this plant community. *H. congesta* subsp. *leucocephala* has the potential occur in the region in this habitat. CNPS ranks this subspecies as List 3 with R-E-D Code is ?-?-3. Global rank is G5T2T3, and State rank is S2S3. Federal and state listing is None. While this subspecies may not occur where sampled; dried plants may be indistinguishable from subsp. *congesta*, and both the subspecies intergrade (CNPS 2005).

*Zigadenus micranthus* was found in 1 of 2 surveys of this plant community. This could be *Z. micranthus* var. *fontanus*. CNPS ranks this subspecies as List 4 with R-E-D Code is 1-2-3. Global rank is G4T3, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** MMWD0038 **Releve(s):** MMWD0026

**Rank:** G4 S3 (alliance level)

#### **GLOBAL DISTRIBUTION**

Western United States from Alaska to California and New Mexico

## REFERENCES

Evens et al. 2004, Manning and Padgett 1995, NatureServe 2005, Smith 1998

### *Hordeum brachyantherum* Alliance

Stratum Herb	Code	Species Name	Con	Avg	Min	Max
	<b>HOB2</b>	<b><i>Hordeum brachyantherum</i></b>	<b>100</b>	<b>15.0</b>	<b>10</b>	<b>20</b>
	MEPO3	<i>Medicago polymorpha</i>	100	4.0	3	5
	TRFU	<i>Trifolium fucatum</i>	100	2.6	0.2	5
	RACA2	<i>Ranunculus californicus</i>	100	1.6	0.2	3
	JUNCU	<i>Juncus</i>	100	1.5	1.5	1.5
	LOWR2	<i>Lotus wrangelianus</i>	100	1.5	1	2
	SIBE	<i>Sisyrinchium bellum</i>	100	0.6	0.2	1
	CAREX	<i>Carex</i>	100	0.2	0.2	0.2
	HOLA	<i>Holcus lanatus</i>	50	6.0	12	12
	LOPE	<i>Lolium perenne</i>	50	6.0	12	12
	VUMY	<i>Vulpia myuros</i>	50	6.0	12	12
	DACA3	<i>Danthonia californica</i>	50	5.0	10	10
	FEID	<i>Festuca idahoensis</i>	50	4.0	8	8
	NAPU4	<i>Nassella pulchra</i>	50	3.0	6	6
	TRMI4	<i>Trifolium microcephalum</i>	50	2.0	4	4
	PLER3	<i>Plantago erecta</i>	50	1.5	3	3
	ERODI	<i>Erodium</i>	50	1.0	2	2
	GERAN	<i>Geranium</i>	50	1.0	2	2
	HESP9	<i>Hesperis matronalis</i>	50	1.0	2	2
	JUAR4	<i>Juncus articulatus</i>	50	1.0	2	2
	RUMEX	<i>Rumex</i>	50	0.6	1.2	1.2
	AVBA	<i>Avena barbata</i>	50	0.5	1	1
	HECO7	<i>Hemizonia congesta</i>	50	0.5	1	1
	SHAR2	<i>Sherardia arvensis</i>	50	0.5	1	1
	ASBR8	<i>Astragalus breweri</i>	50	0.3	0.5	0.5
	CACI2	<i>Calandrinia ciliata</i>	50	0.3	0.5	0.5
	LUBI	<i>Lupinus bicolor</i>	50	0.3	0.5	0.5
	PLNO	<i>Plagiobothrys nothofulvus</i>	50	0.3	0.5	0.5
	RAMU2	<i>Ranunculus muricatus</i>	50	0.3	0.5	0.5
	TRDE	<i>Trifolium depauperatum</i>	50	0.3	0.5	0.5
	TRPU16	<i>Triphysaria pusilla</i>	50	0.3	0.5	0.5
	LACA7	<i>Lasthenia californica</i>	50	0.1	0.2	0.2
	STPY	<i>Stachys pycnantha</i>	50	0.1	0.2	0.2
	ZIMI2	<i>Zigadenus micranthus</i>	50	0.1	0.2	0.2

### ***Iris douglasiana*-*Holcus lanatus* Association**

#### **Douglas Iris - Common Velvet Grass Association**

**Mapping Code: 4500**

#### **LOCAL VEGETATION DESCRIPTION**

One stand of *Iris douglasiana*-*Holcus lanatus* forms a dense herbaceous layer (77%) at 0-0.5m tall. The shrub and tree layers are absent or open (no values recorded). Total vegetation cover is 77%.

In one stand of this association, *Iris douglasiana* is dominant while non-natives such as *Holcus lanatus*, *Geranium dissectum*, or *Chlorogalum pomeridianum* may be present. The shrub layer is sparse and includes *Toxicodendron diversilobum*, while the tree layer is absent or sparse.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 134 ft.

Aspect: NE

Slope: gentle, 3 degrees

Topography: bottom, undulating

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: no data

Bare Ground: no data

Parent Material: Franciscan melange

Soil Texture: moderately fine silty clay loam

One stand of this association was sampled at Nicasio Reservoir, though stands are also found in the Mt Tamalpais Watershed on relatively flat terraces. Stands may be maintained by burning, in which *Iris douglasiana* can survive light to moderate fires and vigorously grow vegetatively.

#### **SITE IMPACTS**

The stand representing this association has moderate non-native plant cover (average 35.8%) relative to native cover. Non-native species that occur with the highest abundance include *Holcus lanatus*, *Geranium dissectum*, *Dipsacus sativus*, and *Carduus pycnocephalus*. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0089 **Releve(s):** none

**Rank:** G3?S3?

#### **GLOBAL DISTRIBUTION**

Northern Central Coast (only sampled in Mt. Tamalpais and observed in Point Reyes National Seashore) and has potential to occur beyond to the North Coast region into Oregon

#### **REFERENCES**

None

***Iris douglasiana*-*Holcus lanatus* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	TODI	<i>Toxicodendron diversilobum</i>	100	1.0	1	1
Herb						
	IRDO	<b><i>Iris douglasiana</i></b>	<b>100</b>	<b>40.0</b>	<b>40</b>	<b>40</b>
	HOLA	<b><i>Holcus lanatus</i></b>	<b>100</b>	<b>10.0</b>	<b>10</b>	<b>10</b>
	DISA9	<i>Dipsacus sativus</i>	100	7.0	7	7
	GEDI	<i>Geranium dissectum</i>	100	7.0	7	7
	CHPO3	<i>Chlorogalum pomeridianum</i>	100	6.0	6	6
	CAPY2	<i>Carduus pycnocephalus</i>	100	4.0	4	4
	JUEF	<i>Juncus effusus</i>	100	2.0	2	2
	CAPR5	<i>Carex praegracilis</i>	100	1.0	1	1
	SIBE	<i>Sisyrinchium bellum</i>	100	0.2	0.2	0.2

***Nassella pulchra* (Mixed herbaceous) Association**  
**Purple Needlegrass ((Mixed herbaceous) Association**

**Mapping Code: 4520**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Nassella pulchra* (Mixed herbaceous) form an intermittent herbaceous layer (55-65%, mean 60%) at 0-0.5m tall. The shrub layer is open (0-0.2%, mean 0.1%) and 0.5-1m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 55-65%, mean 60%.

In this association, *Nassella pulchra* is characteristically present and dominant or co-dominant with other herbs (at least 10% relative cover with all other species combined). A variety of other herbs occurs, with *Avena barbata*, *Hypochaeris glabra*, *Aira caryophyllea*, *Lolium perenne*, *Erodium botrys*, and *Achillea millefolium* most frequent and abundant. The shrub and tree layers are absent or sparse, including species such as *Baccharis pilularis*.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 155-651 ft., mean 385 ft.

Aspect: SE or flat

Slope: flat to somewhat steep, range 0-19 degrees, mean 11.3 degrees

Topography: lower to mid slope, undulating, linear or convex

Small Rock Cover: 1% (data from one plot)

Large Rock Cover: 0% (data from one plot)

Litter Cover: 85% (data from one plot)

Bare Ground: 10% (data from one plot)

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam, moderately fine silty clay loam, medium silt loam

Stands of this association were sampled in the Mt. Tamalpais Watershed, at Nicasio Reservoir, and at Soulajule Reservoir. Stands may be found in uplands on and off of serpentine soils that are relatively well-developed clay or silt loams. Soils may be relatively shallow.

**SITE IMPACTS**

This association has high non-native plant cover (average 52.6%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Avena barbata*, *Hypochaeris glabra*, *Aira caryophyllea*, and *Lolium perenne*. There are no additional site impacts.

**SENSITIVE SPECIES**

*Hemizonia congesta* was found in 1 of 5 surveys of this plant community. *H. congesta* subsp. *leucocephala* has the potential occur in the region in this habitat. CNPS ranks this subspecies as List 3 with R-E-D Code is ?-?-3. Global rank is G5T2T3, and State rank is S2S3. Federal and state listing is None. This subspecies may not occur where sampled; however, dried plants may be indistinguishable from subsp. *congesta*, and both the subspecies intergrade (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=3)**

**Rapid Assessment(s):** MMWD0004, MMWD0090, MMWD0376 **Releve(s):** none

**Rank:** G3 S3?

**GLOBAL DISTRIBUTION**

Central Coast, Southern California; though full distribution is not known

**REFERENCES**

CNPS 1995 (unpublished data), Ertter and Bowerman 2002, Evens and San 2005, Holland 1986, Keeler-Wolf and Evens 2006, Klein and Evens 2005, NatureServe et al. 2003a



***Nassella pulchra* (Mixed herbaceous) Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	BAPI	<i>Baccharis pilularis</i>	33	0.3	1	1
Herb						
	<b>NAPU4</b>	<b><i>Nassella pulchra</i></b>	<b>100</b>	<b>14.3</b>	<b>3</b>	<b>35</b>
	AVBA	<i>Avena barbata</i>	100	1.3	1	2
	HYGL2	<i>Hypochaeris glabra</i>	67	4.3	3	10
	AICA	<i>Aira caryophyllea</i>	67	3.7	0.2	11
	LOPE	<i>Lolium perenne</i>	67	3.4	0.2	10
	ERBO	<i>Erodium botrys</i>	67	3.3	3	7
	ACMI2	<i>Achillea millefolium</i>	67	1.1	0.2	3
	ANAR	<i>Anagallis arvensis</i>	67	0.4	0.2	1
	CHPO3	<i>Chlorogalum pomeridianum</i>	67	0.4	0.2	1
	ESCA2	<i>Eschscholzia californica</i>	67	0.4	0.2	1
	BRMI2	<i>Briza minor</i>	67	0.1	0.2	0.2
	JUNCU	<i>Juncus</i>	67	0.1	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	67	0.1	0.2	0.2
	PHGR16	<i>Phlox gracilis</i>	33	3.3	10	10
	PLLA	<i>Plantago lanceolata</i>	33	2.3	7	7
	BRMA	<i>Briza maxima</i>	33	2.0	6	6
	VIVI	<i>Vicia villosa</i>	33	1.7	5	5
	BRDI3	<i>Bromus diandrus</i>	33	1.3	4	4
	LUBI	<i>Lupinus bicolor</i>	33	1.3	4	4
	MAMA	<i>Madia madioides</i>	33	1.3	4	4
	AGGR	<i>Agoseris grandiflora</i>	33	1.0	3	3
	LUNA3	<i>Lupinus nanus</i>	33	1.0	3	3
	BRMA3	<i>Bromus madritensis</i>	33	0.7	2	2
	VUBR	<i>Vulpia bromoides</i>	33	0.7	2	2
	BRHO2	<i>Bromus hordeaceus</i>	33	0.3	1	1
	CYEC	<i>Cynosurus echinatus</i>	33	0.3	1	1
	FIGA	<i>Filago gallica</i>	33	0.3	1	1
	LIBI5	<i>Linum bienne</i>	33	0.3	1	1
	LOTUS	<i>Lotus</i>	33	0.3	1	1
	LOWR2	<i>Lotus wrangelianus</i>	33	0.3	1	1
	MEPO3	<i>Medicago polymorpha</i>	33	0.3	1	1
	PHAQ	<i>Phalaris aquatica</i>	33	0.3	1	1
	RUAC3	<i>Rumex acetosella</i>	33	0.3	1	1
	TRWI3	<i>Trifolium willdenovii</i>	33	0.3	1	1
	VISA	<i>Vicia sativa</i>	33	0.3	1	1
	BETR	<i>Bellardia trixago</i>	33	0.1	0.2	0.2
	BRDI2	<i>Brachypodium distachyon</i>	33	0.1	0.2	0.2
	CACI2	<i>Calandrinia ciliata</i>	33	0.1	0.2	0.2
	CADE29	<i>Castilleja densiflora</i>	33	0.1	0.2	0.2
	HECO7	<i>Hemizonia congesta</i>	33	0.1	0.2	0.2
	JUOC2	<i>Juncus occidentalis</i>	33	0.1	0.2	0.2
	KOMA	<i>Koeleria macrantha</i>	33	0.1	0.2	0.2
	LIAN	<i>Linanthus androsaceus</i>	33	0.1	0.2	0.2
	LOHU2	<i>Lotus humistratus</i>	33	0.1	0.2	0.2
	MAEX	<i>Madia exigua</i>	33	0.1	0.2	0.2

***Nassella pulchra*-*Melica californica*-Annual Grass Association**  
**Purple Needlegrass - California Melic Grass - Annual Grass Association**

**Mapping Code: 4520**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Nassella pulchra*-*Melica californica*-Annual Grass form an intermittent to dense herbaceous layer (62-80%, mean 68.3%) at 0-0.5m tall. The shrub layer is open (0-3%, mean 0.4%) and 0.5-1m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 65-80%, mean 68.7%.

In this association, *Nassella pulchra* and *Melica californica* are characteristically present usually as co-dominants alone or with annual grass species. *Bromus hordeaceus*, *Avena barbata*, *Bromus diandrus*, and *Aira caryophylla* are most frequent and abundant. Native forbs may be diverse, including *Eschscholzia californica*. The shrub and tree layers are absent or sparse.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 368-1155 ft., mean 808 ft.

Aspect: often NE or NW, sometimes SE or flat

Slope: flat to steep, range 0-27 degrees, mean 16.6 degrees

Topography: lower slope to ridge top, usually linear or undulating

Small Rock Cover: 3% (data from one plot)

Large Rock Cover: 0.2% (data from one plot)

Litter Cover: 52% (data from one plot)

Bare Ground: 41% (data from one plot)

Parent Material: Franciscan melange

Soil Texture: medium to very fine sandy loam, medium loam, moderately fine clay loam, moderately fine silty clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed and at Soulajule Reservoir. They were sampled in gentle to steep-sloped uplands off of serpentine on loamy soils, especially clay loams. Stands are commonly adjacent to other grasslands and *Baccharis pilularis* scrub.

**SITE IMPACTS**

This association has high non-native plant cover (average 65.5%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Bromus hordeaceus*, *Avena barbata*, *Carduus pycnocephalus*, and *Bromus diandrus*. Additional site impacts include light erosion/runoff in one stand and heavy grazing in one stand.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=7)**

**Rapid Assessment(s):** MMWD0007, MMWD0018, MMWD0028, MMWD0030, MMWD0031, MMWD0046, MMWD0378 **Releve(s):** none

**Rank:** G3 S3

**GLOBAL DISTRIBUTION**

Outer Central Coast (including Golden Gate NRA, Mt. Tamalpais, and Soulajule Reservoir) though full distribution is not known

**REFERENCES**

NatureServe et al. 2003a

***Nassella pulchra*-*Melica californica*-Annual grass Association**

Stratum Herb	Code	Species Name	Con	Avg	Min	Max
	<b>NAPU4</b>	<b><i>Nassella pulchra</i></b>	<b>100</b>	<b>4.7</b>	<b>1</b>	<b>7</b>
	<b>MECA2</b>	<b><i>Melica californica</i></b>	<b>100</b>	<b>4.3</b>	<b>1</b>	<b>10</b>
	BRHO2	<i>Bromus hordeaceus</i>	86	15.0	10	27
	AVBA	<i>Avena barbata</i>	71	5.4	1	15
	CAPY2	<i>Carduus pycnocephalus</i>	71	1.4	1	5
	BRDI3	<i>Bromus diandrus</i>	57	5.1	5	18
	ESCA2	<i>Eschscholzia californica</i>	57	0.8	0.2	4
	AICA	<i>Aira caryophylla</i>	57	0.6	0.2	2
	LUBI	<i>Lupinus bicolor</i>	57	0.1	0.2	0.2
	TRDE	<i>Trifolium depauperatum</i>	43	0.1	0.2	0.5
	BRMA	<i>Briza maxima</i>	29	3.5	0.2	24
	HYGL2	<i>Hypochaeris glabra</i>	29	2.9	0.2	20
	TRBA	<i>Trifolium barbigerum</i>	29	1.3	2	7
	FEID	<i>Festuca idahoensis</i>	29	0.7	0.2	5
	ERBO	<i>Erodium botrys</i>	29	0.5	0.2	3
	CHPO3	<i>Chlorogalum pomeridianum</i>	29	0.3	0.2	2
	LOPE	<i>Lolium perenne</i>	29	0.3	1	1
	MAGR3	<i>Madia gracilis</i>	29	0.3	1	1
	PLNO	<i>Plagiobothrys nothofulvus</i>	29	0.3	1	1
	ACMI2	<i>Achillea millefolium</i>	29	0.2	0.2	1
	ELGL	<i>Elymus glaucus</i>	29	0.2	0.2	1
	SABI3	<i>Sanicula bipinnatifida</i>	29	0.2	0.2	1
	TRBI	<i>Trifolium bifidum</i>	29	0.2	0.2	1
	VUMI	<i>Vulpia microstachys</i>	29	0.2	0.2	1
	ANAR	<i>Anagallis arvensis</i>	29	0.1	0.2	0.5
	SIMA2	<i>Sidalcea malviflora</i>	29	0.1	0.2	0.5
	AMME	<i>Amsinckia menziesii</i>	29	0.1	0.2	0.2
	DAPU3	<i>Daucus pusillus</i>	29	0.1	0.2	0.2
	RACA2	<i>Ranunculus californicus</i>	29	0.1	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	29	0.1	0.2	0.2
	STAJ	<i>Stachys ajugoides</i>	29	0.1	0.2	0.2
	TRPU16	<i>Triphysaria pusilla</i>	29	0.1	0.2	0.2

***Phalaris aquatica* Alliance**  
**Harding Grass Alliance**

**Mapping Code: 4410**

**LOCAL VEGETATION DESCRIPTION**

One stand of *Phalaris aquatica* Alliance forms an intermittent herbaceous layer (66%) at 0.5-1m tall. The shrub layer is open (0.2%) and 0-0.5m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 67%.

In one stand of this alliance, *Phalaris aquatica* dominates the herbaceous layer alone or co-dominates with other non-native species such as *Briza maxima* and *Avena barbata* at moderate to dense cover. Native species may be present at trace cover, including *Calochortus luteus* and *Chlorogalum pomeridianum*. The shrub and tree layers are absent or sparse, including *Baccharis pilularis*.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 360 ft.

Aspect: NW

Slope: moderate, 12 degrees

Topography: lower slope, convex

Small Rock Cover: 1%

Large Rock Cover: 0.2%

Litter Cover: 85%

Bare Ground: 10%

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam

One stand of this association was sampled at Soulajule Reservoir. This stand is just above Soulajule dam, in disturbed grassland adjacent to other annual grasslands and *Baccharis pilularis* scrub.

**SITE IMPACTS**

The stand representing this association has high non-native plant cover (average 98.3%) relative to native cover. Non-native species that occur with the highest abundance include *Phalaris aquatica*, *Briza maxima*, *Avena barbata*, and *Brachypodium distachyon*. There are no additional site impacts.

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0374 **Releve(s):** none

**Rank:** Not applicable, stands are considered exotic.

**GLOBAL DISTRIBUTION**

North Coast, Central Coast, Central Valley; though full distribution is not known

**REFERENCES**

CDFG 2000, Evens and San 2004, Jimerson et al. 2000

***Phalaris aquatica* Alliance**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	BAPI	<i>Baccharis pilularis</i>	100	0.2	0.2	0.2
Herb						
	<b>PHAQ</b>	<b><i>Phalaris aquatica</i></b>	<b>100</b>	<b>30.0</b>	<b>30</b>	<b>30</b>
	BRMA	<i>Briza maxima</i>	100	24.0	24	24
	AVBA	<i>Avena barbata</i>	100	7.0	7	7
	BRDI2	<i>Brachypodium distachyon</i>	100	4.0	4	4
	CYEC	<i>Cynosurus echinatus</i>	100	1.0	1	1
	PLLA	<i>Plantago lanceolata</i>	100	1.0	1	1
	RUCR	<i>Rumex crispus</i>	100	1.0	1	1
	BRMI2	<i>Briza minor</i>	100	0.2	0.2	0.2
	CALU9	<i>Calochortus luteus</i>	100	0.2	0.2	0.2
	CAPY2	<i>Carduus pycnocephalus</i>	100	0.2	0.2	0.2
	CHPO3	<i>Chlorogalum pomeridianum</i>	100	0.2	0.2	0.2
	ERCI6	<i>Erodium cicutarium</i>	100	0.2	0.2	0.2
	FIGA	<i>Filago gallica</i>	100	0.2	0.2	0.2
	GEDI	<i>Geranium dissectum</i>	100	0.2	0.2	0.2
	UNKN	<i>irreconcilable unknown</i>	100	0.2	0.2	0.2
	LUPIN	<i>Lupinus</i>	100	0.2	0.2	0.2
	PHGR16	<i>Phlox gracilis</i>	100	0.2	0.2	0.2
	SOAS	<i>Sonchus asper</i>	100	0.2	0.2	0.2
	VIVI	<i>Vicia villosa</i>	100	0.2	0.2	0.2

***Thermopsis californica*- *Bromus carinatus*-Annual Brome Association**  
**California Brome - California Goldenbanner - Annual Brome Association**  
**Mapping Code: 4313**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Thermopsis californica*-*Bromus carinatus*-Annual Brome form an intermittent to dense herbaceous layer (65-80%, mean 72%) at 0-0.5m tall. The shrub layer is open (0-2%, mean 0.6%) at 0-1m tall. The tree layer is absent (no values recorded). Total vegetation cover is 65-80%, mean 72.5%. In this association, *Bromus carinatus* and *Thermopsis californica* are characteristically present in the herbaceous layer, and either or both are dominant. In some situations, *Pteridium aquilinum* may be the dominant forb with *Bromus carinatus*. Also, annual bromes (*Bromus hordeaceus* and/or *B. diandrus*) are also characteristic as sub-dominant or co-dominant species. The shrub layer is sparse, often with *Toxicodendron diversilobum* layer. The tree layer is absent or sparse.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 849-1553 ft., mean 1228 ft.

Aspect: NE or NW

Slope: moderate to steep, range 14-34 degrees, mean 21.8 degrees

Topography: usually upper slope, sometimes lower slope, usually undulating, sometimes linear

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: no data

Bare Ground: no data

Parent Material: Franciscan melange

Soil Texture: medium to very fine sandy loam or moderately fine clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. They occur in forest openings and in open grassland settings, including areas with recent disturbance (e.g., clearing for road/trail maintenance). *Thermopsis californica* is recognized as *Thermopsis macrophylla* in some treatments (e.g., UCB 2004).

**SITE IMPACTS**

This association has moderate non-native plant cover (average 40.1%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Bromus hordeaceus*, *Avena barbata*, *Bromus diandrus*, and *Vulpia myuros*. There are no additional site impacts.

**SENSITIVE SPECIES**

*Linanthus grandiflorus* was found in 1 of 4 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-2-3. Global rank is G3, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=4)**

**Rapid Assessment(s):** MMWD0033, MMWD0035, MMWD0048, MMWD0101 **Releve(s):** none

**Rank:** G3 S3

**GLOBAL DISTRIBUTION**

Northern Central Coast (including Mt. Tamalpais and Ring Mountain) and possibly North Coast; though full distribution is not known

**REFERENCES**

None

***Thermopsis californica*-*Bromus carinatus*-Annual Brome Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	TODI	<i>Toxicodendron diversilobum</i>	50	0.6	0.2	2
	MIAU	<i>Mimulus aurantiacus</i>	25	0.1	0.2	0.2
Herb						
	<b>THCA4</b>	<b><i>Thermopsis californica</i></b>	<b>100</b>	<b>23.0</b>	<b>0.2</b>	<b>60</b>
	<b>BRHO2</b>	<b><i>Bromus hordeaceus</i></b>	<b>100</b>	<b>12.3</b>	<b>2</b>	<b>30</b>
	<b>BRCA5</b>	<b><i>Bromus carinatus</i></b>	<b>100</b>	<b>3.8</b>	<b>0.2</b>	<b>8</b>
	ACMI2	<i>Achillea millefolium</i>	100	0.4	0.2	1
	AVBA	<i>Avena barbata</i>	75	3.8	1	9
	BRDI3	<i>Bromus diandrus</i>	75	2.8	0.2	9
	VUMY	<i>Vulpia myuros</i>	75	1.8	0.2	5
	LOPE	<i>Lolium perenne</i>	50	3.0	4	8
	FEID	<i>Festuca idahoensis</i>	50	2.5	0.2	10
	TRWI3	<i>Trifolium willdenovii</i>	50	0.8	0.2	3
	HYGL2	<i>Hypochaeris glabra</i>	50	0.6	0.2	2
	AMME	<i>Amsinckia menziesii</i>	50	0.3	0.2	1
	CLPE	<i>Claytonia perfoliata</i>	50	0.3	0.2	1
	CYEC	<i>Cynosurus echinatus</i>	50	0.3	0.2	1
	STAJ	<i>Stachys ajugoides</i>	50	0.3	0.2	1
	CASU19	<i>Calystegia subacaulis</i>	50	0.1	0.2	0.2
	MECA2	<i>Melica californica</i>	50	0.1	0.2	0.2
	SADO5	<i>Satureja douglasii</i>	50	0.1	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	50	0.1	0.2	0.2
	PTAQ	<i>Pteridium aquilinum</i>	25	5.0	20	20
	CAPY2	<i>Carduus pycnocephalus</i>	25	2.0	8	8
	BRMA	<i>Briza maxima</i>	25	0.8	3	3
	PLER3	<i>Plantago erecta</i>	25	0.8	3	3
	MAEX	<i>Madia exigua</i>	25	0.5	2	2
	AICA	<i>Aira caryophyllea</i>	25	0.3	1	1
	GAAP2	<i>Galium aparine</i>	25	0.3	1	1
	GED1	<i>Geranium dissectum</i>	25	0.3	1	1
	RACA2	<i>Ranunculus californicus</i>	25	0.3	1	1
	ANAR	<i>Anagallis arvensis</i>	25	0.1	0.2	0.2
	CACA39	<i>Cardamine californica</i>	25	0.1	0.2	0.2
	CASE2	<i>Carex serratodens</i>	25	0.1	0.2	0.2
	CYGR	<i>Cynoglossum grande</i>	25	0.1	0.2	0.2
	DELPH	<i>Delphinium</i>	25	0.1	0.2	0.2
	DICA14	<i>Dichelostemma capitatum</i>	25	0.1	0.2	0.2
	DICO19	<i>Dichelostemma congestum</i>	25	0.1	0.2	0.2
	ELGL	<i>Elymus glaucus</i>	25	0.1	0.2	0.2
	ESCA2	<i>Eschscholzia californica</i>	25	0.1	0.2	0.2
	KOMA	<i>Koeleria macrantha</i>	25	0.1	0.2	0.2
	LINAN2	<i>Linanthus</i>	25	0.1	0.2	0.2
	MAFA3	<i>Marah fabaceus</i>	25	0.1	0.2	0.2
	MAOR3	<i>Marah oreganus</i>	25	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	25	0.1	0.2	0.2
	POSE	<i>Poa secunda</i>	25	0.1	0.2	0.2
	TRAL5	<i>Trifolium albopurpureum</i>	25	0.1	0.2	0.2
	TRMI5	<i>Trifolium microdon</i>	25	0.1	0.2	0.2

### ***Scirpus microcarpus* Alliance or Habitat**

This alliance is classified at the alliance level with one stand sampled. The alliance usually occurs in gently sloping basins, wetlands, and flats with saturated soils (i.e., freshwater marshes), either adjacent to permanent or temporary ponds or adjacent to springs and seeps.

### ***Scirpus microcarpus* Alliance Panicked Bullrush Alliance**

**Mapping Code: 4210**

#### **LOCAL VEGETATION DESCRIPTION**

One Stand of *Scirpus microcarpus* Alliance forms a dense herbaceous layer (75%) at 1-2m tall. The shrub layer is absent or open (no values recorded). The tree layer is absent or open (no values recorded). Total vegetation cover is 75%.

In this alliance, *Scirpus microcarpus* characterizes the herbaceous layer as a dominant or co-dominant species. In one stand sampled, *S. microcarpus* is co-dominant with *Thalictrum fendleri* var. *polycarpum*, and other graminoids including *Carex amplifolia*, *C. subfusca*, and *Juncus* sp. occur at low cover. The shrub and tree layers are sparse, and may include wetland species such as *Rosa californica*, *Rubus ursinus*, or *Salix laevigata* at low cover.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 2067 ft.

Aspect: SW

Slope: gentle, 3 degrees

Topography: upper slope, undulating

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: Range no data

Bare Ground: Range no data

Parent Material: Franciscan melange

Soil Texture: medium silt

One small stand of this association was sampled in the Mt. Tamalpais Watershed. It occurs in Potrero Meadow in a gently sloping, wetland setting with saturated soils, in which *Pseudotsuga menziesii* has been encroaching. Other stands in Marin County have been found adjacent to permanent or temporary ponds or adjacent to springs and seeps (NatureServe et al. 2003a).

#### **SITE IMPACTS**

This association has low non-native plant cover (average 1.6%) relative to native cover. Non-native species with the highest abundance include *Galium aparine* and *Cirsium vulgare*. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0058 **Releve(s):** none.

**Rank:** G3 S3 (alliance level)

#### **GLOBAL DISTRIBUTION**

Northern Central Coast (including Marin County) and north in Oregon (all regions except Columbia Basin); though full distribution is not known



## REFERENCES

Kagan et al. 2004, NatureServe et al. 2003a

### *Scirpus microcarpus* Alliance

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub	RUUR	<i>Rubus ursinus</i>	100	2.0	2	2
	ROCA2	<i>Rosa californica</i>	100	1.0	1	1
Herb	THFEP2	<i>Thalictrum fendleri</i> var. <i>polycarpum</i>	100	27.0	27	27
	<b>SCMI2</b>	<b><i>Scirpus microcarpus</i></b>	<b>100</b>	<b>23.0</b>	<b>23</b>	<b>23</b>
	CAREX	<i>Carex amplifolia</i>	100	5.0	5	5
	CASU6	<i>Carex subfusca</i>	100	5.0	5	5
	JUAR4	<i>Juncus articulatus</i>	100	5.0	5	5
	EQUIS	<i>Equisetum</i>	100	2.0	2	2
	LIPAP2	<i>Lilium pardalinum</i> subsp. <i>pardalinum</i>	100	1.0	1	1
	MAGR3	<i>Madia gracilis</i>	100	1.0	1	1
	POACXX	<i>Poaceae</i>	100	1.0	1	1
	CAOL	<i>Cardamine oligosperma</i>	100	0.2	0.2	0.2
	CIVU	<i>Cirsium vulgare</i>	100	0.2	0.2	0.2
	GAAP2	<i>Galium aparine</i>	100	0.2	0.2	0.2
	THCA4	<i>Thermopsis californica</i>	100	0.2	0.2	0.2

## Serpentine Bald Alliance or Habitat

This habitat is represented by one association that occurs on extremely rocky, highly serpentinized soils. While the habitat contains a sparse shrub overstory and low herb understory, a diversity of native herbs occurs, including rare species and serpentine-endemic species.

### *Quercus durata*/*Allium falcifolium*-*Streptanthus batrachopus* Association

#### Leather Oak / Scythe-leaf Onion - Mt. Tamalpais Jewelflower Association

**Mapping Code: 9401**

#### LOCAL VEGETATION DESCRIPTION

Stands of *Quercus durata*/*Allium falcifolium*-*Streptanthus batrachopus* form an open herbaceous layer (6-7%, mean 6.5%) at 0-0.5m tall. The shrub layer is open (2-5%, mean 3.5%) and 0-0.5m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 10-11%, mean 10.5%.

In this association, *Quercus durata* has sparse cover in the shrub layer while other shrubs also may be present at trace cover such as *Adenostoma fasciculatum*. The herbaceous layer is sparse and characteristically includes *Allium falcifolium*, *Streptanthus batrachopus*, *Claytonia exigua*, *Eriogonum luteolum* var. *caninum*, and *Melica torreyana*. The tree layer is absent or sparse.

#### LOCAL ENVIRONMENTAL DESCRIPTION

Elevation: Range 1763-2266 ft., mean 2015 ft.

Aspect: SW, NW

Slope: somewhat steep, range 20-26 degrees, mean 23 degrees

Topography: mid slope, undulating

Small Rock Cover: Range 70-75%, mean 72.5%

Large Rock Cover: Range 12.2-28%, mean 20.1%

Litter Cover: Range 0.2-1%, mean 0.6%

Bare Ground: Range 5-10%, mean 7.5%

Parent Material: Serpentine

Soil Texture: coarse loamy sand

Stands of this association are found in serpentine barrens/rock outcrops in the Mt. Tamalpais Watershed, where raw serpentine is exposed and little soil is developed. Stands can be small in size (e.g., a few square meters) to much larger in size (e.g., 1-5 acres).

#### SITE IMPACTS

This association has low non-native plant cover (average 10.6%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Bromus diandrus*, *Avena barbata*, and *Bromus hordeaceus*. There are no additional site impacts.

#### SENSITIVE SPECIES

*Arctostaphylos hookeri* subsp. *montana* was found in 1 of 2 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 3-1-3. Global rank is G3T2, and State rank is S2.2. Federal and state listing is None (CNPS 2005).

*Eriogonum luteolum* var. *caninum* was found in 2 of 2 surveys of this plant community. CNPS ranks this species as List 3 with R-E-D Code is ?-2-3. Global rank is G5T3Q, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

*Streptanthus batrachopus* was found in 2 of 2 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 3-1-3. Global rank is G1, and State rank is S1.2. Federal and state listing is None (CNPS 2005).

**Rapid Assessment(s):** **Releve(s):** MMWD0052, MMWD0054

## GLOBAL DISTRIBUTION

## REFERENCES

***Quercus durata*/*Allium falcifolium*-*Streptanthus batrachopus* Association**

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## **Serpentine Grassland Alliance or Habitat**

This habitat is represented by a diverse assemblage of forb and grass dominated stands. Three different alliances are included with this habitat, including the perennial grass alliances of *Melica torreyana* and *Nassella pulchra* and the annual forb alliance of *Plantago erecta*.

### ***Melica torreyana* Alliance (Serpentine)**

#### **Torrey's Melic Grass Alliance (Serpentine)**

**Mapping Code: 4610mu**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Melica torreyana* Alliance (Serpentine) form an open herbaceous layer (25-30%, mean 27.5%) at 0-0.5m tall. The shrub layer is open (1-3%, mean 2%) and 0.5-1m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 25-30%, mean 27.5%.

In this alliance, *Melica torreyana* characterizes the herbaceous layer, and it has at least 10% relative cover with all other species combined. Non-native grasses may be abundant, including *Avena barbata* and *Bromus hordeaceus*. Many native herbs often occur at sparse cover in the stands, including *Daucus pusillus*, *Lotus wrangelianus*, *Nassella pulchra* and *Streptanthus glandulosus*. The shrub layer is sparse in cover and may include *Adenostoma fasciculatum*, *Eriodictyon californicum*, *Heteromeles arbutifolia*, etc. The tree layer is absent or sparse.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 1317-1401 ft., mean 1359 ft.

Aspect: SW

Slope: steep, range 28-40 degrees, mean 34 degrees

Topography: mid to upper slope, convex or undulating

Small Rock Cover: Range 48-70%, mean 59%

Large Rock Cover: Range 3.2-33%, mean 18.1%

Litter Cover: Range 1-1%, mean 1%

Bare Ground: Range 17-25%, mean 21%

Parent Material: Franciscan melange, serpentine

Soil Texture: moderately fine sandy clay loam, coarse loamy sand

Stands of this association were sampled in the Mt. Tamalpais Watershed. Stands are found on rocky, steep slopes with thin soils adjacent to serpentine balds, in which grasslands of variable size (less than to more than one acre) have developed with native species including *Melica torreyana*.

#### **SITE IMPACTS**

This association has moderate non-native plant cover (average 29%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Avena barbata*, *Bromus hordeaceus*, *Anagallis arvensis*, *Aira caryophyllaea*. There are no additional site impacts.

#### **SENSITIVE SPECIES**

*Arctostaphylos hookeri* subsp. *montana* was found in 1 of 2 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 3-1-3. Global rank is G3T2, and State rank is S2.2. Federal and state listing is None (CNPS 2005).

*Eriogonum luteolum* var. *caninum* was found in 1 of 2 surveys of this plant community. CNPS ranks this species as List 3 with R-E-D Code is ?-2-3. Global rank is G5T3Q, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

*Streptanthus glandulosus* subsp. *pulchellus* was found in 1 of 2 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 3-2-3. Global rank is G4T1, and State rank is S1.2. Federal and state listing is None (CNPS 2005). *Streptanthus glandulosus* was found in the other survey which could be *S. glandulosus* subsp. *pulchellus* or *S. glandulosus* subsp. *secundus*.

**SAMPLES USED TO DESCRIBE ASSOCIATION** (n=2)

**Rapid Assessment(s):** **Releve(s):** MMWD0041, MMWD0077

**Rank:** G3 S3 (alliance level)

**GLOBAL DISTRIBUTION**

Central Coast (including San Francisco Bay area) and possibly North Coast on serpentine; though full distribution is not known

**REFERENCES**

Evens and San 2004, Feidler and Leidy 1987, Kruckeberg 1984

**Melica torreyana Alliance (Serpentine)**

Stratum	Code	Species Name	Con	Avg	Min	Max
Shrub						
	ADFA	<i>Adenostoma fasciculatum</i>	100	1.6	0.2	3
	ERCA6	<i>Eriodictyon californicum</i>	100	1.1	0.2	2
	HEAR5	<i>Heteromeles arbutifolia</i>	100	0.2	0.2	0.2
	PIMO5	<i>Pickeringia montana</i>	50	1.5	3	3
	ARHOM	<i>Arctostaphylos hookeri</i> subsp. <i>montana</i>	50	0.1	0.2	0.2
	ERCO25	<i>Eriophyllum confertiflorum</i>	50	0.1	0.2	0.2
Herb						
	<b>METO</b>	<b>Melica torreyana</b>	<b>100</b>	<b>2.5</b>	<b>2</b>	<b>3</b>
	AVBA	<i>Avena barbata</i>	100	2.0	1	3
	DAPU3	<i>Daucus pusillus</i>	100	0.2	0.2	0.2
	LOHU2	<i>Lotus humistratus</i>	100	0.2	0.2	0.2
	LOWR2	<i>Lotus wrangelianus</i>	100	0.2	0.2	0.2
	NAPU4	<i>Nassella pulchra</i>	100	0.2	0.2	0.2
	STGL8	<i>Streptanthus glandulosus</i>	100	0.2	0.2	0.2
	BRHO2	<i>Bromus hordeaceus</i>	50	5.0	10	10
	MINUA	<i>Minuartia</i>	50	2.5	5	5
	ALFA3	<i>Allium falcifolium</i>	50	0.5	1	1
	CAMU3	<i>Calycadenia multiglandulosa</i>	50	0.5	1	1
	ESCA2	<i>Eschscholzia californica</i>	50	0.5	1	1
	FICA2	<i>Filago californica</i>	50	0.5	1	1
	PLER3	<i>Plantago erecta</i>	50	0.5	1	1
	ACMI2	<i>Achillea millefolium</i>	50	0.1	0.2	0.2
	ACMO2	<i>Achyrrachaena mollis</i>	50	0.1	0.2	0.2
	AGGR	<i>Agoseris grandiflora</i>	50	0.1	0.2	0.2
	AICA	<i>Aira caryophyllea</i>	50	0.1	0.2	0.2
	ANAR	<i>Anagallis arvensis</i>	50	0.1	0.2	0.2
	ASDE6	<i>Aspidotis densa</i>	50	0.1	0.2	0.2
	CALYS	<i>Calystegia</i>	50	0.1	0.2	0.2
	CHPO3	<i>Chlorogalum pomeridianum</i>	50	0.1	0.2	0.2
	CHPO4	<i>Chorizanthe polygonoides</i>	50	0.1	0.2	0.2
	CIOC	<i>Cirsium occidentale</i>	50	0.1	0.2	0.2
	CLGR	<i>Clarkia gracilis</i>	50	0.1	0.2	0.2
	CLEX2	<i>Claytonia exigua</i>	50	0.1	0.2	0.2
	EPMI	<i>Epilobium minutum</i>	50	0.1	0.2	0.2
	ERLUC	<i>Eriogonum luteolum</i> var. <i>caninum</i>	50	0.1	0.2	0.2
	HESP9	<i>Hesperervax sparsiflora</i>	50	0.1	0.2	0.2
	KOMA	<i>Koeleria macrantha</i>	50	0.1	0.2	0.2
	LIPA12	<i>Linanthus parviflorus</i>	50	0.1	0.2	0.2
	LOMAT	<i>Lomatium</i>	50	0.1	0.2	0.2
	NAVAR	<i>Navarretia</i>	50	0.1	0.2	0.2
	POSE	<i>Poa secunda</i>	50	0.1	0.2	0.2
	SIGA	<i>Silene gallica</i>	50	0.1	0.2	0.2
	VUMI	<i>Vulpia microstachys</i>	50	0.1	0.2	0.2

***Nassella pulchra*-*Lolium multiflorum*-*Trifolium* spp. Association**  
**Purple Needlegrass - Italian Ryegrass - Clover Association**

**Mapping Code:** 4610mu

**LOCAL VEGETATION DESCRIPTION**

Stands of *Nassella pulchra*-*Lolium multiflorum*-*Trifolium* spp. form an intermittent herbaceous layer (50-55%, mean 52.5%) at 0-0.5m tall. The shrub and tree layers are absent or open (no values recorded). Total vegetation cover is 50-55%, mean 52.5%.

In this association, *Nassella pulchra*, *Lolium perenne* (= *L. multiflorum*), *Bromus hordeaceus* and *Avena barbata* are characteristically present and most dominant. A variety of native forb species also occur, including *Trifolium barbigerum*, *T. bifidum*, *T. depauperatum*, *T. fucatum*, *T. macraei*, *T. wildenovii*, etc. Other herbs often present are *Plantago erecta*, *Hypochaeris glabra*, *Filago gallica*, and *Lotus micranthus*. The shrub and tree layers are absent or sparse.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 1106-1113 ft., mean 1110 ft.

Aspect: SE, NW

Slope: moderate to somewhat steep, range 10-16 degrees, mean 13 degrees

Topography: mid slope, undulating or concave

Small Rock Cover: 2% (data from one plot)

Large Rock Cover: 1% (data from one plot)

Litter Cover: 2% (data from one plot)

Bare Ground: 92% (data from one plot)

Parent Material: Serpentine

Soil Texture: moderately coarse sandy loam, medium to very fine sandy loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. They are found on mesic, often neutral slopes with loamy soils on serpentine with a variety of native species including *Nassella pulchra*.

**SITE IMPACTS**

This association has high non-native plant cover (average 71.4%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Bromus hordeaceus*, *Lolium perenne*, *Avena barbata*, and *Hypochaeris glabra*. There are no additional site impacts.

**SENSITIVE SPECIES**

*Calamagrostis ophitidis* was found in 1 of 2 surveys of this plant community. MMWD regionally considers this species as Rare. CNPS ranks this species as List 4 with R-E-D Code is 1-1-3. Global rank is G3, and State rank is S3.3. Federal and state listing is None (CNPS 2005).

*Linanthus acicularis* was found in 1 of 2 surveys of this plant community. MMWD regionally considers this species as Rare. CNPS ranks this species as List 4 with R-E-D Code is 1-2-3. Global rank is G3, and State rank is S3.2. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** **Releve(s):** MMWD0020, MMWD0027

**Rank:** G3 S3?

**GLOBAL DISTRIBUTION**

Central Coast (including San Francisco Bay area); though full distribution is not known

**REFERENCES**

Evens and San 2004, Fiedler and Leidy 1987, Shuford and Timossi 1989

***Nassella pulchra*-*Lolium multiflorum*-*Trifolium* spp. Association**

Stratum Herb	Code	Species Name	Con	Avg	Min	Max
	BRHO2	<i>Bromus hordeaceus</i>	100	15.0	10	20
	<b>NAPU4</b>	<b><i>Nassella pulchra</i></b>	<b>100</b>	<b>3.5</b>	<b>2</b>	<b>5</b>
	AVBA	<i>Avena barbata</i>	100	1.6	0.2	3
	HYGL2	<i>Hypochaeris glabra</i>	100	1.6	0.2	3
	<b>LOPE</b>	<b><i>Lolium perenne</i></b>	<b>100</b>	<b>1.6</b>	<b>0.2</b>	<b>3</b>
	PLER3	<i>Plantago erecta</i>	100	1.6	0.2	3
	FIGA	<i>Filago gallica</i>	100	1.1	0.2	2
	LOMI	<i>Lotus micranthus</i>	100	1.1	0.2	2
	AICA	<i>Aira caryophyllea</i>	100	0.6	0.2	1
	VUMI	<i>Vulpia microstachys</i>	100	0.6	0.2	1
	ANAR	<i>Anagallis arvensis</i>	100	0.2	0.2	0.2
	GAAP2	<i>Galium aparine</i>	100	0.2	0.2	0.2
	GERAN	<i>Geranium</i>	100	0.2	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	100	0.2	0.2	0.2
	<b>TRBA</b>	<b><i>Trifolium barbigerum</i></b>	<b>100</b>	<b>0.2</b>	<b>0.2</b>	<b>0.2</b>
	BRDI3	<i>Bromus diandrus</i>	50	5.0	10	10
	ERODI	<i>Erodium</i>	50	3.5	7	7
	DAPU3	<i>Daucus pusillus</i>	50	1.0	2	2
	CASTI2	<i>Castilleja</i>	50	0.5	1	1
	SABI3	<i>Sanicula bipinnatifida</i>	50	0.5	1	1
	AGHE2	<i>Agoseris heterophylla</i>	50	0.1	0.2	0.2
	CAOP2	<i>Calamagrostis ophitidis</i>	50	0.1	0.2	0.2
	CACO35	<i>Calystegia collina</i>	50	0.1	0.2	0.2
	CHPO3	<i>Chlorogalum pomeridianum</i>	50	0.1	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	50	0.1	0.2	0.2
	ELEL5	<i>Elymus elymoides</i>	50	0.1	0.2	0.2
	EPMI	<i>Epilobium minutum</i>	50	0.1	0.2	0.2
	ERNU3	<i>Eriogonum nudum</i>	50	0.1	0.2	0.2
	ESCA2	<i>Eschscholzia californica</i>	50	0.1	0.2	0.2
	FICA2	<i>Filago californica</i>	50	0.1	0.2	0.2
	HESP9	<i>Hesperis matronalis</i>	50	0.1	0.2	0.2
	IRIS	<i>Iris</i>	50	0.1	0.2	0.2
	LINAN2	<i>Linanthus</i>	50	0.1	0.2	0.2
	LIPA12	<i>Linanthus parviflorus</i>	50	0.1	0.2	0.2
	LOMAT	<i>Lomatium</i>	50	0.1	0.2	0.2
	LOHU2	<i>Lotus humistratus</i>	50	0.1	0.2	0.2
	LOPU3	<i>Lotus purshianus</i>	50	0.1	0.2	0.2
	LOWR2	<i>Lotus wrangelianus</i>	50	0.1	0.2	0.2
	LUBI	<i>Lupinus bicolor</i>	50	0.1	0.2	0.2



***Nassella pulchra*-*Lolium multiflorum*-*Trifolium* spp. Association**

<b>Stratum</b>	<b>Code</b>	<b>Species Name</b>	<b>Con</b>	<b>Avg</b>	<b>Min</b>	<b>Max</b>
	MECA2	<i>Melica californica</i>	50	0.1	0.2	0.2
	PLNO	<i>Plagiobothrys nothofulvus</i>	50	0.1	0.2	0.2
	RACA2	<i>Ranunculus californicus</i>	50	0.1	0.2	0.2
	SABI2	<i>Sanicula bipinnata</i>	50	0.1	0.2	0.2
	SCPE	<i>Scandix pecten-veneris</i>	50	0.1	0.2	0.2
	SIMA2	<i>Sidalcea malviflora</i>	50	0.1	0.2	0.2
	<b>TRBI</b>	<b><i>Trifolium bifidum</i></b>	<b>50</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>
	<b>TRDE</b>	<b><i>Trifolium depauperatum</i></b>	<b>50</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>
	<b>TRDU2</b>	<b><i>Trifolium dubium</i></b>	<b>50</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>
	<b>TRFU</b>	<b><i>Trifolium fucatum</i></b>	<b>50</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>
	<b>TRMA2</b>	<b><i>Trifolium macraei</i></b>	<b>50</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>
	<b>TRVA</b>	<b><i>Trifolium variegatum</i></b>	<b>50</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>
	<b>TRWI3</b>	<b><i>Trifolium willdenovii</i></b>	<b>50</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>
	TRPU16	<i>Triphysaria pusilla</i>	50	0.1	0.2	0.2
	WYGL	<i>Wyethia glabra</i>	50	0.1	0.2	0.2

***Plantago erecta*-*Calycadenia multiglandulosa*-Annual Grass Association**  
**Dwarf Plantain - Sticky Rosin-weed - Annual Grass Association**

**Mapping Code: 4610mu**

**LOCAL VEGETATION DESCRIPTION**

Stands of *Plantago erecta*-*Calycadenia multiglandulosa*-Annual Grass Association form an open to intermittent herbaceous layer (32-55%, mean 40.5%) at 0-0.5m tall. The shrub layer is absent or open (no values recorded), and tree layer is sparse (0-0.2%, mean 0.05%) at 0-0.5m tall. Total vegetation cover is 32-55%, mean 41.8%.

In this association, *Plantago erecta* and *Calycadenia multiglandulosa* are characteristically present and either or both may be dominant in the herbaceous layer. Their abundance may depend seasonally on the time of year and the amount of rainfall. A variety of other native herbs may be present at low cover, including *Lotus humistratus*, *Agoseris heterophylla*, *Linanthus*, etc. Non-native grasses may also be present and co-dominant, including *Avena barbata* and *Bromus hordeaceus*. The shrub and tree layers are absent or sparse, and may include *Pseudotsuga menziesii* or *Quercus agrifolia*.

**LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 727-1489 ft., mean 1116.3 ft.

Aspect: frequently SE

Slope: somewhat steep to steep, range 16-31 degrees, mean 21.5 degrees

Topography: mid to upper slope, undulating or concave

Small Rock Cover: Range 24-27%, mean 25.5% (data from two plots)

Large Rock Cover: Range 7-40%, mean 23.5% (data from two plots)

Litter Cover: Range 3-5%, mean 4% (data from two plots)

Bare Ground: 20-65%, mean 42.5% (data from two plots)

Parent Material: Franciscan melange, serpentine

Soil Texture: coarse loamy sand, medium loam, sandy clay loam

Stands of this association were sampled in the Mt. Tamalpais Watershed. They commonly occur on serpentine on relatively rocky slopes with thin soils that are sandy loam in texture. Stands are similar to the *Vulpia microstachys*-*Plantago erecta*-*Calycadenia truncata* Association on serpentine uplands in the central Sierra Nevada Foothills (Evens et al. 2004).

**SITE IMPACTS**

This association has moderate non-native plant cover (average 43.0%) relative to native cover. Non-native species that occur with the highest frequency and abundance include *Avena barbata*, *Bromus hordeaceus*, *Bromus diandrus*, and *Anagallis arvensis*. There are no additional site impacts.

**SENSITIVE SPECIES**

*Calamagrostis ophitidis* was found in 1 of 4 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-1-3. Global rank is G3, and State rank is S3.3. Federal and state listing is None (CNPS 2005).

*Gilia capitata* was found in 1 of 4 surveys of this plant community. This could be *G. capitata* subsp. *tomentosa* (which intergrades with *G. capitata* subsp. *capitata*). MMWD regionally considers this subspecies as Rare. CNPS ranks this subspecies as List 1B with R-E-D Code is 3-3-3. Global rank is G5T1, and State rank is S1.1. Federal and state listing is None (CNPS 2005).

*Lessingia micradenia* var. *micradenia* was found in 1 of 4 surveys of this plant community. CNPS ranks this subspecies as List 1B with R-E-D Code is 3-2-3. Global rank is G2T1, and State rank is S1.1. Federal and state listing is None (CNPS 2005).

*Linanthus acicularis* was found in 1 of 4 surveys of this plant community. CNPS ranks this species as List 4 with R-E-D Code is 1-2-3. Global rank is G3, and State rank is S3.2. Federal and state listing is None

(CNPS 2005).

*Streptanthus glandulosus* subsp. *pulchellus* was found in 1 of 4 surveys of this plant community. CNPS ranks this species as List 1B with R-E-D Code is 3-2-3. Global rank is G4T1, and State rank is S1.2. Federal and state listing is None (CNPS 2005).

**SAMPLES USED TO DESCRIBE ASSOCIATION** (n=4)

**Rapid Assessment(s):** MMWD0039 **Releve(s):** MMWD0021, MMWD0025, MMWD0095

**Rank:** G2 S2?

**GLOBAL DISTRIBUTION**

Central Coast (including Mt. Tamalpais) on serpentine and possibly Sierra Nevada foothills; though full distribution is not known

**REFERENCES**

Evens et al. 2004

***Plantago erecta*-*Calycadenia multiglandulosa*-Annual Grass Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
<b>Tree Understory</b>						
	PSME-L	<i>Pseudotsuga menziesii</i>	25	0.1	0.2	0.2
	QUAG-L	<i>Quercus agrifolia</i>	25	0.1	0.2	0.2
<b>Herb</b>						
	AVBA	<i>Avena barbata</i>	100	7.8	0.2	16
	BRHO2	<i>Bromus hordeaceus</i>	100	4.8	0.2	9
	<b>PLER3</b>	<b><i>Plantago erecta</i></b>	<b>100</b>	<b>3.0</b>	<b>1</b>	<b>5</b>
	<b>CAMU3</b>	<b><i>Calycadenia multiglandulosa</i></b>	<b>75</b>	<b>5.8</b>	<b>1</b>	<b>20</b>
	LOHU2	<i>Lotus humistratus</i>	75	0.8	0.2	2
	BRDI3	<i>Bromus diandrus</i>	50	1.8	2	5
	AGHE2	<i>Agoseris heterophylla</i>	50	0.8	0.2	3
	ANAR	<i>Anagallis arvensis</i>	50	0.6	0.2	2
	DAPU3	<i>Daucus pusillus</i>	50	0.3	0.2	1
	LINAN2	<i>Linanthus</i>	50	0.3	0.2	1
	ALLIU	<i>Allium</i>	50	0.1	0.2	0.2
	CHPO3	<i>Chlorogalum pomeridianum</i>	50	0.1	0.2	0.2
	CYEC	<i>Cynosurus echinatus</i>	50	0.1	0.2	0.2
	ERNU3	<i>Eriogonum nudum</i>	50	0.1	0.2	0.2
	JUNCU	<i>Juncus</i>	50	0.1	0.2	0.2
	MECA2	<i>Melica californica</i>	50	0.1	0.2	0.2
	NAPU4	<i>Nassella pulchra</i>	50	0.1	0.2	0.2
	PLANT	<i>Plantago</i>	50	0.1	0.2	0.2
	POSE	<i>Poa secunda</i>	50	0.1	0.2	0.2
	RACA2	<i>Ranunculus californicus</i>	50	0.1	0.2	0.2
	SIGA	<i>Silene gallica</i>	50	0.1	0.2	0.2
	SONCH	<i>Sonchus</i>	50	0.1	0.2	0.2
	VUMI	<i>Vulpia microstachys</i>	50	0.1	0.2	0.2
	CAOP2	<i>Calamagrostis ophitidis</i>	25	2.3	9	9
	SICA4	<i>Silene californica</i>	25	1.0	4	4
	CHPO4	<i>Chorizanthe polygonoides</i>	25	0.8	3	3
	HYGL2	<i>Hypochaeris glabra</i>	25	0.8	3	3
	LOPE	<i>Lolium perenne</i>	25	0.8	3	3
	ERODI	<i>Erodium</i>	25	0.5	2	2
	LOMI	<i>Lotus micranthus</i>	25	0.5	2	2
	LOWR2	<i>Lotus wrangelianus</i>	25	0.5	2	2
	TRFU	<i>Trifolium fucatum</i>	25	0.5	2	2
	AICA	<i>Aira caryophyllea</i>	25	0.3	1	1
	CAPU18	<i>Calystegia purpurata</i>	25	0.3	1	1
	FEID	<i>Festuca idahoensis</i>	25	0.3	1	1
	TRIFO	<i>Trifolium</i>	25	0.1	0.4	0.4
	AIEL2	<i>Aira elegantissima</i>	25	0.1	0.2	0.2
	ASDE6	<i>Aspidotis densa</i>	25	0.1	0.2	0.2
	ASGA	<i>Astragalus gambelianus</i>	25	0.1	0.2	0.2
	BRMA	<i>Briza maxima</i>	25	0.1	0.2	0.2
	CALYS	<i>Calystegia</i>	25	0.1	0.2	0.2
	CATR17	<i>Carex tracyi</i>	25	0.1	0.2	0.2
	CLGR	<i>Clarkia gracilis</i>	25	0.1	0.2	0.2
	CLRU	<i>Clarkia rubicunda</i>	25	0.1	0.2	0.2

***Plantago erecta*-*Calycadenia multiglandulosa*-Annual Grass Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
	DACA3	<i>Danthonia californica</i>	25	0.1	0.2	0.2
	DOHE	<i>Dodecatheon hendersonii</i>	25	0.1	0.2	0.2
	DUCY	<i>Dudleya cymosa</i>	25	0.1	0.2	0.2
	ELEL5	<i>Elymus elymoides</i>	25	0.1	0.2	0.2
	EPMI	<i>Epilobium minutum</i>	25	0.1	0.2	0.2
	ERMO7	<i>Erodium moschatum</i>	25	0.1	0.2	0.2
	ESCA2	<i>Eschscholzia californica</i>	25	0.1	0.2	0.2
	GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	25	0.1	0.2	0.2
	GICA5	<i>Gilia capitata</i>	25	0.1	0.2	0.2
	GICL	<i>Gilia clivorum</i>	25	0.1	0.2	0.2
	HESP9	<i>Hesperervax sparsiflora</i>	25	0.1	0.2	0.2
	IRIS	<i>Iris</i>	25	0.1	0.2	0.2
	LEMI5	<i>Lessingia micradenia</i>	25	0.1	0.2	0.2
	LOMAT	<i>Lomatium</i>	25	0.1	0.2	0.2
	LOPU3	<i>Lotus purshianus</i>	25	0.1	0.2	0.2
	LYHY2	<i>Lythrum hyssopifolia</i>	25	0.1	0.2	0.2
	MEPO3	<i>Medicago polymorpha</i>	25	0.1	0.2	0.2
	METO	<i>Melica torreyana</i>	25	0.1	0.2	0.2
	MIGU	<i>Mimulus guttatus</i>	25	0.1	0.2	0.2
	MINUA	<i>Minuartia</i>	25	0.1	0.2	0.2
	MOPU2	<i>Monardella purpurea</i>	25	0.1	0.2	0.2
	PETR7	<i>Pentagramma triangularis</i>	25	0.1	0.2	0.2
	SABI2	<i>Sanicula bipinnata</i>	25	0.1	0.2	0.2
	SACR2	<i>Sanicula crassicaulis</i>	25	0.1	0.2	0.2
	SIBE	<i>Sisyrinchium bellum</i>	25	0.1	0.2	0.2
	STREP2	<i>Streptanthus</i>	25	0.1	0.2	0.2
	STGL8	<i>Streptanthus glandulosus</i>	25	0.1	0.2	0.2
	TRBA	<i>Trifolium barbigerum</i>	25	0.1	0.2	0.2
	TRBI	<i>Trifolium bifidum</i>	25	0.1	0.2	0.2
	TRWI3	<i>Trifolium willdenovii</i>	25	0.1	0.2	0.2
	URLI5	<i>Uropappus lindleyi</i>	25	0.1	0.2	0.2
	VUMY	<i>Vulpia myuros</i>	25	0.1	0.2	0.2
	WYAN	<i>Wyethia angustifolia</i>	25	0.1	0.2	0.2
<b>Cryptogam</b>						
	MOSS	<i>Moss</i>	25	0.1	0.2	0.2

## ***Typha* Alliance or Habitat**

This habitat is represented in two different emergent wetland alliances: *Typha angustifolia* and *Typha latifolia*. *T. angustifolia* is typically found in low-elevations in fresh and brackish waters. *T. latifolia* is found across various elevations in freshwater marshes.

### ***Typha angustifolia* Association**

#### **Narrow-Leaved Cattail Association**

**Mapping Code: 4110**

#### **LOCAL VEGETATION DESCRIPTION**

Stands of *Typha angustifolia* form an intermittent to dense herbaceous layer (60-80%, mean 70%) at 1-2m tall. The shrub layer is open (0-5%, mean 2.5%) and 0.5-1m tall. The tree layer is absent or open (no values recorded). Total vegetation cover is 60-85%, mean 72.5%.

In this association, *Typha angustifolia* dominates/characterizes the herbaceous layer at moderate to high cover. The herb layer also contains *Cyperus eragrostis* and *Equisetum telmateia* at low cover. Few shrubs and trees are recorded, including *Salix laevigata* and *Rubus ursinus*.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: Range 149-256 ft., mean 203 ft.

Aspect: flat

Slope: flat, range 0-0 degrees, mean 0 degrees

Topography: bottom, linear

Small Rock Cover: no data

Large Rock Cover: no data

Litter Cover: no data

Bare Ground: no data

Parent Material: Franciscan melange

Soil Texture: muck

Stands of this association were sampled in the Mt. Tamalpais Watershed. The stands occur in wetlands with standing and running water, especially at lake margins including at Phoenix Lake.

#### **SITE IMPACTS**

This association has no non-native plant cover. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=2)**

**Rapid Assessment(s):** MMWD0127, MMWD0131 **Releve(s):** none

**Rank:** G5 S5

#### **GLOBAL DISTRIBUTION**

Western United States to British Columbia

#### **REFERENCES**

CDFG 2000, NatureServe 2005

***Typha angustifolia* Association**

Stratum	Code	Species Name	Con	Avg	Min	Max
Tree Understory						
	SALA6	<i>Salix lasiolepis</i>	50	0.1	0.2	0.2
Shrub						
	RUUR	<i>Rubus ursinus</i>	50	1.5	3	3
Herb						
	<b>TYPHA</b>	<b><i>Typha angustifolia</i></b>	<b>100</b>	<b>64.0</b>	<b>48</b>	<b>80</b>
	CYER	<i>Cyperus eragrostis</i>	100	6.0	2	10
	EQTE	<i>Equisetum telmateia</i>	100	1.1	0.2	2
	CAREX	<i>Carex</i>	100	0.2	0.2	0.2
	JUOC2	<i>Juncus occidentalis</i>	50	0.1	0.2	0.2
	POAM8	<i>Polygonum amphibium</i>	50	0.1	0.2	0.2

### ***Typha latifolia* Association**

#### **Broad-Leaved Cattail Association**

**Mapping Code: 4110**

#### **LOCAL VEGETATION DESCRIPTION**

One stand of *Typha latifolia* forms a dense herbaceous layer (78%) at 1-2m tall. The shrub and tree layers are absent or open (no values recorded). Total vegetation cover is 78%.

In this association, *Typha latifolia* dominates the herbaceous layer at high cover. The herb layer also contains trace cover of other wetland species such as *Juncus effusus* and *Scirpus microcarpus*. No shrubs or trees are recorded in the stand.

#### **LOCAL ENVIRONMENTAL DESCRIPTION**

Elevation: 795 ft.

Aspect: flat

Slope: flat, 0 degrees

Topography: bottom, linear

Small Rock Cover: 0%

Large Rock Cover: 0%

Litter Cover: 90%

Bare Ground: 5%

Parent Material: Franciscan melange

Soil Texture: moderately fine clay loam

One stand of this association was sampled in the Mt. Tamalpais Watershed. Stands are found in wetland settings with standing water, including along lake margins such as where Lagunitas Creek runs into the Lagunitas Lake.

#### **SITE IMPACTS**

The stand representing this association has no non-native plant cover. There are no additional site impacts.

#### **SAMPLES USED TO DESCRIBE ASSOCIATION (n=1)**

**Rapid Assessment(s):** MMWD0184 **Releve(s):** none

**Rank:** G5 S5

#### **GLOBAL DISTRIBUTION**

Cismontane California (including the Coast Ranges and Central Valley) and Transmontane California; to eastern North America and Canada

#### **REFERENCES**

CDFG 2000, Evens and San 2005, Evens et al. 2006, Keeler-Wolf and Evens 2006, NatureServe 2005, NatureServe et al. 2003a, Sawyer and Keeler-Wolf 1995



***Typha latifolia* Association**

Stratum Herb	Code	Species Name	Con	Avg	Min	Max
	TYPHA	<i>Typha latifolia</i>	100	77.0	77	77
	EPILO	<i>Epilobium</i>	100	0.2	0.2	0.2
	JUEF	<i>Juncus effusus</i>	100	0.2	0.2	0.2
	SCMI2	<i>Scirpus microcarpus</i>	100	0.2	0.2	0.2

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**APPENDIX 1.** Field forms used by MMWD for the vegetation sampling.

**CALIFORNIA NATIVE PLANT SOCIETY RELEVÉ FIELD FORM**

(Revised 4/4/05)

Page \_\_\_\_\_ of Relevé # \_\_\_\_\_

*See code list for italicized fields*

FOR OFFICE USE ONLY		
Polygon # _____ or Relevé # _____		Permanent Number: _____
Date _____ / _____ / _____ MM DD YYYY		Community Name: _____ Community Number: _____ Occurrence Number: _____
County _____		Source Code: _____
USGS Quad. _____	7.5' or 15' (Circle one)	Quad Code: _____ Quad Name: _____ Map Index Number: _____
CNPS Chapter _____	Update: Yes No (Circle one)	
Landowner _____		
Contact Person _____		
Address _____		
City _____	Zip _____	Phone number _____
Observers _____		
<p>Relevé plot shape (square, rectangle, triangle, circle, entire stand) _____ <b>NOTE:</b> Forest/woodland plots should be 1000m<sup>2</sup> if upland or 400m<sup>2</sup> if riparian.</p> <p>Relevé plot size (length and width of rectangle, or circle-diameter) _____ (m.) All shrub plots should be 400m<sup>2</sup>. Herb plots should be 100 or 10m<sup>2</sup>.*            (1000m<sup>2</sup>) *Please consult with CNPS Vegetation Ecologist on herb plots.            For circle radiuses: 5.64m (100m<sup>2</sup>), 11.28m (400m<sup>2</sup>), 17.84m</p> <p>Study Plot Revisit? Yes or No (Circle one) Photo Interpreter Community Code for Polygon _____</p> <p>Other polygons of same type? Yes or No Is plot representative of whole polygon? Yes or No (Circle one) If not, why not? _____</p>		
<p>GPS File # _____ GPS name (or points in file) _____ Start Time _____: _____ (am or pm) GPS Datum (from GPS setup) (e.g. WGS 84, NAD 27)</p> <p>File type: Point or Polygon (circle one) Relevé: UTMN _____ UTME _____ Error ± _____ ft/m UTM Zone _____</p> <p>Transect: Start UTME _____ UTMN _____ End: UTME _____ UTMN _____</p>		
<p>Elevation (ft.) _____ Slope (°) _____ Aspect (°) _____ Topography: Macro _____ Micro _____</p>		
VEGETATION DESCRIPTION		
<p>Dominant Layer ____ 0-0.5 m, ____ 0.5-5 m, ____ &gt;5 m Preliminary Alliance Name _____</p> <p>Stand Size ____ &lt;1 acre, ____ 1-5 acres, ____ &gt;5 acres Dominant Vegetation Group _____ (use codes from code list)</p>		
<p>Structure: Ground _____ Shrub _____ Tree _____ Phenology: Ground _____ Shrub _____ Tree _____            (1. Continuous 2. Intermittent 3. Open) (Early, Peak, Late)</p>		
<p>Wetland Community Type _____ (Wetland or Upland)</p> <p>If Community Type = Wetland (see Artificial Keys to Cowardin Systems and Names)</p> <p>Cowardin System _____ Subsystem _____ Class _____</p> <p>Distance to water (m): Vertical _____ Horizontal _____ Channel form (if riverine) _____            (Straight, Meandering, Braided)</p>		
Adjacent Alliance _____	Location (e.g., North, South, East, or West of stand) _____	Description (up to 4 species by layer)

# CALIFORNIA NATIVE PLANT SOCIETY RELEVÉ FIELD FORM

Page \_\_\_\_\_ of Relevé # \_\_\_\_\_

STAND AND ENVIRONMENTAL DESCRIPTION										
Trend code _____ 1. Increasing 2. Stable 3. Decreasing 4. Fluctuating 5. Unknown		Site Impact codes _____ (List codes in order, with most significant first)								
		Site Intensity _____ 1. Light 2. Moderate 3. Heavy (List beneath each impact code)								
Site Location and Plot Description – Describing where the plot is located and what the main vegetation and environmental features are										
Site History – Including observations of fire scars, insect/disease damage, grazing/browsing, human disturbance										
Sensitive Species – List species observed and GPS UTM's; Estimate size and extent of local populations										
Unknown Specimens – List code, identification notes (e.g. Genus, condition of specimen) of unknowns										
Additional Comments – Including animal observations, anthropological observations, abiotic features										
Surface Coarse Fragments and Soils Information (see cover class intervals-below ↓)										
Type:	Fines	Gravel	Cobble	Stone	Boulders	Bedrock	Litter	Water	Living stems	Other (Specify):
Descriptor:	Including sand, mud	2mm-7.5 cm diameter	7.5-25 cm diam	25-60cm diam.	>60cm diam.	Including outcrops	Organic matter covering ground	Standing or running water	At ground surface	
Cover class (see below):										
% Cover*:										
*note all surface fragments, non-vegetation, living stems, etc., should add up to 100%										
% Bioturbation _____				Soil Texture _____				Parent Material _____		

Cover Class Intervals: 1 (<1%), 2 (1-5%), 3a (>5-15%), 3b (>15-25%), 4 (>25-50%), 5 (>50-75%), 6 (>75%)

Height Classes for Vegetation Strata & Cover Estimates (see cover class intervals - above ↑)										
Layer name:	Cryptogam Layer	0-25 cm	25-50 cm	0.5-1 m	1-2 m	2-5 m	5-10 m	10-20 m	20-30 m	>30 m.
Main species:										
Cover										

## SPECIES SHEET (Revised 5/17/01)

Page\_\_\_\_\_ of Relevé # \_\_\_\_\_

**Cover Class Intervals: 1 (<1%), 2 (1-5%), 3a (>5-15%), 3b (>15-25%), 4 (>25-50%), 5 (>50-75%), 6 (>75%)**

*L*=Low herbs and subshrubs (<0.5 m.), *M*=Medium height (0.5 m.-5.0 m.), *T*=Tall height (>5.0 m.)

[illegible]



(Revised April 11, 2005)

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**APPENDIX 2.** List of plants identified in the MMWD surveys with scientific names and native status accepted by UCB (2004) and codes and common names by USDA-NRCS (2005).

Code	Taxon	Common Name	Family	Native
ACACI	<i>Acacia</i>	acacia	Fabaceae	no
ACMA3	<i>Acer macrophyllum</i>	bigleaf maple	Aceraceae	yes
ACMI2	<i>Achillea millefolium</i>	common yarrow	Asteraceae	yes
ACMO2	<i>Achyrrachaena mollis</i>	soft blow wives	Asteraceae	yes
ADBI	<i>Adenocaulon bicolor</i>	American trailplant	Asteraceae	yes
ADFA	<i>Adenostoma fasciculatum</i>	chamise	Rosaceae	yes
ADCA	<i>Adiantum capillus-veneris</i>	common maidenhair fern	Pteridaceae	yes
ADJO	<i>Adiantum jordanii</i>	California maidenhair fern	Pteridaceae	yes
AECA	<i>Aesculus californica</i>	California buckeye	Hippocastanaceae	yes
AGOSE	<i>Agoseris</i>	agoseris	Asteraceae	yes
AGGR	<i>Agoseris grandiflora</i>	bigflower agoseris	Asteraceae	yes
AGHE2	<i>Agoseris heterophylla</i>	annual agoseris	Asteraceae	yes
AGROS2	<i>Agrostis</i>	bentgrass	Poaceae	unknown
AGEX	<i>Agrostis exarata</i>	spike bentgrass	Poaceae	yes
AGMI3	<i>Agrostis microphylla</i>	small-leaf bentgrass	Poaceae	yes
AICA	<i>Aira caryophyllea</i>	silver hairgrass	Poaceae	no
AIEL2	<i>Aira elegantissima</i>	elegant hairgrass	Poaceae	no
ALLIU	<i>Allium</i>	wild onion	Liliaceae	yes
ALAM2	<i>Allium amplexans</i>	narrowleaf onion	Liliaceae	yes
ALFA3	<i>Allium falcifolium</i>	scytheleaf onion	Liliaceae	yes
ALUN	<i>Allium unifolium</i>	oneleaf onion	Liliaceae	yes
ALRH2	<i>Alnus rhombifolia</i>	white alder	Betulaceae	yes
ALRU2	<i>Alnus rubra</i>	red alder	Betulaceae	yes
AMCAN	<i>Amorpha californica</i> var. <i>napensis</i>	Napa false indigo	Fabaceae	yes
AMME	<i>Amsinckia menziesii</i>	Menzies' fiddleneck	Boraginaceae	yes
AMMEI2	<i>Amsinckia menziesii</i> var. <i>intermedia</i>	common fiddleneck	Boraginaceae	yes
ANAR	<i>Anagallis arvensis</i>	pimpernel	Primulaceae	no
ANMA	<i>Anaphalis margaritacea</i>	pearly everlasting	Asteraceae	yes
ANOR	<i>Anemone oregana</i>	blue windflower	Ranunculaceae	yes
ANTHE	<i>Anthemis</i>	chamomile	Asteraceae	no
APOC	<i>Aphanes occidentalis</i>	field parsley piert	Rosaceae	yes
ARCA2	<i>Aralia californica</i>	prairie sagewort	Araliaceae	yes
ARME	<i>Arbutus menziesii</i>	Pacific madrone	Ericaceae	yes
ARCA5	<i>Arctostaphylos canescens</i>	hoary manzanita	Ericaceae	yes
ARGL3	<i>Arctostaphylos glandulosa</i>	Eastwood's manzanita	Ericaceae	yes
ARHOM	<i>Arctostaphylos hookeri</i> subsp. <i>montana</i>	Tamalpais manzanita	Ericaceae	yes
ARMA	<i>Arctostaphylos manzanita</i>	whiteleaf manzanita	Ericaceae	yes
ARNU3	<i>Arctostaphylos nummularia</i>	glossyleaf manzanita	Ericaceae	yes
ARVI3	<i>Arctostaphylos virgata</i>	Bolinas manzanita	Ericaceae	yes
ARDI6	<i>Arnica discoidea</i>	rayless arnica	Asteraceae	yes
ARCA11	<i>Artemisia californica</i>	California sagebrush	Asteraceae	yes
ARDO3	<i>Artemisia douglasiana</i>	Douglas' sagewort	Asteraceae	yes
ASCA2	<i>Asarum caudatum</i>	wild ginger	Aristolochiaceae	yes
ASDE6	<i>Aspidotis densa</i>	Indian's dream	Pteridaceae	yes
ASRA	<i>Aster radulinus</i>	roughleaf aster	Asteraceae	yes

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ASTEXX	Asteraceae	aster family	Asteraceae	yes
ASBR8	<i>Astragalus breweri</i>	Brewer's milkvetch	Fabaceae	yes
ASGA	<i>Astragalus gambelianus</i>	Gambel's dwarf milkvetch	Fabaceae	yes
ATFI	<i>Athyrium filix-femina</i>	common ladyfern	Dryopteridaceae	yes
AVBA	<i>Avena barbata</i>	slender oat	Poaceae	no
BAPI	<i>Baccharis pilularis</i>	dwarf chaparral broom	Asteraceae	yes
BAOR	<i>Barbarea orthoceras</i>	erectpod wintercress	Brassicaceae	yes
BASSI	<i>Bassia</i>	bassia	Chenopodiaceae	no
BETR	<i>Bellardia trixago</i>	Mediterranean lineseed	Scrophulariaceae	no
BEPI	<i>Berberis pinnata</i>	California barberry	Berberidaceae	yes
BOOC2	<i>Boykinia occidentalis</i>	coastal brookfoam	Saxifragaceae	yes
BRDI2	<i>Brachypodium distachyon</i>	purple false brome	Poaceae	no
BRMA	<i>Briza maxima</i>	big quakinggrass	Poaceae	no
BRMI2	<i>Briza minor</i>	little quakinggrass	Poaceae	no
BREL	<i>Brodiaea elegans</i>	harvest brodiaea	Liliaceae	yes
BRELE	<i>Brodiaea elegans</i> subsp. <i>elegans</i>	harvest brodiaea	Liliaceae	yes
BRTE4	<i>Brodiaea terrestris</i>	dwarf brodiaea	Liliaceae	yes
BROMU	<i>Bromus</i>	brome	Poaceae	no
BRCA5	<i>Bromus carinatus</i>	California brome	Poaceae	yes
BRDI3	<i>Bromus diandrus</i>	ripgut grass	Poaceae	no
BRHO2	<i>Bromus hordeaceus</i>	soft brome	Poaceae	no
BRLA3	<i>Bromus laevipes</i>	Chinook brome	Poaceae	yes
BRMA3	<i>Bromus madritensis</i>	Spanish brome	Poaceae	no
CALAM	<i>Calamagrostis</i>	reedgrass	Poaceae	yes
CABO	<i>Calamagrostis bolanderi</i>	Bolander's reedgrass	Poaceae	yes
CAOP2	<i>Calamagrostis ophitidis</i>	serpentine reedgrass	Poaceae	yes
CACI2	<i>Calandrinia ciliata</i>	red maids	Portulacaceae	yes
CALU9	<i>Calochortus luteus</i>	yellow mariposa lily	Liliaceae	yes
CAUM	<i>Calochortus umbellatus</i>	Oakland star-tulip	Liliaceae	yes
CAUN	<i>Calochortus uniflorus</i>	large-flowered star-tulip	Liliaceae	yes
CALYC	<i>Calycadenia</i>	rosinweed	Asteraceae	yes
CAMU3	<i>Calycadenia multiglandulosa</i>	sticky western rosinweed	Asteraceae	yes
CALYS	<i>Calystegia</i>	morning-glory	Convolvulaceae	yes
CACO35	<i>Calystegia collina</i>	coast range false bindweed	Convolvulaceae	yes
CAPU18	<i>Calystegia purpurata</i>	Pacific false bindweed	Convolvulaceae	yes
CASU19	<i>Calystegia subacaulis</i>	hillside false bindweed	Convolvulaceae	yes
CAOV4	<i>Camissonia ovata</i>	sun cup	Onagraceae	yes
CARDA	<i>Cardamine</i>	bittercress	Brassicaceae	yes
CACA39	<i>Cardamine californica</i>	California toothwort	Brassicaceae	yes
CAOL	<i>Cardamine oligosperma</i>	Idaho bittercress	Brassicaceae	yes
CAPY2	<i>Carduus pycnocephalus</i>	Italian thistle	Asteraceae	no
CAREX	<i>Carex</i>	carex	Cyperaceae	yes
CAAM1	<i>Carex amplifolia</i>	bigleaf sedge	Cyperaceae	yes
CABA4	<i>Carex barbarae</i>	Santa Barbara sedge	Cyperaceae	yes
CABR8	<i>Carex brevicaulis</i>	shortstem sedge	Cyperaceae	yes
CADE8	<i>Carex densa</i>	dense sedge	Cyperaceae	yes
CAGL7	<i>Carex globosa</i>	roundfruit sedge	Cyperaceae	yes
CAGR9	<i>Carex gracilior</i>	slender sedge	Cyperaceae	yes
CAGY3	<i>Carex gynodynamis</i>	Olney's hairy sedge	Cyperaceae	yes

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CAOB3	<i>Carex obnupta</i>	coast carex	Cyperaceae	yes
CAPR5	<i>Carex praegracilis</i>	clustered field sedge	Cyperaceae	yes
CASE2	<i>Carex serratodens</i>	twotooth sedge	Cyperaceae	yes
CASI2	<i>Carex simulata</i>	analogue sedge	Cyperaceae	yes
CASU4	<i>Carex subbracteata</i>	smallbract sedge	Cyperaceae	yes
CASU6	<i>Carex subfusca</i>	brown sedge	Cyperaceae	yes
CATR17	<i>Carex tracyi</i>	eggbract sedge	Cyperaceae	yes
CALA20	<i>Carthamus lanatus</i>	distaff thistle	Asteraceae	no
CASTI2	<i>Castilleja</i>	Indian paintbrush	Scrophulariaceae	yes
CADE29	<i>Castilleja densiflora</i>	denseflower Indian paintbrush	Scrophulariaceae	yes
CAFO2	<i>Castilleja foliolosa</i>	woolly Indian paintbrush	Scrophulariaceae	yes
CARUL	<i>Castilleja rubicundula</i> subsp. <i>lithospermoides</i>	cream sacs	Scrophulariaceae	yes
CASU10	<i>Castilleja subinclusa</i>	longleaf Indian paintbrush	Scrophulariaceae	yes
CEANO	<i>Ceanothus</i>	ceanothus	Rhamnaceae	yes
CECU	<i>Ceanothus cuneatus</i>	buckbrush	Rhamnaceae	yes
CEDED	<i>Ceanothus dentatus</i> var. <i>dickeyi</i>	sandscrub ceanothus	Rhamnaceae	yes
CEFO	<i>Ceanothus foliosus</i>	wavyleaf ceanothus	Rhamnaceae	yes
CEGLE	<i>Ceanothus gloriosus</i> var. <i>exaltatus</i>	Point Reyes ceanothus	Rhamnaceae	yes
CEJE	<i>Ceanothus jepsonii</i>	Jepson ceanothus	Rhamnaceae	yes
CEOLS	<i>Ceanothus oliganthus</i> subsp. <i>sorediatus</i>	jimbrush	Rhamnaceae	yes
CETH	<i>Ceanothus thyrsiflorus</i>	blue blossom ceanothus	Rhamnaceae	yes
CENTA	<i>Centaurea</i>	knapweed	Asteraceae	no
CESO3	<i>Centaurea solstitialis</i>	yellow star-thistle	Asteraceae	no
CENTA2	<i>Centaureum</i>	centaury	Gentianaceae	yes
CEMU2	<i>Centaureum muehlenbergii</i>	Muhlenberg's centaury	Gentianaceae	yes
CEBE3	<i>Cercocarpus betuloides</i>	birchleaf mountain mahogany	Rosaceae	yes
CHPO3	<i>Chlorogalum pomeridianum</i>	wavyleaf soap plant	Liliaceae	yes
CHPO4	<i>Chorizanthe polygonoides</i>	knotweed spineflower	Polygonaceae	yes
CHCH7	<i>Chrysopsis chrysophylla</i>	giant chinquapin	Fagaceae	yes
CHCHC4	<i>Chrysopsis chrysophylla</i> var. <i>chrysophylla</i>	giant chinquapin	Fagaceae	yes
CHCHM	<i>Chrysopsis chrysophylla</i> var. <i>minor</i>	giant chinquapin	Fagaceae	yes
CIHYV	<i>Cirsium hydrophilum</i> var. <i>vaseyi</i>	Vasey's thistle	Asteraceae	yes
CIOC	<i>Cirsium occidentale</i>	cobwebby thistle	Asteraceae	yes
CIVU	<i>Cirsium vulgare</i>	bull thistle	Asteraceae	no
CLARK	<i>Clarkia</i>	clarkia	Onagraceae	yes
CLCO	<i>Clarkia concinna</i>	red ribbons	Onagraceae	yes
CLGR	<i>Clarkia gracilis</i>	slender clarkia	Onagraceae	yes
CLPU2	<i>Clarkia purpurea</i>	winecup clarkia	Onagraceae	yes
CLRU	<i>Clarkia rubicunda</i>	ruby chalice clarkia	Onagraceae	yes
CLAYT	<i>Claytonia</i>	springbeauty	Portulacaceae	yes
CLEX2	<i>Claytonia exigua</i>	serpentine springbeauty	Portulacaceae	yes
CLEXE2	<i>Claytonia exigua</i> subsp. <i>exigua</i>	serpentine springbeauty	Portulacaceae	yes
CLPE	<i>Claytonia perfoliata</i>	miner's lettuce	Portulacaceae	yes
CLAN2	<i>Clintonia andrewsiana</i>	Andrew's clintonia	Liliaceae	yes
COHE	<i>Collinsia heterophylla</i>	purple Chinese houses	Scrophulariaceae	yes
COSP	<i>Collinsia sparsiflora</i>	spinster's blue eyed Mary	Scrophulariaceae	yes
COLLO	<i>Collomia</i>	trumpet	Polemoniaceae	yes

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COHE2	<i>Collomia heterophylla</i>	variableleaf collomia	Polemoniaceae	yes
COMA2	<i>Conium maculatum</i>	poison hemlock	Apiaceae	no
COAR4	<i>Convolvulus arvensis</i>	field bindweed	Convolvulaceae	no
CORAL2	<i>Corallorrhiza</i>	coralroot	Orchidaceae	yes
COMA4	<i>Corallorrhiza maculata</i>	summer coralroot	Orchidaceae	yes
COSEO	<i>Cornus sericea</i> subsp. <i>occidentalis</i>	western dogwood	Cornaceae	yes
COCOC	<i>Corylus cornuta</i> var. <i>californica</i>	California hazel	Betulaceae	yes
CRATA	<i>Crataegus</i>	hawthorn	Rosaceae	unknown
CRCA3	<i>Crepis capillaris</i>	smooth hawksbeard	Asteraceae	no
CRYPT3	<i>Cryptogramma</i>	rockbrake	Pteridaceae	yes
CUMA2	<i>Cupressus macrocarpa</i>	Monterey cypress	Cupressaceae	yes
CUSA3	<i>Cupressus sargentii</i>	Sargent's cypress	Cupressaceae	yes
CYGR	<i>Cynoglossum grande</i>	Pacific hound's tongue	Boraginaceae	yes
CYEC	<i>Cynosurus echinatus</i>	bristly dogtail grass	Poaceae	no
CYER	<i>Cyperus eragrostis</i>	tall flatsedge	Cyperaceae	yes
CYSC4	<i>Cytisus scoparius</i>	scotchbroom	Fabaceae	no
DACA3	<i>Danthonia californica</i>	California oatgrass	Poaceae	yes
DAPU3	<i>Daucus pusillus</i>	American wild carrot	Apiaceae	yes
DELPH	<i>Delphinium</i>	larkspur	Ranunculaceae	yes
DEHE	<i>Delphinium hesperium</i>	foothill larkspur	Ranunculaceae	yes
DEPA3	<i>Delphinium patens</i>	zigzag larkspur	Ranunculaceae	yes
DERI	<i>Dendromecon rigida</i>	tree poppy	Papaveraceae	yes
DECA18	<i>Deschampsia caespitosa</i>	tufted hairgrass	Poaceae	yes
DICA14	<i>Dichelostemma capitatum</i>	bluedicks	Liliaceae	yes
DICO19	<i>Dichelostemma congestum</i>	ookow	Liliaceae	yes
DISA9	<i>Dipsacus sativus</i>	Indian teasel	Dipsacaceae	no
DISM2	<i>Disporum smithii</i>	largeflower fairybells	Liliaceae	yes
DOHE	<i>Dodecatheon hendersonii</i>	mosquito bills	Primulaceae	yes
DRAR3	<i>Dryopteris arguta</i>	coastal woodfern	Dryopteridaceae	yes
DREX2	<i>Dryopteris expansa</i>	spreading woodfern	Dryopteridaceae	yes
DUDLE	<i>Dudleya</i>	dudleya	Crassulaceae	yes
DUCY	<i>Dudleya cymosa</i>	canyon liveforever	Crassulaceae	yes
ELMA5	<i>Eleocharis macrostachya</i>	common spikerush	Cyperaceae	yes
ELYMU	<i>Elymus</i>	wildrye	Poaceae	yes
ELCA10	<i>Elymus californicus</i>	California bottlebrush grass	Poaceae	yes
ELEL5	<i>Elymus elymoides</i>	squirreltail	Poaceae	yes
ELGL	<i>Elymus glaucus</i>	blue wildrye	Poaceae	yes
EPILO	<i>Epilobium</i>	willowherb	Onagraceae	yes
EPBR3	<i>Epilobium brachycarpum</i>	tall annual willowherb	Onagraceae	yes
EPCI	<i>Epilobium ciliatum</i>	fringed willowherb	Onagraceae	yes
EPMI	<i>Epilobium minutum</i>	chaparral willowherb	Onagraceae	yes
EQUIS	<i>Equisetum</i>	horsetail	Equisetaceae	yes
EQAR	<i>Equisetum arvense</i>	field horsetail	Equisetaceae	yes
EQHY	<i>Equisetum hyemale</i>	scouringrush horsetail	Equisetaceae	yes
EQLA	<i>Equisetum laevigatum</i>	smooth horsetail	Equisetaceae	yes
EQTE	<i>Equisetum telmateia</i>	giant horsetail	Equisetaceae	yes
ERMI6	<i>Erechtites minima</i>	coastal burnweed	Asteraceae	no
ERIGE2	<i>Erigeron</i>	fleabane	Asteraceae	yes

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ERRE12	<i>Erigeron reductus</i>	lesser California rayless fleabane	Asteraceae	yes
ERCA6	<i>Eriodictyon californicum</i>	California yerba santa	Hydrophyllaceae	yes
ERLUC	<i>Eriogonum luteolum</i> var. <i>caninum</i>	Tiburon buckwheat	Polygonaceae	yes
ERNU3	<i>Eriogonum nudum</i>	naked buckwheat	Polygonaceae	yes
ERCO25	<i>Eriophyllum confertiflorum</i>	golden-yarrow	Asteraceae	yes
ERLA6	<i>Eriophyllum lanatum</i>	common woolly sunflower	Asteraceae	yes
ERST9	<i>Eriophyllum stoechadifolium</i>	seaside woolly sunflower	Asteraceae	yes
ERBO	<i>Erodium botrys</i>	longbeak stork's bill	Geraniaceae	no
ERBR14	<i>Erodium brachycarpum</i>	shortfruit stork's bill	Geraniaceae	no
ERIC6	<i>Erodium cicutarium</i>	redstem stork's bill	Geraniaceae	no
ERMO7	<i>Erodium moschatum</i>	musky stork's bill	Geraniaceae	no
ESCA2	<i>Eschscholzia californica</i>	California poppy	Papaveraceae	yes
FESTU	<i>Festuca</i>	fescue	Poaceae	unknown
FEAR3	<i>Festuca arundinacea</i>	tall fescue	Poaceae	no
FECA	<i>Festuca californica</i>	California fescue	Poaceae	yes
FEID	<i>Festuca idahoensis</i>	Idaho fescue	Poaceae	yes
FERU2	<i>Festuca rubra</i>	red fescue	Poaceae	yes
FICA	<i>Ficus carica</i>	edible fig	Moraceae	no
FICA2	<i>Filago californica</i>	California cottonrose	Asteraceae	yes
FIGA	<i>Filago gallica</i>	narrowleaf cottonrose	Asteraceae	no
FOVU	<i>Foeniculum vulgare</i>	sweet fennel	Apiaceae	no
FRVE	<i>Fragaria vesca</i>	woodland strawberry	Rosaceae	yes
FRLA	<i>Fraxinus latifolia</i>	Oregon ash	Oleaceae	yes
FRIT1	<i>Fritillaria</i>	fritillary	Liliaceae	yes
FRAF2	<i>Fritillaria affinis</i>	checker lily	Liliaceae	yes
GALI1	<i>Galium</i>	bedstraw	Rubiaceae	yes
GAAP2	<i>Galium aparine</i>	stickywilly	Rubiaceae	yes
GACA3	<i>Galium californicum</i>	California bedstraw	Rubiaceae	yes
GADI	<i>Galium divaricatum</i>	Lamarck's bedstraw	Rubiaceae	no
GAPO	<i>Galium porrigens</i>	graceful bedstraw	Rubiaceae	yes
GAPOP	<i>Galium porrigens</i> var. <i>porrigens</i>	graceful bedstraw	Rubiaceae	yes
GATR3	<i>Galium triflorum</i>	fragrant bedstraw	Rubiaceae	yes
GAEL	<i>Garrya elliptica</i>	wavyleaf silktassel	Garryaceae	yes
GEMO2	<i>Genista monspessulana</i>	French broom	Fabaceae	no
GEDI	<i>Geranium dissectum</i>	cutleaf geranium	Geraniaceae	no
GEMO	<i>Geranium molle</i>	dovefoot geranium	Geraniaceae	no
GICA5	<i>Gilia capitata</i>	bluehead gilia	Polemoniaceae	yes
GICL	<i>Gilia clivorum</i>	purplespot gilia	Polemoniaceae	yes
GNCA	<i>Gnaphalium californicum</i>	ladies' tobacco	Asteraceae	yes
GNCA2	<i>Gnaphalium canescens</i>	Wright's cudweed	Asteraceae	yes
GNPU2	<i>Gnaphalium purpureum</i>	spoonleaf purple everlasting	Asteraceae	yes
GOOB2	<i>Goodyera oblongifolia</i>	western rattlesnake plantain	Orchidaceae	yes
HEHE	<i>Hedera helix</i>	English ivy	Araliaceae	no
HELEN	<i>Helenium</i>	sneezeweed	Asteraceae	unknown
HECO7	<i>Hemizonia congesta</i>	hayfield tarweed	Asteraceae	yes
HELA4	<i>Heracleum lanatum</i>	common cowparsnip	Apiaceae	yes
HESP9	<i>Hesperervax sparsiflora</i>	erect dwarf-cudweed	Asteraceae	yes
HEMI9	<i>Hesperolinon micranthum</i>	smallflower dwarf-flax	Linaceae	yes

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HEAR5	<i>Heteromeles arbutifolia</i>	toyon	Rosaceae	yes
HESE	<i>Heterotheca sessiliflora</i>	sessileflower false goldenaster	Asteraceae	yes
HEMI7	<i>Heuchera micrantha</i>	crevice alumroot	Saxifragaceae	yes
HIAL2	<i>Hieracium albiflorum</i>	white hawkweed	Asteraceae	yes
HIOC	<i>Hierochloe occidentalis</i>	California sweetgrass	Poaceae	yes
HOITA	<i>Hoita</i>	leather-root	Fabaceae	yes
HOLA	<i>Holcus lanatus</i>	common velvetgrass	Poaceae	no
HODI	<i>Holodiscus discolor</i>	oceanspray	Rosaceae	yes
HORDE	<i>Hordeum</i>	barley	Poaceae	unknown
HOB2	<i>Hordeum brachyantherum</i>	meadow barley	Poaceae	yes
HOMU	<i>Hordeum murinum</i>	mouse barley	Poaceae	no
HOVU	<i>Hordeum vulgare</i>	common barley	Poaceae	no
HOC3	<i>Horkelia californica</i>	California horkelia	Rosaceae	yes
HYAN2	<i>Hypericum anagalloides</i>	tinker's penny	Clusiaceae	yes
HYCO3	<i>Hypericum concinnum</i>	goldwire	Clusiaceae	yes
HYGL2	<i>Hypochaeris glabra</i>	smooth catsear	Asteraceae	no
HYRA3	<i>Hypochaeris radicata</i>	hairy catsear	Asteraceae	no
IRIS	<i>Iris</i>	iris	Iridaceae	unknown
IRDO	<i>Iris douglasiana</i>	Douglas iris	Iridaceae	yes
IRMA	<i>Iris macrosiphon</i>	bowltube iris	Iridaceae	yes
JUNCXX	Juncaceae	rush family	Juncaceae	unknown
JUNCU	<i>Juncus</i>	rush	Juncaceae	unknown
JUAR4	<i>Juncus articulatus</i>	jointleaf rush	Juncaceae	yes
JUCA5	<i>Juncus capitatus</i>	leafybract dwarf rush	Juncaceae	no
JUCO5	<i>Juncus covillei</i>	Coville's rush	Juncaceae	yes
JUEF	<i>Juncus effusus</i>	common rush	Juncaceae	yes
JUOC2	<i>Juncus occidentalis</i>	western rush	Juncaceae	yes
JUPA2	<i>Juncus patens</i>	spreading rush	Juncaceae	yes
JUXI	<i>Juncus xiphioides</i>	irisleaf rush	Juncaceae	yes
KOMA	<i>Koeleria macrantha</i>	prairie Junegrass	Poaceae	yes
LACA7	<i>Lasthenia californica</i>	California goldfields	Asteraceae	yes
LATHY	<i>Lathyrus</i>	pea	Fabaceae	yes
LAJE	<i>Lathyrus jepsonii</i>	Delta tule pea	Fabaceae	yes
LAVE2	<i>Lathyrus vestitus</i>	Pacific pea	Fabaceae	yes
LAYIA	<i>Layia</i>	tidytips	Asteraceae	yes
LECA3	<i>Lepechinia calycina</i>	woodbalm	Lamiaceae	yes
LEMI5	<i>Lessingia micradenia</i>	Mt. Tamalpais lessingia	Asteraceae	yes
LICHEN	Lichen	lichen	Unknown	yes
LIAP	<i>Ligusticum apiifolium</i>	celeryleaf licorice-root	Apiaceae	yes
LIPAP2	<i>Lilium pardalinum</i> subsp. <i>pardalinum</i>	leopard lily	Liliaceae	yes
LIDO2	<i>Limnanthes douglasii</i>	Douglas' meadowfoam	Limnanthaceae	yes
LINAN2	<i>Linanthus</i>	linanthus	Polemoniaceae	yes
LIAC3	<i>Linanthus acicularis</i>	bristly linanthus	Polemoniaceae	yes
LIAN	<i>Linanthus androsaceus</i>	false babystars	Polemoniaceae	yes
LIGR3	<i>Linanthus grandiflorus</i>	largeflower linanthus	Polemoniaceae	yes
LIPA12	<i>Linanthus parviflorus</i>	variable linanthus	Polemoniaceae	yes
LIBI5	<i>Linum bienne</i>	pale flax	Linaceae	no
LIDE3	<i>Lithocarpus densiflorus</i>	tanoak	Fagaceae	yes
LIAF	<i>Lithophragma affine</i>	San Francisco woodland-star	Saxifragaceae	yes

Code	Taxon	Common Name	Family	Native
LIHE	<i>Lithophragma heterophyllum</i>	hillside woodland-star	Saxifragaceae	yes
LOPE	<i>Lolium perenne</i>	perennial ryegrass	Poaceae	no
LOMAT	<i>Lomatium</i>	desertparsley	Apiaceae	yes
LODA	<i>Lomatium dasycarpum</i>	woollyfruit desertparsley	Apiaceae	yes
LOUT	<i>Lomatium utriculatum</i>	common lomatium	Apiaceae	yes
LONIC	<i>Lonicera</i>	honeysuckle	Caprifoliaceae	yes
LOHI2	<i>Lonicera hispidula</i>	pink honeysuckle	Caprifoliaceae	yes
LOIN5	<i>Lonicera involucrata</i>	twinberry honeysuckle	Caprifoliaceae	yes
LOTUS	<i>Lotus</i>	trefoil	Fabaceae	unknown
LOCO6	<i>Lotus corniculatus</i>	birdfoot deervetch	Fabaceae	yes
LOFO2	<i>Lotus formosissimus</i>	seaside bird's-foot trefoil	Fabaceae	yes
LOHU2	<i>Lotus humistratus</i>	foothill deervetch	Fabaceae	yes
LOMI	<i>Lotus micranthus</i>	desert deervetch	Fabaceae	yes
LOPU3	<i>Lotus purshianus</i>	American bird's-foot trefoil	Fabaceae	yes
LOSC2	<i>Lotus scoparius</i>	common deerweed	Fabaceae	yes
LOWR2	<i>Lotus wrangelianus</i>	Chilean bird's-foot trefoil	Fabaceae	yes
LUPIN	<i>Lupinus</i>	lupine	Fabaceae	yes
LUAL4	<i>Lupinus albifrons</i>	silver lupine	Fabaceae	yes
LUBI	<i>Lupinus bicolor</i>	miniature lupine	Fabaceae	yes
LUNA3	<i>Lupinus nanus</i>	sky lupine	Fabaceae	yes
LUCO6	<i>Luzula comosa</i>	Pacific woodrush	Juncaceae	yes
LYHY2	<i>Lythrum hyssopifolia</i>	hyssop loosestrife	Lythraceae	no
MADIA	<i>Madia</i>	tarweed	Asteraceae	yes
MAEL	<i>Madia elegans</i>	common madia	Asteraceae	yes
MAEX	<i>Madia exigua</i>	small tarweed	Asteraceae	yes
MAGR3	<i>Madia gracilis</i>	grassy tarweed	Asteraceae	yes
MAMA	<i>Madia madioides</i>	woodland madia	Asteraceae	yes
MASA	<i>Madia sativa</i>	coast tarweed	Asteraceae	yes
MAFA3	<i>Marah fabaceus</i>	California manroot	Cucurbitaceae	yes
MAOR3	<i>Marah oreganus</i>	coastal manroot	Cucurbitaceae	yes
MEAR	<i>Medicago arabica</i>	spotted medick	Fabaceae	no
MEPO3	<i>Medicago polymorpha</i>	burclover	Fabaceae	yes
MELIC	<i>Melica</i>	melicgrass	Poaceae	yes
MECA2	<i>Melica californica</i>	California melicgrass	Poaceae	yes
MEGE	<i>Melica geyeri</i>	Geyer's oniongrass	Poaceae	yes
MEHA2	<i>Melica harfordii</i>	Harford's oniongrass	Poaceae	yes
MESU	<i>Melica subulata</i>	Alaska oniongrass	Poaceae	yes
METO	<i>Melica torreyana</i>	Torrey's melicgrass	Poaceae	yes
MENTH	<i>Mentha</i>	mint	Lamiaceae	no
MEAR4	<i>Mentha arvensis</i>	wild mint	Lamiaceae	no
MEPU	<i>Mentha pulegium</i>	pennyroyal	Lamiaceae	no
MIDO	<i>Microseris douglasii</i>	Douglas' silverpuffs	Asteraceae	yes
MIAU	<i>Mimulus aurantiacus</i>	orange bush monkeyflower	Scrophulariaceae	yes
MIGU	<i>Mimulus guttatus</i>	seep monkeyflower	Scrophulariaceae	yes
MIMO3	<i>Mimulus moschatus</i>	muskflower	Scrophulariaceae	yes
MINUA	<i>Minuartia</i>	stitchwort	Caryophyllaceae	yes
MICA7	<i>Minuartia californica</i>	California sandwort	Caryophyllaceae	yes
MIDO3	<i>Minuartia douglasii</i>	Douglas' stitchwort	Caryophyllaceae	yes
MONAR2	<i>Monardella</i>	monardella	Lamiaceae	yes



Code	Taxon	Common Name	Family	Native
MOPU2	<i>Monardella purpurea</i>	serpentine monardella	Lamiaceae	yes
MOVI2	<i>Monardella villosa</i>	coyote mint	Lamiaceae	yes
MOSS	Moss	moss	Unknown	yes
MYLA4	<i>Myosotis latifolia</i>	broadleaf forget-me-not	Boraginaceae	no
MYCA13	<i>Myrica californica</i>	California wax myrtle	Myricaceae	yes
NALE2	<i>Nassella lepida</i>	smallflower tussockgrass	Poaceae	yes
NAPU4	<i>Nassella pulchra</i>	purple tussockgrass	Poaceae	yes
NAVAR	<i>Navarretia</i>	pincushionplant	Polemoniaceae	yes
NAPU2	<i>Navarretia pubescens</i>	downy pincushionplant	Polemoniaceae	yes
NARO2	<i>Navarretia rosulata</i>	San Anselmo navarretia	Polemoniaceae	yes
NASQ	<i>Navarretia squarrosa</i>	skunkbush	Polemoniaceae	yes
NEHE	<i>Nemophila heterophylla</i>	small baby blue eyes	Hydrophyllaceae	yes
NEME	<i>Nemophila menziesii</i>	baby blue eyes	Hydrophyllaceae	yes
NEPA	<i>Nemophila parviflora</i>	smallflower nemophila	Hydrophyllaceae	yes
ORBU	<i>Orobanche bulbosa</i>	chaparral broomrape	Orobanchaceae	yes
OSBE	<i>Osmorhiza berteroi</i>	sweetcicely	Apiaceae	yes
OSCH	<i>Osmorhiza chilensis</i>	sweetcicely	Apiaceae	yes
PEDE	<i>Pedicularis densiflora</i>	Indian warrior	Scrophulariaceae	yes
PEAN2	<i>Pellaea andromedifolia</i>	coffee cliffbrake	Pteridaceae	yes
PEMU	<i>Pellaea mucronata</i>	birdfoot cliffbrake	Pteridaceae	yes
PETR7	<i>Pentagramma triangularis</i>	goldback fern	Pteridaceae	yes
PEKE	<i>Perideridia kelloggii</i>	Kellogg's yampah	Apiaceae	yes
PHACE	<i>Phacelia</i>	phacelia	Hydrophyllaceae	yes
PHAQ	<i>Phalaris aquatica</i>	bulbous canarygrass	Poaceae	no
PHGR16	<i>Phlox gracilis</i>	slender phlox	Polemoniaceae	yes
PHORA	<i>Phoradendron</i>	mistletoe	Viscaceae	yes
PIMO5	<i>Pickeringia montana</i>	Montana chaparral pea	Fabaceae	yes
PIMU	<i>Pinus muricata</i>	Bishop pine	Pinaceae	yes
PIRA2	<i>Pinus radiata</i>	Monterey pine	Pinaceae	yes
PIEL2	<i>Piperia elegans</i>	elegant piperia	Orchidaceae	yes
PIEL4	<i>Piperia elongata</i>	denseflower rein orchid	Orchidaceae	yes
PITR3	<i>Piperia transversa</i>	royal rein orchid	Orchidaceae	yes
PIUN3	<i>Piperia unalascensis</i>	slender-spire orchid	Orchidaceae	yes
PLBR	<i>Plagiobothrys bracteatus</i>	bracted popcornflower	Boraginaceae	yes
PLNO	<i>Plagiobothrys nothofulvus</i>	rusty popcornflower	Boraginaceae	yes
PLANT	<i>Plantago</i>	plantain	Plantaginaceae	unknown
PLER3	<i>Plantago erecta</i>	dotseed plantain	Plantaginaceae	yes
PLLA	<i>Plantago lanceolata</i>	narrowleaf plantain	Plantaginaceae	no
PLSU2	<i>Plantago subnuda</i>	tall coastal plantain	Plantaginaceae	yes
PLTRF2	<i>Plantago truncata</i> subsp. <i>firma</i>	Chilean plantain	Plantaginaceae	no
PLCI	<i>Plectritis ciliosa</i>	longspur seablush	Valerianaceae	yes
PLCIC	<i>Plectritis ciliosa</i> subsp. <i>ciliosa</i>	longspur seablush	Valerianaceae	yes
POA	<i>Poa</i>	bluegrass	Poaceae	unknown
POSE	<i>Poa secunda</i>	Sandberg bluegrass	Poaceae	yes
POACXX	Poaceae	grass family	Unknown	unknown
POCA5	<i>Polygala californica</i>	California milkwort	Polygalaceae	yes
POAM8	<i>Polygonum amphibium</i>	water knotweed	Polygonaceae	yes
POLYP	<i>Polypodium</i>	polypody	Polypodiaceae	yes
POCA12	<i>Polypodium californicum</i>	California polypody	Polypodiaceae	yes

Code	Taxon	Common Name	Family	Native
POGL8	<i>Polypodium glycyrrhiza</i>	licorice fern	Polypodiaceae	yes
POSC4	<i>Polypodium scolieri</i>	leathery polypody	Polypodiaceae	yes
POCA25	<i>Polystichum californicum</i>	California swordfern	Dryopteridaceae	yes
POMU	<i>Polystichum munitum</i>	western swordfern	Dryopteridaceae	yes
POAN5	<i>Potentilla anserina</i>	silverweed cinquefoil	Rosaceae	yes
PRCE2	<i>Prunus cerasifera</i>	cherry plum	Rosaceae	no
PSME	<i>Pseudotsuga menziesii</i>	Douglas-fir	Pinaceae	yes
PTAQ	<i>Pteridium aquilinum</i>	brackenfern	Dennstaedtiaceae	yes
PYPI2	<i>Pyrola picta</i>	whitevein shinleaf	Pyrolaceae	yes
QUAG	<i>Quercus agrifolia</i>	California live oak	Fagaceae	yes
QUBE5	<i>Quercus berberidifolia</i>	scrub oak	Fagaceae	yes
QUCH2	<i>Quercus chrysolepis</i>	canyon live oak	Fagaceae	yes
QUDU4	<i>Quercus durata</i>	leather oak	Fagaceae	yes
QUGA4	<i>Quercus garryana</i>	Oregon white oak	Fagaceae	yes
QUKE	<i>Quercus kelloggii</i>	California black oak	Fagaceae	yes
QULO	<i>Quercus lobata</i>	California white oak	Fagaceae	yes
QUPAS2	<i>Quercus parvula</i> var. <i>shrevei</i>	Shreve oak	Fagaceae	yes
QUWI2	<i>Quercus wislizeni</i>	interior live oak	Fagaceae	yes
RACA2	<i>Ranunculus californicus</i>	California buttercup	Ranunculaceae	yes
RAMU2	<i>Ranunculus muricatus</i>	spinyfruit buttercup	Ranunculaceae	yes
RASA2	<i>Raphanus sativus</i>	cultivated radish	Brassicaceae	no
RHCA	<i>Rhamnus californica</i>	California buckthorn	Rhamnaceae	yes
RHCR	<i>Rhamnus crocea</i>	redberry buckthorn	Rhamnaceae	yes
RHOC	<i>Rhododendron occidentale</i>	western azalea	Ericaceae	yes
RIBES	<i>Ribes</i>	currant	Grossulariaceae	yes
RICA	<i>Ribes californicum</i>	hillside gooseberry	Grossulariaceae	yes
RIME	<i>Ribes menziesii</i>	canyon gooseberry	Grossulariaceae	yes
ROSA5	<i>Rosa</i>	rose	Rosaceae	unknown
ROCA2	<i>Rosa californica</i>	California wildrose	Rosaceae	yes
ROGY	<i>Rosa gymnocarpa</i>	dwarf rose	Rosaceae	yes
ROSP3	<i>Rosa spithamea</i>	ground rose	Rosaceae	yes
RUPA	<i>Rubus parviflorus</i>	western thimbleberry	Rosaceae	yes
RUUR	<i>Rubus ursinus</i>	California blackberry	Rosaceae	yes
RUMEX	<i>Rumex</i>	dock	Polygonaceae	unknown
RUAC3	<i>Rumex acetosella</i>	common sheep sorrel	Polygonaceae	no
RUCR	<i>Rumex crispus</i>	curly dock	Polygonaceae	no
RUSA	<i>Rumex salicifolius</i>	willow dock	Polygonaceae	yes
SALIX	<i>Salix</i>	willow	Salicaceae	yes
SALA3	<i>Salix laevigata</i>	red willow	Salicaceae	yes
SALA6	<i>Salix lasiolepis</i>	arroyo willow	Salicaceae	yes
SALU	<i>Salix lucida</i>	shining willow	Salicaceae	yes
SASC	<i>Salix scouleriana</i>	Scouler's willow	Salicaceae	yes
SACO6	<i>Salvia columbariae</i>	chia	Lamiaceae	yes
SAME5	<i>Sambucus mexicana</i>	common elderberry	Caprifoliaceae	yes
SANIC	<i>Sanicula</i>	sanicle	Apiaceae	yes
SABI2	<i>Sanicula bipinnata</i>	poison sanicle	Apiaceae	yes
SABI3	<i>Sanicula bipinnatifida</i>	purple sanicle	Apiaceae	yes
SACR2	<i>Sanicula crassicaulis</i>	Pacific blacksnakeroot	Apiaceae	yes
SALA7	<i>Sanicula laciniata</i>	coastal blacksnakeroot	Apiaceae	yes

Code	Taxon	Common Name	Family	Native
SATU	<i>Sanicula tuberosa</i>	turkey pea	Apiaceae	yes
SADO5	<i>Satureja douglasii</i>	yerba buena	Lamiaceae	yes
SCPE	<i>Scandix pecten-veneris</i>	shepherdsneedle	Apiaceae	no
SCMI2	<i>Scirpus microcarpus</i>	panicled bulrush	Cyperaceae	yes
SCBI	<i>Scoliopus bigelovii</i>	California fetid adderstongue	Liliaceae	yes
SCBO	<i>Scribneria bolanderi</i>	Scribner's grass	Poaceae	yes
SCCA2	<i>Scrophularia californica</i>	California figwort	Scrophulariaceae	yes
SEAR4	<i>Senecio aronicoides</i>	rayless ragwort	Asteraceae	yes
SESE3	<i>Sequoia sempervirens</i>	redwood	Taxodiaceae	yes
SHAR2	<i>Sherardia arvensis</i>	blue fieldmadder	Rubiaceae	no
SICA	<i>Sidalcea calycosa</i>	annual checkerbloom	Malvaceae	yes
SIMA2	<i>Sidalcea malviflora</i>	dwarf checkerbloom	Malvaceae	yes
SICA4	<i>Silene californica</i>	Indian pink	Caryophyllaceae	yes
SIGA	<i>Silene gallica</i>	common catchfly	Caryophyllaceae	no
SIMA3	<i>Silybum marianum</i>	blessed milkthistle	Asteraceae	no
SIBE	<i>Sisyrinchium bellum</i>	western blue-eyed grass	Iridaceae	yes
SMRAA	<i>Smilacina racemosa</i> var. <i>amplexicaulis</i>	feathery false lily of the vally	Liliaceae	yes
SMST	<i>Smilacina stellata</i>	starry false lily of the vally	Liliaceae	yes
SOSE2	<i>Soliva sessilis</i>	field burrweed	Asteraceae	no
SONCH	<i>Sonchus</i>	sowthistle	Asteraceae	no
SOAS	<i>Sonchus asper</i>	spiny sowthistle	Asteraceae	no
SOOL	<i>Sonchus oleraceus</i>	common sowthistle	Asteraceae	no
STAJ	<i>Stachys ajugoides</i>	bugle hedgenettle	Lamiaceae	yes
STPY	<i>Stachys pycnantha</i>	shortspike hedgenettle	Lamiaceae	yes
STRI	<i>Stachys rigida</i>	rough hedgenettle	Lamiaceae	yes
STME2	<i>Stellaria media</i>	common chickweed	Caryophyllaceae	no
STREP2	<i>Streptanthus</i>	twistflower	Brassicaceae	yes
STBA4	<i>Streptanthus batrachopus</i>	Mt. Tamalpais jewelflower	Brassicaceae	yes
STGL8	<i>Streptanthus glandulosus</i>	bristly jewelflower	Brassicaceae	yes
STGLP	<i>Streptanthus glandulosus</i> subsp. <i>pulchellus</i>	Mt. Tamalpais jewelflower	Brassicaceae	yes
STGLS	<i>Streptanthus glandulosus</i> subsp. <i>secundus</i>	secund jewelflower	Brassicaceae	yes
SYAL	<i>Symphoricarpos albus</i>	common snowberry	Caprifoliaceae	yes
SYMO	<i>Symphoricarpos mollis</i>	creeping snowberry	Caprifoliaceae	yes
SYCH4	<i>Symphyotrichum chilense</i>	Pacific aster	Asteraceae	yes
SYRE	<i>Synthyris reniformis</i>	snowqueen	Scrophulariaceae	yes
TAKE	<i>Tauschia kelloggii</i>	Kellogg's umbrellawort	Apiaceae	yes
THFEP2	<i>Thalictrum fendleri</i> var. <i>polycarpum</i>	Fendler's meadow-rue	Ranunculaceae	yes
THCA4	<i>Thermopsis californica</i>	California goldenbanner	Fabaceae	yes
TORIL	<i>Torilis</i>	hedgearsley	Apiaceae	no
TOAR	<i>Torilis arvensis</i>	spreading hedgearsley	Apiaceae	no
TONO	<i>Torilis nodosa</i>	knotted hedgearsley	Apiaceae	no
TOCA	<i>Torreya californica</i>	California torreya	Taxaceae	yes
TODI	<i>Toxicodendron diversilobum</i>	Pacific poison oak	Anacardiaceae	yes
TRLA6	<i>Trientalis latifolia</i>	broadleaf starflower	Primulaceae	yes
TRIFO	<i>Trifolium</i>	clover	Fabaceae	unknown
TRAL5	<i>Trifolium albopurpureum</i>	rancheria clover	Fabaceae	yes
TRBA	<i>Trifolium barbigerum</i>	bearded clover	Fabaceae	yes

Code	Taxon	Common Name	Family	Native
TRBI	<i>Trifolium bifidum</i>	notchleaf clover	Fabaceae	yes
TRCI	<i>Trifolium ciliolatum</i>	foothill clover	Fabaceae	yes
TRDE	<i>Trifolium depauperatum</i>	cowbag clover	Fabaceae	yes
TRDEA	<i>Trifolium depauperatum</i> var. <i>amplectens</i>	balloon sack clover	Fabaceae	yes
TRDU2	<i>Trifolium dubium</i>	suckling clover	Fabaceae	no
TRFU	<i>Trifolium fucatum</i>	bull clover	Fabaceae	yes
TRMA2	<i>Trifolium macraei</i>	Chilean clover	Fabaceae	yes
TRMI4	<i>Trifolium microcephalum</i>	smallhead clover	Fabaceae	yes
TRMI5	<i>Trifolium microdon</i>	thimble clover	Fabaceae	yes
TRPR2	<i>Trifolium pratense</i>	red clover	Fabaceae	no
TRSU3	<i>Trifolium subterraneum</i>	subterranean clover	Fabaceae	no
TRVA	<i>Trifolium variegatum</i>	whitetip clover	Fabaceae	yes
TRWI3	<i>Trifolium willdenovii</i>	tomcat clover	Fabaceae	yes
TRILL	<i>Trillium</i>	trillium	Liliaceae	unknown
TRCH2	<i>Trillium chloropetalum</i>	giant wakerobin	Liliaceae	yes
TROV2	<i>Trillium ovatum</i>	Pacific trillium	Liliaceae	yes
TRPU16	<i>Triphysaria pusilla</i>	dwarf owl's-clover	Scrophulariaceae	yes
TRCA21	<i>Trisetum canescens</i>	tall trisetum	Poaceae	yes
TRLA16	<i>Triteleia laxa</i>	Ithuriel's spear	Liliaceae	yes
TYPHA	<i>Typha</i>	cattail	Typhaceae	yes
TYAN	<i>Typha angustifolia</i>	narrowleaf cattail	Typhaceae	yes
TYLA	<i>Typha latifolia</i>	broadleaf cattail	Typhaceae	yes
UMCA	<i>Umbellularia californica</i>	California laurel	Lauraceae	yes
UNKN	Unknown	unknown	Unknown	unknown
URLI5	<i>Uropappus lindleyi</i>	Lindley's silverpuffs	Asteraceae	yes
URDI	<i>Urtica dioica</i>	stinging nettle	Urticaceae	yes
VAOV2	<i>Vaccinium ovatum</i>	California huckleberry	Ericaceae	yes
VAPL	<i>Vancouveria planipetala</i>	redwood insideout flower	Berberidaceae	yes
VEAM2	<i>Veronica americana</i>	American speedwell	Scrophulariaceae	yes
VICIA	<i>Vicia</i>	vetch	Fabaceae	yes
VIAM	<i>Vicia americana</i>	American vetch	Fabaceae	yes
VIGI	<i>Vicia gigantea</i>	giant vetch	Fabaceae	yes
VISA	<i>Vicia sativa</i>	garden vetch	Fabaceae	no
VIVI	<i>Vicia villosa</i>	winter vetch	Fabaceae	no
VIOLA	<i>Viola</i>	violet	Violaceae	yes
VIOC	<i>Viola ocellata</i>	pinto violet	Violaceae	yes
VISE3	<i>Viola sempervirens</i>	evergreen violet	Violaceae	yes
VULPI	<i>Vulpia</i>	fescue	Poaceae	unknown
VUBR	<i>Vulpia bromoides</i>	brome fescue	Poaceae	no
VUMI	<i>Vulpia microstachys</i>	small fescue	Poaceae	yes
VUMY	<i>Vulpia myuros</i>	rat-tail fescue	Poaceae	no
WHMO	<i>Whipplea modesta</i>	common whipplea	Hydrangeaceae	yes
WOFI	<i>Woodwardia fimbriata</i>	giant chainfern	Blechnaceae	yes
WYAN	<i>Wyethia angustifolia</i>	California compassplant	Asteraceae	yes
WYGL	<i>Wyethia glabra</i>	Coast Range mule-ears	Asteraceae	yes
XETE	<i>Xerophyllum tenax</i>	common beargrass	Liliaceae	yes
ZIFR	<i>Zigadenus fremontii</i>	Fremont's deathcamas	Liliaceae	yes
ZIMI2	<i>Zigadenus micranthus</i>	smallflower deathcamas	Liliaceae	yes

**APPENDIX 3.** Sensitive plants recorded in the 2005 vegetation surveys, with listing and habitat information by CNPS 2005.

***Amorpha californica* var. *napensis* (Napa false indigo)**

CNPS List: 1B. CNPS R-E-D Code: 2-2-3.

Global and State Ranks: G4T2 S2.2. Federal and State Listings: None.

Habitat: Occurs in openings in broadleaved upland forest, chaparral, and cismontane woodlands. Found between 120 and 2000 meters in elevation. Blooms April to July.

Number of vegetation samples species was found in 2005: 2

***Arctostaphylos hookeri* subsp. *montana* (Tamalpais manzanita)**

CNPS List: 1B. CNPS R-E-D Code: 3-1-3.

Global and State Ranks: G3T2 S2.2. Federal and State Listings: None.

Habitat: Occurs in serpentine slopes in chaparral and grasslands in the Mount Tamalpais area. Found between 160 and 760 meters in elevation. Blooms January to April.

Number of vegetation samples species was found in 2005: 41

***Arctostaphylos virgata* (Bolas manzanita)**

CNPS List: 1B. CNPS R-E-D Code: 2-2-3.

Global and State Ranks: G2 S2.2. Federal and State Listings: None.

Habitat: Occurs on sandstone or granitic soils between 60 and 700 meters in elevation, generally in broadleaved upland forest, closed-cone coniferous forest, chaparral, or north coast coniferous forest. Blooms January to April.

Number of vegetation samples species was found in 2005: 1

***Astragalus breweri* (Brewer's milkvetch)**

CNPS List: 4. CNPS R-E-D Code: 1-2-3.

Global and State Ranks: G3 S3.2. Federal and State Listings: None.

Habitat: Generally associated with serpentinite and volcanic substrates in chaparral, cismontane woodland, and valley and foothill grasslands. Populations have been lost to development and road construction. Found between 90 and 730 meters in elevation. Blooms April to June.

Number of vegetation samples species was found in 2005: 1

***Calamagrostis ophitidis* (serpentine reedgrass)**

CNPS List: 4. CNPS R-E-D Code: 1-1-3.

Global and State Ranks: G3 S3.3. Federal and State Listings: None.

Habitat: Occurs on serpentine balds and in serpentine grasslands and chaparral. Found between 90 and 1065 meters in elevation. Blooms May to June.

Number of vegetation samples species was found in 2005: 25

***Calochortus umbellatus* (Oakland star-tulip)**

CNPS List: 4. CNPS R-E-D Code: 1-2-3.

Global and State Ranks: G3 S3.2. Federal and State Listings: None.

Habitat: Occurs in chaparral, valley and foothill grassland, cismontane woodland, and mixed evergreen forest; often on serpentinite. Found between 100 and 700 meters in elevation. Blooms March to May.

Number of vegetation samples species was found in 2005: 22

***Calystegia collina* (coast range false bindweed)**

CNPS List: 4. CNPS R-E-D Code: 1-2-3.

Global and State Ranks: G4T3 S3.2. Federal and State Listings: None.

Habitat: Occurs in chaparral and grasslands as well as lower montane coniferous forest; often on serpentinite. Threatened by road maintenance. Found between 300 and 1010 meters in elevation. Blooms April to June.

Number of vegetation samples species was found in 2005: 1

***Ceanothus gloriosus* var. *exaltatus* (Point Reyes ceanothus) *Cirsium hydrophilum* var. *vaseyi* (Vasey's thistle)**

CNPS List: 4. CNPS R-E-D Code: 1-1-3.

Global and State Ranks: G3G4T3 S3.3. Federal and State Listings: None.

Habitat: Occurs primarily in chaparral, and sometimes in Douglas fir forest. Found between 30 and 610 meters in elevation. Blooms March to May.

Number of vegetation samples species was found in 2005: 1

***Cirsium hydrophilum* var. *vaseyi* (Vasey's thistle)**

CNPS List: 1B. CNPS R-E-D Code: 3-2-3.

Global and State Ranks: G1T1 S1.2. Federal and State Listings: None.

Habitat: Occurs in serpentine seeps and streams in chaparral, woodland, and broadleaf upland forest habitat. Known from fewer than ten occurrences on Mt. Tamalpais. Threatened by road construction and non-native plants. Found between 240 and 620 meters in elevation. Blooms July to September.

Number of vegetation samples species was found in 2005: 3

***Elymus californicus* (California bottlebrush grass)**

CNPS List: 4. CNPS R-E-D Code: 1-1-3.

Global and State Ranks: G3 S3.3. Federal and State Listings: None.

Habitat: Occurs in broadleafed upland forest, cismontane woodland, North Coast coniferous forest, and riparian woodland habitats. Found between 15 and 470 meters in elevation. Blooms May through August.

Number of vegetation samples species was found in 2005: 8

***Eriogonum luteolum* var. *caninum* (Tiburon buckwheat)**

CNPS List: 3. CNPS R-E-D Code: ?-2-3.

Global and State Ranks: G5T3Q S3.2. Federal and State Listings: None.

Habitat: Occurs on serpentinite slopes in valley and foothill grassland, coastal prairie and chaparral. Found between 10 and 500 meters in elevation. Blooms June to September.

Number of vegetation samples species was found in 2005: 14

***Gilia capitata* subsp. *tomentosa* (bluehead gilia)**

CNPS List: 1B. CNPS R-E-D Code: 3-3-3.

Global and State Ranks: G5T1 S1.1. Federal and State Listings: None.

Habitat: Occurs in coastal bluff scrub, especially among rock outcrops or rocky soil. Known from only three occurrences near Tomales and Salt Pt. SP. Threatened by urbanization, road maintenance, and erosion. Found between 15 and 155 meters in elevation. Blooms May-July. See Aliso 2(3):304 (1950) for revised

nomenclature. Intergrades with subsp. *capitata* in northeastern San Francisco Bay area.

Number of vegetation samples species was found in 2005: 1

***Hemizonia congesta* subsp. *leucocephala* (hayfield tarweed)**

CNPS List: 3. CNPS R-E-D Code: ?-?-3.

Global and State Ranks: G5T2T3 S2S3. Federal and State Listings: None.

Habitat: Occurs in coastal sage scrub habitat and in valley and foothill grasslands. Threatened by agriculture and urbanization, yet precise location, rarity, and endangerment information are needed. Found in elevations from 25 to 455 m. Blooms April to October. See Phytologia 73(3):259-260 (1992) for revised nomenclature. Intergrades with subsp. *congesta*; dried plants may be indistinguishable. Many herbarium collections are misidentified.

Number of vegetation samples species was found in 2005: 5

***Lessingia micradenia* var. *micradenia* (Mt. Tamalpais lessingia)**

CNPS List: 1B. CNPS R-E-D Code: 3-2-3.

Global and State Ranks: G2T1 S1.1. Federal and State Listings: None.

Habitat: Occurs in road cuts and openings in valley and foothill grasslands and chaparral, usually on serpentinite soils. Found between 100 and 500 meters in elevation. Blooms June to November.

Number of vegetation samples species was found in 2005: 4

***Linanthus acicularis* (bristly linanthus)**

CNPS List: 4. CNPS R-E-D Code: 1-2-3.

Global and State Ranks: G3 S3.2. Federal and State Listings: None.

Habitat: Occurs in chaparral, cismontane woodland, coastal prairie, and valley and foothill grassland habitats. Found between 55 and 1500 meters in elevation. Blooms April through July. Current scientific name is *Leptosiphon acicularis*. See Pittonia 2:259 (1892) for original description, and School fl. Pacif. Coast 77 (1902) for revised nomenclature.

Number of vegetation samples species was found in 2005: 3

***Linanthus grandiflorus* (largeflower linanthus)**

CNPS List: 4. CNPS R-E-D Code: 1-2-3.

Global and State Ranks: G3 S3.2. Federal and State Listings: None.

Occurs in a variety of habitats from coastal scrub and bluff scrub, to valley and foothill grassland, and to closed-cone conifer forest and cismontane woodland. Many historical occurrences extirpated by development; need status information. Found between 5 and 1220 meters in elevation. Bloom April to August. See Pittonia 2:260 (1892) for revised nomenclature, and Aliso 19(1):55-91 (2000) for taxonomic treatment.

Number of vegetation samples species was found in 2005: 1

***Lotus formosissimus* (seaside bird's-foot trefoil)**

CNPS List: 4. CNPS R-E-D Code: 1-2-1.

Global and State Ranks: G4 S3.2. Federal and State Listings: None.

Occurs in moist soils in a variety of habitats including broadleaf upland forest, closed-cone and North Coast coniferous forest, cismontane woodland, coastal bluff scrub, coastal prairie, coastal scrub, meadows, seeps, marshes and swamps, and valley and foothill grasslands. Threatened by development and competition. Found between 0 and 700 meters in elevation. Blooms March through July. See Pittonia 2:147 (1890) for revised nomenclature.

Number of vegetation samples species was found in 2005: 7

***Navarretia rosulata* (San Anselmo navarretia)**

CNPS List: 1B. CNPS R-E-D Code: 2-2-3.

Global and State Ranks: G2? S2?. Federal and State Listings: None.

Occurs in open, dry rocky slopes and grassy areas in closed-cone coniferous forest and chaparral habitats; often associated with serpentinite. Found between 200 and 635 meters in elevation. Blooms June to July.

Number of vegetation samples species was found in 2005: 13

***Streptanthus batrachopus* (Mt. Tamalpais jewelflower)**

CNPS List: 1B. CNPS R-E-D Code: 3-1-3.

Global and State Ranks: G1 S1.2. Federal and State Listings: None.

Occurs on talus serpentine outcrops in closed-cone coniferous forest and chaparral habitats. Found between 410 and 650 meters in elevation. Blooms May to June.

Number of vegetation samples species was found in 2005: 3

***Streptanthus glandulosus* subsp. *pulchellus* (Mt. Tamalpais jewelflower)**

CNPS List: 1B. CNPS R-E-D Code: 3-2-3.

Global and State Ranks: G4T1 S1.2. Federal and State Listings: None.

Occurs on serpentine slopes in chaparral and valley and foothill grassland habitats between 150 and 800 meters in elevation. Blooms May to June.

Number of vegetation samples species was found in 2005: 5

***Zigadenus micranthus* (smallflower deathcamas)**

CNPS List: 4. CNPS R-E-D Code: 1-2-3.

Global and State Ranks: G4T3 S3.2. Federal and State Listings: None.

Often occurs in vernal mesic meadows, seeps, marshes and swamps; especially on serpentinite soils. Also can occur in chaparral, cismontane woodlands, and lower montane coniferous forests. Found between 15 and 1000 meters in elevation. Blooms April to July. See Leaflets of Western Botany 2:41 (1937) for original description, and Phytologia 73(4):307-311 (1992) for revised nomenclature.

Number of vegetation samples species was found in 2005: 4