Vegetation Sampling, Mapping and Accuracy Assessment Report for Point Arena-Stornetta Unit

By

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Abstract

The California Native Plant Society (CNPS) Vegetation Program has produced a fine-scale vegetation map for the Point Arena-Stornetta Unit of the California Coastal National Monument. The vegetation map encompasses 1,668 acres and was produced using heads-up digitizing based upon 2016 National Agricultural Imagery Program (NAIP) aerial imagery from Mendocino County. The minimum mapping unit (MMU) was 1 acre, with exceptions for wetland and other special types (0.25-acre MMU). The classification and map follow the National Vegetation Classification Standard and State of California Vegetation and Mapping Standards. The map includes 45 map units, of which 35 are natural vegetation types, six are exotic vegetation types and four are non-vegetated types (e.g., coast range cliffs, developed, agriculture, dune/sand). While the primary map attribute is vegetation type, additional map attributes include structural information (e.g., herbaceous, shrub and tree cover), disturbance and site quality information. This report provides a summary of the mapping and field sampling methods, vegetation classification, and field verification that exceeded the 80% state standard for overall map accuracy. The fine-scale vegetation map and supporting field survey data provide baseline information for long-term land management, conservation, and wildlife protection within the only accessible terrestrial component of the California Coastal National Monument.

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Introduction and Background

The vegetation mapping project for the Point Arena-Stornetta Unit was completed by the California Native Plant Society (CNPS) for the US Bureau of Land Management (BLM). The project was implemented in four primary stages: 1) collection of field data to inform vegetation classification; 2) preparation of a key to the vegetation types based on survey data; 3) creation of a Unit-wide, fine-scale vegetation map based on the vegetation key; and 4) post-mapping ground truth data used to verify map accuracy. The data presented in this report and the accompanying vegetation map will allow for informed management activities, the identification and maintenance of habitat suitable for federally listed plant and animal species, and an increased understanding of ecosystem functions and processes within the Unit.

Methods

Project Location

The Point Arena-Stornetta Unit of the California Coastal National Monument, located in western Mendocino County, encompasses 1,668 acres of the only accessible land component of this marine monument, which stretches over 1,000 miles along our coastline. This unit includes coastal bluffs and shelves, onshore dunes, coastal prairies, riverbanks, and the mouth and estuary of the Garcia River.

Data Collection

Vegetation classification surveys were collected in 2017 by CNPS staff and volunteers using the CNPS-CDFW Combined Vegetation Rapid Assessment and Relevé protocol (see Appendix A). A sample allocation guided data collection by stratifying sample points across environmental gradients (e.g. soil type) within the project boundary. Supplemental data points were reviewed; including rare plant occurrences noted in the California Natural Diversity Database (CNDDB), plant specimen locations from the California Consortium of Herbaria (CCH), and new collections made through by the UC Berkeley Botanic Gardens. We also reviewed a Floristic study of Point Arena published in 1972 by Hardam and True.

Reconnaissance surveys, consisting of GPS locations and notes on vegetation type and species cover, were collected to increase the number of observations of vegetation types occurring in the area, to determine the edge of stands, and to mark transitions between one vegetation type and another.

Vegetation Mapping

Vegetation polygons were digitized using ESRI's ArcMap (version 10.5.1) at a scale of approximately 1:2000. Base imagery for mapping relied on 2016 natural color one-meter aerial imagery (1:12000 spatial accuracy) from Mendocino County (NAIP 2016). Other ancillary data aided in digitizing polygons and designating map attributes, including CalVeg (Classification and Assessment with Landsat of Visible Ecological Groupings) maps and an existing USFWS vegetation map which covered a portion of the study area (Clark 2005). In addition, CNPS reviewed other regional mapping projects, including the adjacent Manchester State Park, the

upper Garcia River (Aerial Information Systems 2007), and inland mapping of Mendocino cypress by CDFW (Keeler-Wolf et al. 2019).

For the mapping effort, the vegetation classification (Appendix B) and accompanying field key (Appendix C) were used to create a mapping classification. Most woodlands, shrublands, and herbaceous vegetation types were mapped at the Alliance or Association-level following the online Manual of California Vegetation (MCV). Mapping rules were implemented to prevent 'over-delineating', or splitting vegetation stands into polygons that lack ecological significance; and to ensure that rare types, which often occur in relatively small stands, were not overlooked. The following mapping rules were used in this project:

Minimum mapping unit (MMU) – the minimum polygon size allowed:

- 1 acre for upland vegetation types
- 0.25 acre for localized vegetation types (e.g., wetlands and riparian)
- 10-meter width for linear polygons meeting one of the above MMUs

Using the survey data available, the photo interpreter reviewed aerial photo signatures (color-texture-tone combinations) of each vegetation type. Correlations between the vegetation units and photo signatures were evaluated and refined to ensure that the map would consistently represent different vegetation types at a fine-scale resolution. After initially mapping a portion of the study area, field reconnaissance was conducted in September 2017 to verify signatures.

Accuracy Assessment

Upon completing a draft map, it was tested for accuracy using a combination of field data collection and analysis of the results. A subset (n=71) of stratified polygons was selected to ensure verification of all vegetation types mapped across the study area. The Accuracy Assessment (AA) surveys assessed the extent of the polygon, the vegetation type, and other map attributes such as cover values and disturbances. For polygons containing more than one vegetation type that meet the MMU requirements, an AA was done for each type to provide sufficient information to divide the polygon. See Appendix D for a sample AA data field form.

Data from AA field forms were entered into an MS Access database, and the vegetation types attributed by the mappers were analyzed and scored using AA survey data and accompanying ground photos. Cover and disturbance attributes were not scored but were used to update map attributes. A fuzzy logic method was used to compare the vegetation type assigned to each polygon in the map (i.e., the photo-interpreted map unit attribute) with the type assigned during field verification, instead of a straight score of correct or incorrect (Congalton and Green 1999, Foody 2002, Gopal and Woodcock 1994, Hagen 2003).

For each polygon assessed, a database code having a corresponding numeric score was assigned (see Table 1), based on the accuracy of the vegetation type identified by the mapper. For example, a polygon assigned a correct vegetation type received a score of 5 (code A), while a polygon that was incorrect at the Alliance level but correct at the Group level (or next level up in hierarchy) received a score of 3 (code D). Scores were then summed for each vegetation type, divided by the total possible score for each type, and multiplied by 100 to determine the percent accuracy. The minimum accuracy standard for California is an overall mapping score of 80%.

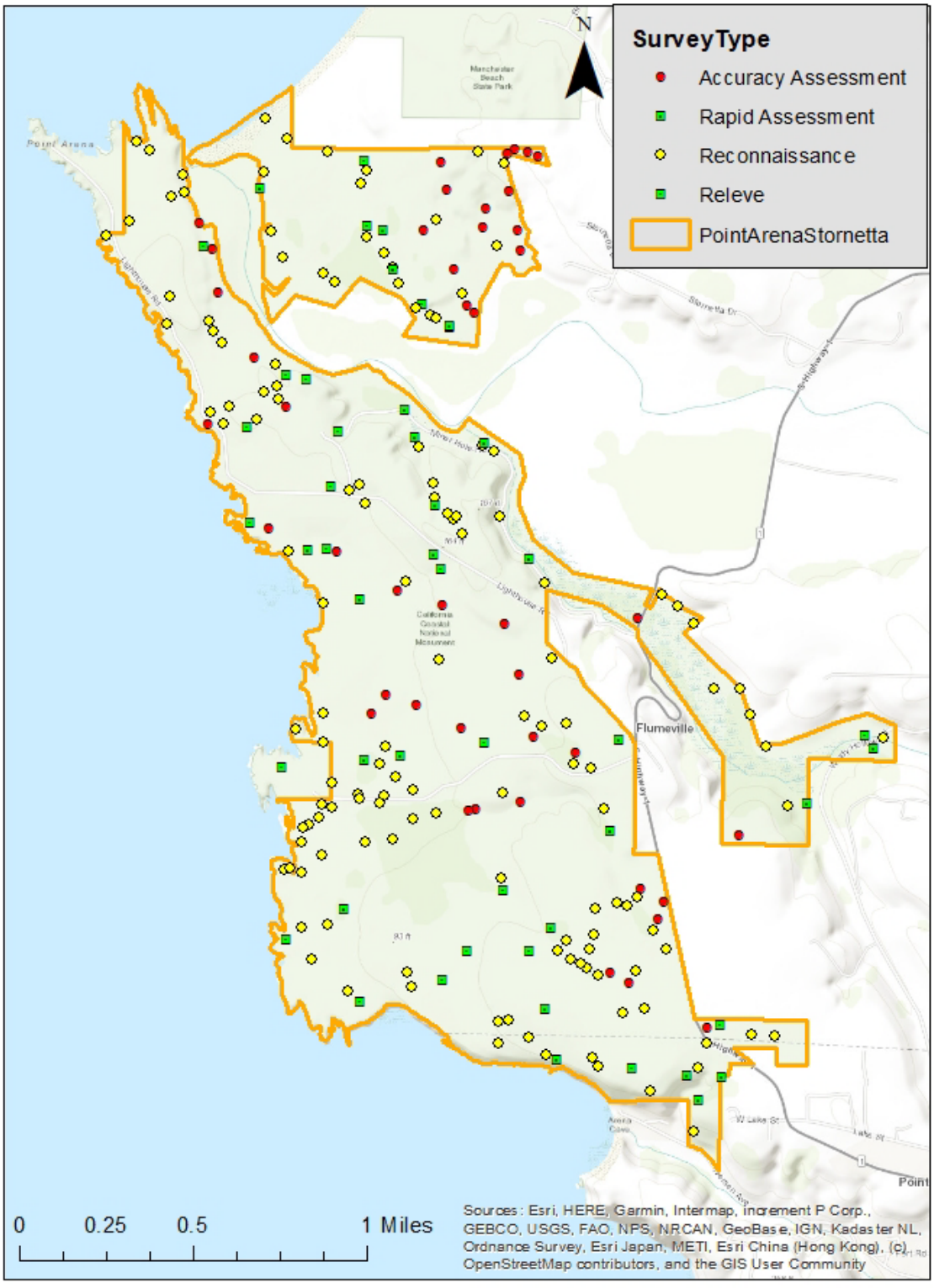

Figure 1. Point Arena study area boundary with vegetation classification surveys (Relevé and Rapid Assessment), reconnaissance surveys, and field verification locations (Accuracy Assessment) where vegetation polygons were verified for accuracy.

AA analysis helps map users determine how much confidence can be assigned to each of the map units and provides an understanding of the map's appropriateness for various applications. Two forms of accuracy, users' and producers', can be estimated from the data (Story and Congalton 1986). Users' accuracy (field verification) is conditional on the mapped classes and is defined as the probability that a location mapped as class 'i' is in fact class 'i'. This provides an estimate of how well spatial mapping data actually represents what is found on the ground (i.e., if the user goes to a location mapped as class 'i', what is the probability it is in fact vegetation class 'i'). Producers' accuracy (map user), on the other hand, is conditional on the true vegetation class in the field. The producers' accuracy for class 'j' is the probability that a location of vegetation class 'j' in the field is mapped as class 'j'. Producers' accuracy informs producers of remotely mapped data how readily a mapping class may be detected by mapping whenever it occurs on the ground (Story and Congalton 1986, Lea and Curtis 2010).

Table 1. Score code list for Accuracy Assessment analysis.

Code	Reason For Score	Score
A	PI completely correct.	5
B	Correct at the Group level OR the next level up in the hierarchy.	4
C	Threshold/transition between PI call and Final call.	4
D	Correct at the Macrogroup level OR next level up in hierarchy.	3
E	Based on close ecological similarity.	3
F	Correct Division.	2
G	Some floristic/hydrologic similarity.	2
H	Correct only at Lifeform.	1
I	No similarity above Formation and incorrect life form.	0
J	Survey removed because significant change in polygon (e.g., the stand was burned, developed, or cleared since the date of the base imagery).	N/A; no score
K	Survey removed because inadequate portion (<10%) of the polygon was viewed by the AA field crew.	N/A; no score
L	Survey removed because field/PI data is incomplete, inadequate or confusing.	N/A; no score
M	Supplementary record, not scored.	N/A; no score

Map Attributes

This section provides a list of map attributes and definitions for each polygon mapped.

Vegetation Type (MapUnit): Numeric code for the cover type (i.e., vegetation association, alliance, group, or unvegetated type like dune) assigned by the photo interpreter. The types below are Alliances unless otherwise noted (as a Macrgroup, Group or Association).

Vegetation Type and Codes	
Vegetation Name	**Code**
Native and Naturalized Vegetation Types	
Pinus muricata – Pinus radiata	1130
Pinus muricata – (Arbutus menziesii) / Vaccinium ovatum Association	1133
Hesperocyparis macrocarpa Provisional Semi-natural Association	1140
Pinus radiata plantations Semi-natural Association	1141
Pinus contorta ssp. contorta Association	1151
Acer macrophyllum – Alnus rubra	1240
Salix lucida ssp. lasiandra	1250
Eucalyptus spp. – Ailanthus altissima - Robinia pseudoacacia	1410
Vancouverian Coastal Riparian Scrub Group	1500
Rubus spectabilis – Morella californica	1510
Salix hookeriana – Salix sitchensis – Spiraea douglasii	1520
Salix hookeriana Association	1521
Salix sitchensis Provisional Association	1522
Frangula californica – Rhododendron occidentale	1610
Arctostaphylos columbiana	2110
Baccharis pilularis	2120
Gaultheria shallon – Rubus (ursinus)	2140
Garrya elliptica	3310
Lupinus arboreus	3320
Abronia latifolia – Ambrosia chamissonis	3410
Eriophyllum staechadifolium – Eriogonum latifolium Association	3411
Ammophila arenaria	3510
Mesembryanthemum spp. – Carpobrotus spp.	3520
Typha (angustifolia, domingensis, latifolia)	4010
Vancouverian Coastal/Tidal Marsh and Meadow Group	4100
Carex obnupta	4110
Juncus (effusus, patens)	4120
Oenanthe sarmentosa	4140
California Annual and Perennial Grassland Macrogroup	5000
Nuphar spp. – Potamogeton spp. – Lemna spp.	5120
Lasthenia californica – Plantago erecta – Vulpia microstachys	5320
Pteridium aquilinum – Grass Association	5411
Nassella spp. – Melica spp.	5420
Deschampsia cespitosa coastal	5610
Holcus lanatus – Anthoxanthum odoratum	5710
Poa pratensis – Agrostis gigantea – Agrostis stolonifera	5720

Vegetation Type and Codes	
Vegetation Name	**Code**
Calamagrostis nutkaensis	5910
Eleocharis (acicularis, macrostachya)	6210
Juncus arcticus (var. balticus, mexicanus)	6310
Distichlis spicata	6510
Unvegetated and Developed Types	
Pastures and Crop Agriculture	7300
Central California Coast Ranges Cliff and Canyon Group	8100
Dune/Sand	8200
Urban/Developed	9200
Water	9400

Cover: Five separate attribute entries for cover, which is defined as the percent "bird's-eye" cover within a vegetation stand. "Bird's-eye" cover is what can be seen on an air photo; therefore, it does not include the cover of understory layers that may be obscured by an overstory layer. These include Conifer Cover (**ConCov**), Hardwood Cover (**HdwdCov**), Total Tree Cover (**TreeCov**), which is the combined total cover of conifer and hardwoods, and Shrub Cover (**ShrubCov**). These were estimated in 1% increments from 0-99%. The fifth cover type of Herbaceous Cover (**HerbCov**) was estimated using cover classes.

Herbaceous Cover Classes	
Code	Range
1	<2%
2	2-9%
3	10-40%

Non-Native Plants (Exotics): Level of impact by exotic or invasive species, broken into the following categories.

Non-Native Plant Impact Levels	
Code	**Range**
0	None visible
1	Patches of exotics visible, but cover not significant (relative cover to total <33%)
2	Exotics (particularly herbaceous) significant and cover may exceed dominant vegetation strata (relative cover <66%)
3	Stand characterized by exotics (vegetation type is “exotic”) (relative cover >66%)

Roadedness: Level of impact by paved and unpaved roads. Impact is defined by proportion of polygon vegetation that is roadless. This is broken into the classes shown in the table below.

Roadedness Impact Levels	
Code	**Range**
0	None visible
1	Low (>2/3 contiguous roadless)
2	Moderate (1/3 - 2/3 contiguous roadless)
3	High (<1/3 contiguous roadless)

Development Disturbance (DevDist): Lists the level of development impact on polygon.

Development Impact Levels	
Code	**Range**
0	None visible
1	Low (>0 - 2% of polygon affected)
2	Moderate (>2% - 5% of polygon affected)
3	High (>5% of polygon affected)

Anthropogenic Alteration (AnthroAlt): Lists the level of anthropogenic alteration within each polygon.

Anthropogenic Alteration Impact Levels	
Code	**Range**
0	None visible
1	Low (>0% – 33% of polygon affected)
2	Moderate (>33% – 66% of polygon affected)
3	High (>66% of polygon affected)

CWHR Tree Size Class (CWHRclass): Size class assigned to polygons dominated by trees

CWHR Tree Size Classes	
Code	**Range**
1	Seedling (Less Than 1 ")
2	Sapling (1 to 6 ")
3	Pole (6 to 11 ")
4	Small Tree (11 to 24 ")
5	Medium/Large (Tree Greater Than 24 ")
6	Multi Layered (Size 5 Over Size 4 Or 3; Total Tree Crown Closure Greater Than 60%)

Tree Height Classes (TreeHeight): Height class assigned to polygons dominated by trees

Tree Height Classes	
Code	**Height**
1	< 1/2 meter
2	1/2-1 meter
3	1-2 meters
4	2-5 meters
5	5-10 meters
6	10-15 meters
7	15-20 meters
8	20-35 meters
9	35-50 meters

CWHR Type (CWHRType): Standard acronyms found in California Wildlife Habitat Relationship Descriptions

CWHR Name (CWHRName): Name of California Wildlife Habitat Relationship type that relates to the CWHR acronym

Land Use (LandUse): Coded land use designation

Land Use Categories	
Code	**Land Use Description**
0	Not Assigned/Not assessed
1000	Urban
2100	Non-woody row & field crops
9800	Undifferentiated water

Methods Used for attribution (MethodID): Identifies what type of field data (if any) supported the vegetation type decision for that polygon or if it was interpreted through aerial imagery.

Methods Used to Identify Polygon	
Code	**Description**
1	Rapid assessment field data
2	Relevé field data
3	Field verification
4	Photo interpretation
5	Adjacent stand info or ground photo
6	Reconnaissance
10	Accuracy Assessment

Notes: Open text field for notes by the mapper. If a data point was used to help identify the vegetation in a polygon, its database ID is included in this field.

Unique Identifier (UID): A number assigned to each polygon for the AA allocation process.

Allocated: A yes/no field for allocation for field verification during accuracy assessment.

NVCS_Name: The standardized name of the vegetation description used in the National Vegetation Classification System (see http://usnvc.org/) or the Manual of California Vegetation.

NVCS_Level: The standardized level of the vegetation description used in the National Vegetation Classification System.

CaCode: The official California code of an alliance or association.

NVCSAlliance: The alliance level of the hierarchy assigned to the map unit

NVCSGroup: The group level of the hierarchy assigned to the map unit

NVCSMG: The macrogroup level of the hierarchy assigned to the map unit

Results

In 2017, 49 vegetation classification surveys were collected within the study area (26 in the month of May, 22 in June, and one in September) to evaluate vegetation resources and establish a floristic classification before mapping. All data were quality-controlled and standardized prior to vegetation classification analysis. Additionally, a permanently marked long-term monitoring plot was established by Mendocino College staff at the field station (an inclusion within Point Arena – Stornetta Unit boundary) to detect vegetation change over time. More than 140 reconnaissance points also were collected during the 2017-18 field effort to inform the mapping stage of this project.

The attributes of sampled vegetation, including species composition, structure, and cover, were used to develop a floristic key to vegetation types of Point Arena (Appendix C) based on membership rules established in the recent Sonoma County vegetation classification (Klein et al. 2015). These vegetation classifications are hierarchical and generally follow the National Vegetation Classification Standard (Faber-Langendoen et al. 2012, FGDC 2008, Jennings et al. 2009, USNVC 2012) and *A Manual of California Vegetation* (Sawyer et al. 2009). However, some modifications of this local classification and the hierarchy will be needed once further classification and mapping of the North Coast region is completed.

More than 360 stands of vegetation were delineated and attributed during the mapping process. The two most frequently mapped types were *Gaultheria shallon – Rubus ursinus* and *Carex obnupta* alliances, while perennial grasslands covered the most acreage, including the *Holcus lanatus – Anthoxanthum odoratum* and *Deschampsia cespitosa* coastal alliances. See Figure 2 for a close-up of the map showing fine-scale delineation of vegetation types. The highlighted polygon shows an example of attributes included within each vegetation stand (polygon). Also, see Table 2 for a summary of the vegetation types mapped (with number of polygons and acreage) in the study area.

Map Accuracy

In September 2018, 44 accuracy assessment surveys (AAs) were collected throughout the mapping area (Figure 1). Based on the information collected during the AA surveys, the average producers' map accuracy across all types was 89% and the average users' map accuracy was 90%, exceeding the state standard goal of overall accuracy at 80%. Table 3 provides a summary of native and naturalized vegetated map units assessed through field verification, including their average score and associated sample size for both users' and producers' accuracy. Of the 45 mapped units, 24 were sampled to verify the map, though the majority of these had only one or two verification points per type.

After map accuracy scoring was complete, CNPS staff reviewed all polygons where the field verification name and map unit did not agree, to correct issues in photo interpretation and attribution. Overall, at least 60% of the polygons mapped were visited either during initial classification or in this accuracy assessment phase.

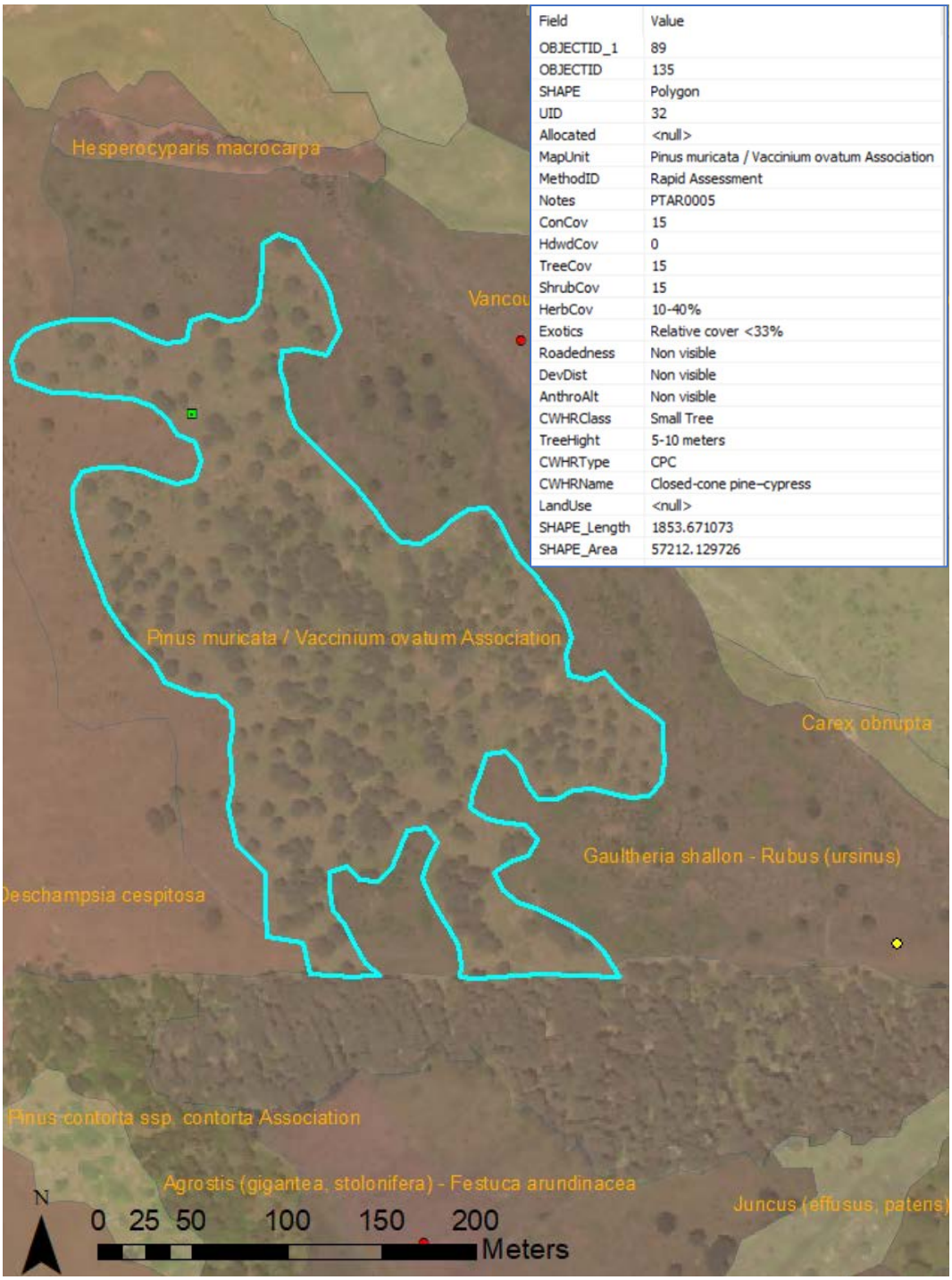

Figure 2. Depiction of the fine-scale delineation of different vegetation types in the map and the attributes included in each polygon of the map.

Table 2. Vegetation types mapped, including number of polygons (N), acres (ac), hectares (ha), and map unit (code). Types are primarily mapped at the Alliance level, unless otherwise noted below.

	MapUnit Name	N	ac	ha	code
Tree	Acer macrophyllum – Alnus rubra	6	17.4	7.0	1240
	Eucalyptus spp. – Ailanthus altissima – Robinia pseudoacacia	1	0.3	0.1	1410
	Hesperocyparis macrocarpa Provisional Semi-natural Association	31	61.7	25.0	1140
	Pinus muricata – Pinus radiata	2	7.6	3.1	1130
	Pinus muricata – (Arbutus menziesii) / Vaccinium ovatum Association	16	73.2	29.6	1133
	Pinus radiata plantations Semi-natural Association	15	67.5	27.3	1141
	Pinus contorta ssp. contorta Association	17	94.0	38.0	1151
	Salix lucida ssp. lasiandra	3	44.4	18.0	1250
Shrub	Arctostaphylos columbiana	1	1.0	0.4	2110
	Baccharis pilularis	20	94.5	38.2	2120
	Frangula californica – Rhododendron occidentale	3	10.2	4.1	1610
	Garrya elliptica Association	1	1.0	0.4	3310
	Gaultheria shallon – Rubus (ursinus)	41	243.8	98.7	2140
	Lupinus arboreus	5	21.8	8.8	3320
	Rubus spectabilis – Morella californica	19	51.4	20.8	1510
	Salix hookeriana – Salix sitchensis – Spiraea douglasii	10	46.0	18.6	1520
	Salix hookeriana Association	12	35.5	14.4	1521
	Salix sitchensis Provisional Association	2	2.6	1.1	1522
	Vancouverian Coastal Riparian Scrub Group	1	4.1	1.7	1500
Herb	Abronia latifolia – Ambrosia chamissonis	1	1.4	0.6	3410
	Poa pratensis – Agrostis gigantea – Agrostis stolonifera	9	85.9	34.8	5720
	Ammophila arenaria	9	21.9	8.9	3510
	Calamagrostis nutkaensis	6	32.9	13.3	5910
	California Annual and Perennial Grassland Macrogroup	1	1.3	0.5	5000
	Carex obnupta	38	124.1	50.2	4110
	Deschampsia cespitosa coastal	12	144.9	58.6	5610
	Distichlis spicata	3	4.4	1.8	6510
	Eleocharis (acicularis, macrostachya)	1	6.8	2.7	6210
	Eriophyllum staechadifolium – Eriogonum latifolium Association	3	1.4	0.6	3411
	Holcus lanatus – Anthoxanthum odoratum	20	253.9	102.7	5710
	Juncus (effusus, patens)	9	16.7	6.8	4120
	Juncus arcticus (var. balticus, mexicanus)	4	9.4	3.8	6310
	Lasthenia californica – Plantago erecta – Vulpia microstachys	1	7.1	2.9	5320
	Mesembryanthemum spp. – Carpobrotus spp.	1	0.2	0.1	3520

	Nassella spp. – Melica spp.	2	4.6	1.9	5420
	Nuphar spp. – Potamogeton spp. - Lemna spp.	5	5.8	2.4	5120
	Oenanthe sarmentosa	2	2.6	1.1	4140
	Pteridium aquilinum – Grass Association	6	20.6	8.3	5411
	Typha (angustifolia, domingensis, latifolia)	1	0.9	0.3	4010
	Vancouverian Coastal/Tidal Marsh and Meadow Group	3	17.4	7.0	4100
Other	Central California Coast Ranges Cliff and Canyon Group	12	59.6	24.1	8100
	Dune/Sand	4	14.1	5.7	8200
	Pastures and Crop Agriculture	1	14.6	5.9	7300
	Urban/Developed	4	6.4	2.6	9200
	Water	2	1.4	0.6	9400
Total Number of Polygons and Area Mapped		**366**	**1,738.3**	**703.5**	

Table 3. Percent accuracy of vegetation map units for both producers and for users with sample size.

Code	Vegetation Type	N-Producers	% Producers	N-Users	% Users
1130	Pinus muricata – Pinus radiata	1	100%	1	100%
1133	Pinus muricata – (Arbutus menziesii) / Vaccinium ovatum Association	2	100%	2	100%
1141	Pinus radiata plantations Semi-natural Association	0	na	1	80%
1140	Hesperocyparis macrocarpa Provisional Semi-natural Association	1	80%	0	na
1151	Pinus contorta ssp. contorta Association	1	100%	0	na
1240	Acer macrophyllum – Alnus rubra	0	na	2	70%
1250	Salix lucida ssp. lasiandra	2	80%	1	100%
1500	Vancouverian Coastal Riparian Scrub Group	1	80%	0	na
1510	Rubus spectabilis – Morella californica	1	80%	3	80%
1520	Salix hookeriana –Salix sitchensis –Spiraea douglasii	2	80%	4	85%
1521	Salix hookeriana Association	5	90%	1	100%
2120	Baccharis pilularis	0	na	2	90%
2140	Gaultheria shallon – Rubus (ursinus)	4	100%	5	92%
3320	Lupinus arboreus	1	100%	0	na
3410	Abronia latifolia – Ambrosia chamissonis	1	100%	1	100%
3510	Ammophila arenaria	4	100%	5	84%
4100	Vancouverian Coastal/Tidal Marsh and Meadow Group	2	80%	1	100%
4110	Carex obnupta	5	96%	4	100%
4120	Juncus (effusus, patens)	1	60%	1	80%
5411	Pteridium aquilinum – Grass Association	1	100%	1	100%
5610	Deschampsia cespitosa coastal	3	73%	1	100%
5710	Holcus lanatus – Anthoxanthum odoratum	2	90%	1	100%
5720	Poa pratensis – Agrostis gigantea – Agrostis stolonifera	0	na	2	70%
5910	Calamagrostis nutkaensis	0	na	1	60%
	Total Number of Samples and Average Score Across All Types	40	89%	40	90%

Discussion

A large portion of the Point Arena – Stornetta Unit is dominated by perennial herbaceous vegetation (32%) encompassing a diverse mix of native and non-native plant species, which fluctuate in composition over the growing season. More than 10% of the unit is dominated by native perennial bunchgrass prairie, including associations with *Calamagrostis nutkaensis, Deschampsia cespitosa*, and *Stipa pulchra (= Nassella pulchra)*. Polygons attributed as *Holcus lanatus – Anthoxanthum odoratum* and *Poa pratensis – Agrostis gigantea – Agrostis stolonifera* alliances are mapped in areas dominated by non-native perennial grasses. However, even in these non-native areas a rich diversity of important native species co-exist at low cover, such as Bro*mus carinatus, Danthonia californica, Pteridium aquilinum*, and *Iris douglasiana*. At least 10 mapped vegetation types are listed as sensitive by the California Department of Fish and Wildlife, covering more than 2/3 of the monument. These include tree types such as the *Pinus contorta* ssp. *contorta* and *Pinus muricata – Pinus radiata* alliances and riparian habitats dominated by willow species (*Salix*) and/or alder (*Alnus*) that thread throughout the Unit.

Much of the coastline north of the mouth of the Garcia River towards Manchester State Park is dominated and stabilized by European beach grass (*Ammophila arenaria*), though you can still find small patches of the native dune grass (*Elymus mollis*) and shifting sands that support native dune species such as beach morning glory (*Calystegia soldanella*), sand verbena (*Abronia latifolia*), and beach bur (*Ambrosia chamissonis*). Less than an acre of the highly invasive ice plant was mapped under the *Mesembryanthemum* spp. – *Carpobrotus* spp. semi-natural alliance; these stands could be targeted for removal and revegetation efforts.

Disturbances noted across the Unit include abandoned structures and infrastructure, bank erosion in riparian areas, water troughs and bare ground from cattle, naturalized cultivars and invasive species such as *Hesperocyparis macrocarpa, Pinus radiata, Cotoneaster* spp. and others. The detailed vegetation and disturbance information in the map and associated field survey data are useful tools for habitat monitoring and modeling, land management decisions, conservation, and wildlife protection in the Point Arena – Stornetta Unit.

References

Aerial Information Systems. 2007. Garcia River Vegetation Mapping Report. Photo Interpretive Guidelines for Mapping Vegetation. Unpublished report prepared for The Nature Conservancy.

California Wildlife Habitat Relations (CWHR) 2019. Online Access https://www.wildlife.ca.gov/Data/CWHR

Sander, C. 2004. Spring 2004 field survey for Viola adunca and general botanical inventory for the Stornetta Ranch, Point Arena, CA. Unpublished report and GIS map prepared for the Bureau of Land Management, Ukiah Field Office.

Congalton, R.G. and K. Green 1999. Assessing the accuracy of remotely sensed data: principles and practices. Lewis Publishers, New York.

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, P. Comer. 2012. *Macrogroups and Groups for the U.S. National Vegetation Classification*. NatureServe, Arlington, VA. + Appendices.

Federal Geographic Data Committee (FGDC). 2008. National Vegetation Classification Standard, Version 2 FGDC-STD-005-2008 (version 2). Vegetation Subcommittee, Federal Geographic Data Committee, FGDC Secretariat, U.S. Geological Survey. Reston, VA. 55 pp. + Appendices.

Foody, G.M. 2002. Status of land cover classification accuracy assessment. Remote Sensing of Environment 80:185–201.

Gopal, S. and C. Woodcock. 1994. Theory and methods for accuracy assessment of thematic maps using fuzzy sets. Photogrammetric Engineering and Remote Sensing 60:181–188.

Hagen, A. 2003. Fuzzy set approach to assessing similarity of categorical maps. International Journal of Geographical Information Science 17:235–249.

Hardam, C.B. and Gordon H. True. 1972. A floristic study of Point Arena, Mendocino County, California. Madroño, Vol. 21, No. 8, pp. 499-546.

Jennings, M.D., D. Faber-Langendoen, O.L. Loucks, R.K. Peet, and D. Roberts. 2009. Standards for associations and alliances of the U.S. National Vegetation Classification. Ecological Monographs 79: 173-199.

Keeler-Wolf, T., D. Hickson, R. Yacoub and M.J. Colletti. 2019. Classification and Mapping of Mendocino Cypress (Hesperocyparis pygmaea) Woodland and Related Vegetation on Oligotrophic Soils, Mendocino and Sonoma Counties, California. Vegetation Classification and Mapping Program, California Department of Fish and Wildlife, Sacramento, CA.

Klein, A, Todd Keeler-Wolf, and Julie M. Evens. 2015. Classification of the Vegetation Alliances and Associations of Sonoma County, California. Unpublished report.

Lea, C. and A. C. Curtis. 2010. Thematic accuracy assessment procedures: National Park Service Vegetation Inventory, version 2.0. Natural Resource Report NPS/2010/NRR—2010/204. National Park Service, Fort Collins, Colorado.

Mayer, K.E. and W.F. Laudenslayer, Jr. 1988. A guide to wildlife habitats of California. California Department of Forestry and Fire Protection, Sacramento, CA.

NAIP. 2016. National Agriculture Imagery Program. USDA Farm Service Agency, Salt Lake City, UT.

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2009. A Manual of California Vegetation, Second Edition. California Native Plant Society, Sacramento, CA.

Story, M., and R. G. Congalton. 1986. Accuracy assessment: a users' perspective. Photogrammetric Engineering and Remote Sensing 52:397–399.

U.S. National Vegetation Classification (USNVC). 2018. USNVC Hierarchy Explorer. Accessed at http://usnvc.org/explore-classification/.

USDA Forest Service. 2017. Vegetation mapping. Existing vegetation (EVEG) layers. Pacific Southwest Region Remote Sensing Lab. Accessed at https://www.fs.usda.gov/detail/r5/landmanagement/resourcemanagement/?cid=stelprdb5347192

Appendix A

CNPS Field Sampling Protocols and Sample Field Form

CDFW-CNPS Protocol for the Combined Vegetation Rapid Assessment and Relevé Field Form

(April 28, 2016)

Introduction

This protocol describes the methodology for both the Relevé and Rapid Assessment (RA) vegetation sampling techniques as recorded in the Combined Vegetation Rapid Assessment and Relevé Field Form. The same environmental data are collected for both techniques. However, the relevé sample is a plot demarcated with a measuring tape, and each species in the plot is recorded along with its cover. The rapid assessment sample is not based on a taped plot, but is based on a visually estimated, usually circular area within a representative portion of the entire stand, with up to 20 of the dominant or characteristic species and their cover values recorded.

In general, collect rapid assessments in woody vegetation and relevés in herbaceous vegetation. When working in an area that has not been sampled before, RAs in woody vegetation may list more than 20 species.

Defining a Stand

A stand is the basic physical unit of vegetation in a landscape. It has no set size. Some vegetation stands are very small, such as a portion of a vernal pool, and some may be several square kilometers in size, such as a forest type. All samples should be in stands that meet the minimum mapping unit of 1 acre for upland and 0.5 acre for special stands such as small wetlands, riparian and serpentine barrens.

A stand is defined by two main unifying characteristics:

1) 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 indistinct.
2) It has structural integrity. It has a similar history or environmental setting that affords relatively similar horizontal and vertical spacing of plant species. For example, a hillside forest originally dominated by the same species that burned on the upper part of the slopes but not the lower, would be divided into two stands. Likewise, sparse woodland occupying a slope with very shallow rocky soils would be considered a different stand from an adjacent slope with deeper, moister soil and a denser woodland or forest of the same species.

The structural and compositional features of a stand are often combined into a term called homogeneity. For an area of vegetated ground to meet the requirements of a stand, it must be homogeneous (uniform in structure and composition throughout).

Selecting a bounded plot (Relevé) or representative area (Rapid Assessment) to sample within a stand

Stands to be sampled may be selected by evaluation prior to a site visit (e.g., from aerial photos) or they may be selected on site during reconnaissance to determine extent and boundaries, location of other similar stands, etc.

Because many stands are large, it may be difficult to summarize the species composition, cover, and structure of an entire stand. We are usually trying to capture the most information as efficiently as possible. Thus, we are typically forced to select a representative portion to sample.

When sampling a stand of vegetation, the main point is to select a sample that, in as many ways possible, is representative of that stand. This means that you are not randomly selecting a plot; on the contrary, you are actively using your own best judgment to find a representative example of the stand.

Selecting a relevé plot or RA area requires that you see enough of the stand you are sampling to feel comfortable in choosing a representative plot location. Take a brief walk through the stand and look for variations in species composition and in stand structure. In hilly or mountainous terrain, look for a vantage point from which you can get a representative view of the whole stand.

Variations in vegetation that are repeated throughout the stand should be included in your plot. Once you assess the variation within the stand, attempt to find an area that captures the stand's common species composition and structural condition to sample.

Tracking sampled vegetation types

For large projects, the number of samples should be tracked daily or weekly by field-assessed Alliance type so that samples are spread as evenly as possible over types and time is not wasted collecting excessive numbers of samples of certain types. When multiple teams are in the field in the same week, daily communication between teams about Alliances sampled can ensure even sampling. *Prior to selecting a stand to sample, determine if what you are going to sample is needed based on this Alliance tracking.*

Selecting plots to avoid spatial autocorrelation

When possible, do not sample adjacent stands. Do not take more than one sample of the same vegetation type within a sub-watershed. Exceptions can be made due to limited access to private lands. For example, samples from different formations, subclasses or classes (e.g., wetlands vs. uplands, lithomorphic vs. mesomorphic) may be sampled in the same sub-watershed, however, avoid sampling a grassland adjacent to an open woodland, even though they are technically different formations.

Plot Size

All relevés of the same type of vegetation need to be the same size if they are to be analyzed together. Plot shape and size are somewhat dependent on the type of vegetation under study. Therefore, general guidelines for plot sizes of tree, shrub, and herbaceous communities have been established. Sufficient work has been done in temperate vegetation to be confident the following conventions will capture species richness:

Herbaceous communities: 100 m^2 plot
Special herbaceous communities, such as vernal pools, fens: 10 m^2 plot
Shrublands and riparian forest/woodlands: 400 m^2 plot
Open desert and other shrublands with widely dispersed but regularly occurring woody species: 1000 m^2 plot
Upland Forest and woodland communities: 1000 m^2 plot

Plot Shape

A relevé has no fixed shape, though plot shape should reflect the character of the stand and is either a square or a rectangle. Adjust the orientation and dimensions of the plot to incorporate the best approximation of stand homogeneity. If the stand is about the same size as a Relevé, the plot boundaries may be similar to that of the entire stand. If we are sampling streamside riparian or other linear communities, our plot dimensions should not go beyond the community's natural ecological boundaries. Thus, a relatively long, narrow plot capturing the vegetation within the stand, but not outside it, would be appropriate. Species present along the edges of the plot that are clearly part of the adjacent stand should be excluded from the plot.

Location of GPS Points

For Relevés, one corner will be considered the plot Identifier (ID point) and should be in the SW corner, if possible. If it is taken in another corner, this should be noted in the Site History section.

Definitions of fields in the Field Form

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION

Relevé or RA: Circle the appropriate survey type.

Database #: This is the unique ID number for Relevés and Rapid Assessments, in the form of PPPPxxxx, where PPPP is the 4-character project code and xxxx is a unique 4-digit number (e.g. CARR0001 for Carrizo sample #1). If this is a long term plot, a character from A to Z can be added to the unique ID for each re-sampling survey; so the first re-sample for CARR0001 would be CARR0001A.

Date: Date of the sampling.

UID: The ID number of a reference point that this survey describes.

Name of recorder: The full name of the recorder should be provided for the first field form for the day. On successive forms, initials can be recorded.

Other Surveyors: The full names of each person assisting should be provided for the first field form for the day. On successive forms, initials of each person assisting can be recorded.

Location Name: The name of the property or park, or the location within large holdings (like USFS or BLM properties).

GPS name: The name/number assigned to each GPS unit. This can be the serial number if another number is not assigned.

Bearing°, left axis at ID point of Long / Short side: Fill this in for Relevés only. For square or rectangular plots: from the ID Point, looking towards the plot, record the bearing of the axis to your left. If the plot is a rectangle, indicate whether the left side of the plot is the long or short side of the rectangle by circling "long" or "short" side (no need to circle anything for square plots). If there are no stand constraints, set up the plot with boundaries running in the cardinal directions and place the ID Point in the SW corner.

UTM coordinates: Easting (**UTME**) and northing (**UTMN**) location coordinates using the Universal Transverse Mercator (UTM) grid. Record the information from your GPS unit. These coordinates are always the base point of the survey. Soil samples and photos are taken from this point, and exposure, steepness, topography, etc. are measured here. If the GPS is not within the stand (i.e., the point is projected), these are the UTMs of the base point.
For Relevé plots, take the waypoint in the southwest corner of the plot whenever possible or in the center of a circular plot.

Zone: Universal Transverse Mercator zone. Zone 10 is for California west of the 120th longitude; zone 11 is for California east of 120th longitude (the straight portion of California's eastern boundary).

NAD83: This is the default GPS datum. If you use a different one, cross this out and write in the correct datum.

GPS error: ft./ m./ PDOP: Circle the appropriate unit of measure and record the error reading from the GPS unit.

Decimal degrees: *Use this only if your GPS unit will not record UTM coordinates.* Latitude–Longitude reading in decimal degrees. Record the information from your GPS unit. These coordinates are always the base point of the survey. Soil samples and photos are taken from this point, and exposure, steepness, topography, etc. are measured here.
For Relevé plots, take the waypoint in the southwest corner of the plot whenever possible or in the center of a circular plot.

GPS within stand? Yes / No: Circle "Yes" to denote that the GPS waypoint was taken directly within or at the edge of the stand being assessed for a Rapid Assessment, or circle "No" if the waypoint was taken at a distance from the stand (such as with a binocular view of the stand). If the point is taken at the edge of the stand, note the direction to the stand.

If No, cite from GPS to stand: distance (m), bearing°, inclination°: From the base GPS point, measure the distance to the projected point using a range finder. Record the compass bearing from the base point to the projected point; record the inclination if the base and projected points are not at the same elevation.
and record Base point ID: This is the waypoint # of the base GPS point, where the surveyors were standing to record the distance survey.
and Projected UTMs: These are the coordinates of the projected point, the point being surveyed. They are generated in the field if the GPS units have the ability to calculate projected points. If the GPS unit does not have this capability, make a note to that effect and leave these fields blank.

Camera Name: Write the camera name.

Cardinal photos at ID point: Take four photos in the main cardinal directions (N, E, S, W) clockwise from the north, from the ID Point, and record the jpeg numbers here. Try to include the horizon in at least some of these photos. If this is a distance survey to a projected point, take the four cardinal photos at the base point and at least one photo of the stand. A digital camera with a minimum 10 megapixel resolution must be used.

Other photos: This may include cardinal photos at additional corners or other relevant photos. Notes regarding photo locations or subjects can go here.

Stand Size: Estimate the size of the entire stand in which the sample is taken. As a measure, one acre is about 4,000 square meters (approximately 64 x 64 m), or 208 feet by 208 feet. One acre is similar in size to a football field.

Plot Size: If this is a Relevé, circle "100" for a 100m^2 plot, or record the plot size.

Plot Shape: Record the length and width of the Relevé plot in meters.

RA Radius: Enter the radius in meters of the visually estimated sample area for Rapid Assessments (should be a 20-meter radius at minimum). For a large stand, this limits the area covered by the RA. If you can see and assess the entire stand, the length and width should be recorded. If it is a long, narrow stand, note the width of the stand at your location. If your point is on the edge of the stand, record the radius into the stand, but note your location and the direction to which the RA Radius applies in the Site History section.

Exposure: (Enter Actual ° and circle general category): While facing in the general downhill direction, read degrees of the compass for the aspect or the direction you are standing, using degrees from north, adjusted for declination. Average the reading over the entire stand, even if you are sampling a Relevé plot, since your plot is representative of the stand. If estimating the exposure, write "N/A" for the actual degrees, and circle the general category chosen. "Variable" may be selected if the same, homogenous stand of vegetation occurs across a varied range of slope exposures.

Steepness: (Enter Actual ° and circle general category): Read degree slope from your compass. If estimating, write "N/A" for the actual degrees, and circle the general category chosen. Make sure to average the reading across the entire stand even if you are sampling in a Relevé plot.

Topography: First assess the broad (**Macro**) topographic feature or general position of the stand in the surrounding watershed, that is, the stand is at the top, upper (1/3 of slope), middle (1/3 of slope), lower (1/3 of slope), or bottom. **Circle *all* of the positions that apply for macrotopography.**
Then assess the local (**Micro**) topographic features or the lay of the area (e.g., surface is flat or concave). **Circle only *one* of the microtopographic descriptors**.

Geology code: Geological parent material of stand. If exact type is unknown, use a more general category (e.g., igneous, metamorphic, sedimentary). *See code list for types.*

Soil Texture code: Record soil texture that is characteristic of the plot (*e.g.,* coarse loamy sand, sandy clay loam). *See soil texture key for types.*

Upland or Wetland/Riparian: Indicate if the stand is in upland or wetland/riparian setting. (Wetland and riparian are one category.) Note that a site need not be officially delineated as a wetland to qualify as such in this context (e.g., seasonally wet meadow).

% Surface cover: The abiotic substrates of the plot. The total should sum to 100%. It is helpful to imagine "mowing off" all of the live vegetation at the base of the plants and removing it – you will be estimating what is left covering the surface. Note that non-vascular cover (lichens, mosses, cryptobiotic crusts) is not estimated in this section.

H_2O:	Percent surface cover of running or standing water, ignoring the substrate below the water.
BA Stems:	Percent surface cover of the basal area of stems at the ground surface. For most vegetation types, BA is 1-3% cover.
Litter:	Percent surface cover of litter, duff, or wood on the ground.
Bedrock:	Percent surface cover of bedrock, including outcrops.
Boulder:	Percent surface cover of rocks >60 cm in the longest dimension.
Stone:	Percent surface cover of rocks >25–60 cm in the longest dimension.
Cobble:	Percent surface cover of rocks >7.5–25 cm in the longest dimension.
Gravel:	Percent surface cover of rocks 2 mm–7.5 cm in the longest dimension.
Fines:	Percent surface cover of bare ground and fine sediment <2 mm in the longest dimension (*e.g.,* dirt, sand).

% Current year bioturbation: Estimate the percent of the plot exhibiting soil disturbance by any organism that lives underground. Do not include disturbance by ungulates. Note that this is a separate estimation from surface cover.

Past bioturbation present? Circle Yes if there is evidence of bioturbation from previous years in the plot.

% Hoof punch: Note the percent of the plot surface that has been punched down by hooves (cattle or native grazers) in wet soil. Depressions must be >2 cm deep.

Fire Evidence: Circle Yes if there is visible evidence of fire within the stand, and note the type of evidence in the "Site history, stand age, comments section," for example, "charred dead stems of *Quercus berberidifolia* extending 2 feet above resprouting shrubs." If you are certain of the year of the fire, put this in the Site history section.

Site history, stand age, comments: Briefly describe the stand age/seral stage, disturbance history, nature and extent of land use, and other site environmental and vegetation factors, such as distribution of species. Examples of disturbance history: fire, landslides, avalanching, drought, flood, animal burrowing, or pest outbreak. Also, try to estimate year or frequency of disturbance. Examples of land use: grazing, timber harvest, or mining. Examples of other site factors: exposed rocks, soil with fine-textured sediments, high litter/duff build-up, multi-storied vegetation structure, or other stand dynamics.

Disturbance code / Intensity (L,M,H): List codes for potential or existing impacts on the stability of the plant community. See code list for impacts and definitions of levels of disturbance. Characterize each impact each as **L** (=Light), **M** (=Moderate), or **H** (=Heavy). Disturbance is evaluated on a stand basis.

II. HABITAT AND VEGETATION DESCRIPTION

California Wildlife Habitat Relationships (CWHR)

For CWHR, identify the size/height class of the plot using the following tree, shrub, and/or herbaceous categories. These categories are based on functional life forms.

Tree DBH: Circle one of the tree size classes provided when the tree canopy closure exceeds 10% of the total cover, or if young tree density indicates imminent tree dominance. Size class is based on the average diameter at breast height (dbh) of each trunk (standard breast height is 4.5ft or 137cm). When marking the main size class, make sure to estimate the mean diameter of all trees over the entire stand, and weight the mean toward the larger tree dbh's. The "**T6 multi-**

layered" dbh size class signifies a multi-layered tree canopy (with a size class T3 and/or T4 layer growing under a T5 layer and a distinct height separation between the classes) exceeding 60% total cover. Stands in the T6 class need also to contain at least 10% cover of size class 5 (>24" dbh) trees growing over a distinct layer with at least 10% combined cover of trees in size classes 3 (>6-11" dbh) or 4 (>11-24" dbh).

Shrub: Circle one of the shrub size classes provided when shrub canopy closure exceeds 10% (except in desert types) by recording which class is predominant in the survey. Shrub size class is based on the average amount of crown decadence (dead standing vegetation on live shrubs when looking across the crowns of the shrubs).

Herbaceous: Circle one of the herb height classes when herbaceous cover exceeds 2% by recording the predominant class in the survey. Note*: This height class is based on the average plant height at maturity, not necessarily at the time of observation.*

Desert Palm/Joshua Tree: Circle one of the palm or Joshua tree size classes by averaging all the stem-base diameters (i.e., mean diameter of all stem-base sizes). Diameter is measured at the plant's base above the bulge near the ground.

Desert Riparian Tree/Shrub: Circle one of the size classes by measuring mean stem height (whether tree and/or shrub stand).

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: Enter the name of the Alliance following the Manual of California Vegetation, 2nd Edition (Sawyer, Keeler-Wolf and Evens 2009). Please use scientific nomenclature, *e.g., Quercus agrifolia* forest. An Alliance is based on the dominant or diagnostic species of the stand, and usually reflects the uppermost and/or dominant height stratum. A dominant species covers the greatest area. A diagnostic species is consistently found in some vegetation types but not others.

The field-assessed Alliance name may not exist in the present classification, in which case you can provide a new Alliance name in this field. If this is the case, also make sure to state that it is not in the MCV under "Explain" below.

Field-assessed Association name (optional): Enter the name of the species in the Alliance and additional dominant/diagnostic species from any strata. In following naming conventions, species in differing strata are separated with a slash, and species in the uppermost stratum are listed first (*e.g., Quercus douglasii / Toxicodendron diversilobum*). Species in the same stratum are separated with a dash (*e.g., Quercus lobata – Quercus douglasii)*.

The field-assessed Association name may not exist in the present classification, in which you can provide a new Association name in this field.

Adjacent Alliances/direction: Identify other vegetation types that are directly adjacent to the stand being assessed by noting the dominant species (or known type). Also note the distance in meters from the GPS waypoint and the direction in degrees that the adjacent alliance is found (*e.g., Amsinckia tessellata* / 50m, 360° N or *Eriogonum fasciculatum* / 100m, 110°).

Confidence in Alliance identification: (L, M, H) With respect to the "Field-assessed Alliance name," note whether you have L (=Low), M (=Moderate), or H (=High) confidence in the interpretation of this Alliance name.

Explain: Please elaborate if your "Confidence in Alliance identification" is low or moderate. Low confidence can occur from such things as a poor view of the stand, an unusual mix of species that does not meet the criteria of any described Alliance, or a low confidence in your ability to identify species that are significant members of the stand.

Phenology: Indicate early (E), peak (P), or late (L) phenology for each of the strata. For herbs, this generally indicates if species are in flower and/or fruit and are therefore identifiable. For shrubs and trees, this attribute generally refers to cover, e.g., a tree that is fully leafed out will be considered

peak (P) even if it is not in flower. Phenology is useful for cover estimation and species identification issues, and should be elaborated upon in the next field.

Other identification or mapping information: Discuss any further problems with the identification of the assessment or issues that may be of interest to mappers. Note if this sample represents a type that is likely too small to map.

IV. VEGETATION DESCRIPTION

Database #: Copy the database # from Page 1.

Overall Cover of Vegetation

Provide an estimate of cover for the life-form categories below. Record a specific number for the total aerial cover or "bird's-eye view" looking from above for each category, estimating cover for the living plants only. Litter/duff should not be included in these estimates.

The *porosity* of the vegetation should be taken into consideration when estimating percent foliar cover for all categories below: consider how much of the sky you can see when you are standing under the canopy of a tree, or how much light passes through the canopy of the shrub layer to help you estimate foliar cover.

% NonVasc cover: The total cover of all lichens, bryophytes (mosses, liverworts, hornworts), and cryptogamic crust on substrate surfaces including downed logs, rocks and soil, but not on standing or inclined trees or vertical rock surfaces.

Total % Vasc Veg cover: The total cover of all vascular vegetation taking into consideration the porosity, or the holes, in the vegetation, and disregarding overlap[1] of the various tree, shrub, and/or herbaceous layers and species.

% Cover by Layer

Conifer Tree /Hardwood Tree: The total foliar cover (considering porosity) of all live tree species, disregarding overlap[1] of individual trees. Estimate conifer and hardwood covers separately. **Please note:** These cover values should not include the coverage of regenerating tree species (i.e., tree seedlings and saplings).

Regenerating Tree: The total foliar cover of seedlings and saplings, disregarding overlap[1] of individual recruits. See seedling and sapling definitions below.

Shrub: The total foliar cover (considering porosity) of all live shrub species disregarding overlap[1] of individual shrubs.

Herbaceous: The total cover (considering porosity) of all herbaceous species, disregarding overlap[1] of individual herbs.

Height Class by Layer

Modal height for conifer tree / hardwood tree, regenerating tree, shrub, and herbaceous categories. Record an average height value for each category by estimating the mean height for each group. Please use the following height intervals to record a height class: 1 = <1/2 m, 2 = 1/2-1 m, 3 = 1-2 m, 4 = 2-5 m, 5 = 5-10 m, 6 = 10-15 m, 7 = 15-20 m, 8 = 20-35 m, 9 = 35-50 m, 10 => 50 m.

Note: For the herbaceous layer height, this height class is based on the average plant height at the time of observation, as opposed to how this is recorded in the CWHR section (at maturity).

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[1] Porosity reduces the total cover of the canopy. Overlapping strata should not be included in the total cover percent; for instance, if a shrub is growing under a tree, only the cover of the tree will be added into the total; the cover of the shrub will be disregarded, except for the amount by which it fills in the porosity of the tree canopy.

Species List and Coverage

For Rapid Assessments: List up to 20 species that are dominant or that are characteristically consistent within the assessment area. These species may or may not be abundant, but they should be constant representatives in the survey. When different layers of vegetation occur, make sure to list species from each stratum. As a general guide, make sure to list at least 1-2 of the most abundant species per stratum. There is a heavy line on the form under the 20th line to limit the RA section of the species list.
Note: If constant, diagnostic, or interesting species occur outside the assessment area but in the stand, list the species and estimated stand cover in the Site History section.

For Relevés: list all species present in the plot, using a second species list page if necessary.
** If using a second species list page, note "Continued" on the bottom of the first page and be sure to note the Database # on the second page.

For both sample types, provide the stratum:

T = Tree. A woody perennial plant that has a single trunk.

A = SApling. 1" - <6" dbh and young in age, OR small trees that are <1" dbh, are clearly of appreciable age, and are kept short by repeated browsing, burning, or other disturbance. Includes trees that are re-sprouting from roots or stumps following fire, logging or other disturbance. These re-sprouts may exhibit a shrubby form, with multiple small trunks, but are species that are generally considered trees. If a majority of the trunks are >6" dbh, then the re-sprouts would be recorded under the "Tree" stratum.

E = SEedling. A tree species clearly of a very young age that is <1" dbh or has not reached breast height. Applies only to trees propagating from seed; resprouts are not recorded here even if they meet the size requirements.

S = Shrub. A perennial, woody plant, that is multi-branched and doesn't die back to the ground every year.

H = Herb. An annual or perennial that dies down to ground level every year.

N = Non-vascular. Includes moss, lichen, liverworts, hornworts, cryptogammic crust, and algae.

Be consistent and don't break up a single species into two separate strata. The only time it would be appropriate to do so is when one or more tree species are regenerating, in which case the SEedling and/or SApling strata should be recorded for that species. These may be noted on the same line, *e.g.:*

Strata	Species	%Cover	C
T/A/E	Quercus douglasii	40/<1/<1	

In some cases, the stratum of a particular species might not be obvious. Some examples are *Juniperus californica,* which has the size and growth habit of a shrub, but it is considered a tree, and mistletoe, which is considered a shrub. It is useful to have a list of species with ambiguous strata for each project. Consult the MCV or contact VegCAMP if you are unsure.

C. If a species collection is made, it should be indicated in the collection column with a "C" (for collected). If the species is later keyed out, cross out the species name or description and write the keyed species name in pen on the data sheet. Do not erase what was written in the field, because this information can be used if specimens get mixed up later. If the specimen is then thrown out, add a "T" to the "C" in the collection column (CT = thrown out after confirmation) or cross out the "C". If the specimen is kept but is still not confidently identified, add a "U" to the "C" in the collection column (CU = collected and unconfirmed). In this case the unconfirmed species epithet should be put in parentheses [*e.g., Hordeum (murinum)*]. If the specimen is kept and is confidently identified, add a "C" to the existing "C" in the collection column (CC = collected and confirmed). If the specimen is later deposited in an herbarium, add a "D" to the existing "C" in the collection column (CD = collected and deposited) and note the receiving herbarium.

Use Jepson Manual nomenclature. Write out the genus and species of the plant. Do not abbreviate except for dominant species that do not have ambiguous codes. If you aren't sure there aren't duplicate codes, don't use a code. When uncertain of an identification (which you intend to confirm later) use parentheses to indicate what part of the determination needs to be confirmed. For example, you could write out *Brassica* (*nigra*) if you are sure it is a *Brassica* but you need further clarification on the specific epithet.

Provide the % absolute foliar cover for each species listed, considering porosity. When estimating, it is often helpful to think of coverage in terms of the following cover intervals at first:

<1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%.

Keeping these classes in mind, refine your estimate to a specific percentage. All species percent covers may total over 100% because of overlap.
Include the percent cover of snags (standing dead) of trees and shrubs. Use the code "SNAG." Note their species, if known, in the "Species" column (i.e. SNAG – *Quercus wislizeni*).

For Rapid Assessments, make sure that the major non-native species occurring in the stand also are listed in the space provided in the species list with their strata and % cover.

For Relevés, all non-native species should be included in the species list.

Also for Relevés, record the <1% cover in one of two categories: "r" for trace (i.e., rare in plot, or solitary individuals) and "+" for <1% but not rare or solitary individuals.

Unusual species: List species that are locally or regionally rare, endangered, or atypical (e.g., range extension or range limit) within the stand. This field will be useful to the Program for obtaining data on regionally or locally significant populations of plants.

Note: Field forms are generally filled out in pencil, so that changes may be made easily while working in the plot or stand. Once out of the stand, however, entries on the field form should not be erased, but should be crossed out and corrected in a different-colored ink.

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised April 28, 2016)

ryacomb 6/21/17

For Office Use:	Final database #:	Final vegetation type:	Alliance Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION — circle: Relevé or RA

Database #:	Date:	Name of recorder: JSR
PTAR0022	5/18/17	Other surveyors:
		Location Name: Pt. Arena

GPS name: DRAB — For Relevé only: Bearing°, left axis at ID point_____ of Long / Short side

UTME _____ UTMN _____ Zone: 11 NAD83 GPS error: ft. / m. / PDOP 5

Decimal degrees: LAT 38.929235 LONG 123.723733

GPS within stand? Yes / No If No, cite from GPS to stand: distance (m) _____ bearing ° _____ inclination ° _____

and record: Base point ID _____ Projected UTMs: UTME _____ UTMN _____

Camera Name: JUG Cardinal photos at ID point: 94-97 (N)

Other photos:

Stand Size (acres): <1, (1-5), >5 | Plot Size (m²): 100 / _____ | Plot Shape ___ x ___ m | RA Radius 30 m

Exposure, Actual °: 138 NE NW (SE) SW Flat Variable | Steepness, Actual °: 1 0° (1-5°) > 5-25° > 25

Topography: Macro: top upper (mid) lower bottom | Micro: convex flat concave (undulating)

Geology code: _____ Soil Texture code: MESA | (Upland) or Wetland/Riparian (circle one)

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

H_20: 0 BA Stems: 2 Litter: 98 Bedrock: 0 Boulder: 0 Stone: 0 Cobble: 0 Gravel: 0 Fines: 1 =100%

% Current year bioturbation 0 Past bioturbation present? Yes / (No) | % Hoof punch 0

Fire evidence: Yes / (No) (circle one) If yes, describe in Site history section, including date of fire, if known.

Site history, stand age, comments: Dense stand of Pinus contorta. Some areas on westside of stand have little to no understory. There is an strip of the stand that has dead trees and a lot of woody debris.

Disturbance code / Intensity (L,M,H): ___/___ ___/___ ___/___ ___/___ ___/___ "Other" _____/___

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover)

Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), S3 mature (1-25% dead), S4 decadent (>25% dead)

Herbaceous: H1 (<12" plant ht.), H2 (>12" ht.)

~~Desert Riparian Tree/Shrub:~~ 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)

~~Desert Palm/Joshua Tree:~~ 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: Pinus contorta ssp. Contorta

Field-assessed Association name (optional): _____

Adjacent Alliances/direction: _____/_____, _____/_____

Confidence in Alliance identification: L M H Explain: _____

Phenology (E,P,L): Herb P Shrub P Tree P Other identification or mapping information:

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Combined Vegetation Rapid Assessment and Relevé Field Form
(Revised April 28, 2016)
SPECIES SHEET

Database #: PTAR0022

IV. VEGETATION DESCRIPTION

% NonVasc cover: 1 **Total % Vasc Veg cover:** 67

% Cover - **Conifer tree / Hardwood tree:** 55 / — **Regenerating Tree:** — **Shrub:** 13 **Herbaceous:** 11

Height Class **- Conifer tree / Hardwood tree:** 05 / — **Regenerating Tree:** — **Shrub:** 4 **Herbaceous:** 2

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular
% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
T	Pinus contorta contorta	55		
S	Vaccinium ovatum	6		
	Rubus ursinus	1		
	Morella californica	4		
	Frangula californica	3		
	Gaultheria shallon	+1		
	Rubus spectabilis	1		
H	Carex obnupta	5		
	Pteridium aquilinum	7		
	Senecio minimus	+		
	Heart Leaf	1	C	
	Polystichum munitum	+		
	Juncus sp. (effusus)	+	C	
N	Lichen on trees	+		
N	Moss	1		

Unusual species: _____

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Appendix B

Hierarchical Vegetation Classification

Hierarchical list of alliances and associations encountered in Point Arena, organized within the USNVC structure. This hierarchy is consistent with the version of the USNVC used in the Sonoma Classification (Klein et. al. 2015). Map Unit codes are in parentheses following type name. These codes match the map units for the nearby CDFW Mendocino cypress project.

Mesomorphic Tree Vegetation (Forest and Woodland) Formation Class
Temperate Forest Formation Subclass
Warm Temperate Forest Formation
Madrean Forest and Woodland Division
California Forest and Woodland Macrogroup
Californian Evergreen Coniferous Forest and Woodland Group
Hesperocyparis macrocarpa – Pinus radiata Semi-Natural Alliance
Hesperocyparis macrocarpa Semi-Natural Association (1140)
Pinus radiata plantations Semi-Natural Association (1141)
Pinus contorta ssp*. contorta* Alliance
Pinus contorta ssp*. contorta* Association (1151)
Pinus muricata – Pinus radiata Alliance (1130)
Pinus muricata – (Arbutus menziesii) / Vaccinium ovatum Association (1133)
Cool Temperate Forest Formation
North American Introduced Evergreen Broadleaf and Conifer Forest Division
Introduced North American Mediterranean Woodland and Forest Macrogroup
Introduced North American Mediterranean Woodland and Forest Group
Eucalyptus spp. - *Ailanthus altissima - Robinia pseudoacacia* Semi-Nat. Alliance (1410)
Eucalyptus (globulus, camaldulensis) Semi-Natural Association
Temperate Flooded and Swamp Forest Formation
Western North America Flooded and Swamp Forest Division
Southwestern North American Riparian, Flooded and Swamp Forest Macrogroup
Southwestern North American riparian/wash Scrub Group
Frangula californica – Rhododendron occidentale Provisional Alliance (1610)
Frangula californica ssp*. californica* Provisional Association
Western Cordilleran Montane–Boreal Riparian Scrub Macrogroup
Vancouverian Coastal Riparian Scrub Group (1500)
Rubus spectabilis – Morella californica Alliance (1510)
Morella californica – Rubus spp. Provisional Association
Rubus spectabilis Association
Salix hookeriana – Salix sitchensis – Spiraea douglasii Provisional Alliance (1520)
Salix hookeriana Association (1521)
Salix sitchensis Provisional Association (1522)
Vancouverian Riparian Deciduous Forest Group (1200)
Acer macrophyllum – Alnus rubra Alliance (1240)
Alnus rubra / Rubus spp. Provisional Association

Salix lucida ssp. *lasiandra* Alliance (1250)
Salix lucida ssp. *lasiandra* Association
Mesomorphic Shrub and Herb Vegetation (Shrubland and Grassland) Formation Class
Temperate and Boreal Shrubland and Grassland Formation Subclass
Temperate and Boreal Bog and Fen Formation
North American Scrub and Herb Peatland Division
Western North American Montane/Boreal Peatland Macrogroup
North Pacific Acidic Open Bog & Fen Group
Rhododendron columbianum Alliance
Mediterranean Scrub and Grassland Formation Subclass
Mediterranean Scrub Formation
California Scrub Division
California Chaparral Macrogroup
California Maritime Chaparral Group
Arctostaphylos columbiana Provisional Alliance (2110)
California Coastal Scrub Macrogroup
California North Coastal & Mesic Scrub Group (2100)
Baccharis pilularis Alliance (2120)
Baccharis pilularis – (*Frangula californica)* – *Rubus* spp. Provisional Association
Garrya elliptica Provisional Association (3310)
Gaultheria shallon – Rubus (ursinus) Provisional Alliance (2140)
Gaultheria shallon – Rubus spp. Provisional Association
Rubus ursinus Association
Mediterranean Grassland and Forb Meadow Formation
California Grassland and Meadow Division
California Annual and Perennial Grassland Macrogroup (5000)
California Annual Herb/Grass Group (5300)
Lasthenia californica – Plantago erecta – Vulpia microstachys Alliance (5320)
Lasthenia californica – Plantago erecta – Hesperevax sparsiflora Association
California Perennial Grassland Group (5400)
Bromus carinatus – Elymus glaucus Alliance (5410)
Pteridium aquilinum – Grass Association (5411)
Nassella spp. – *Melica* spp. Provisional Alliance (5420)
Nassella pulchra – Plantago lanceolata Association
Corethrogyne filaginifolia – Eriogonum (elongatum, nudum) Alliance
Mediterranean California Naturalized Annual and Perennial Grassland Group
Temperate and Boreal Shrubland and Grassland Subclass
Temperate Grassland, Meadow, and Shrubland Formation
Vancouverian and Rocky Mountain Grassland and Shrubland Division
Western Cordilleran Montane-Boreal Wet Meadow Macrogroup
Western Cordilleran Montane-Boreal Mesic Wet Meadow Group
Deschampsia cespitosa coastal Alliance (5610)
Deschampsia cespitosa var*. holciformis* Association
Deschampsia cespitosa – Eryngium armatum Association
Deschampsia cespitosa / Rosa nutkana Provisional Association
Western North American Temperate Grassland and Meadow Macrogroup

Vancouverian and Rocky Mountain Naturalized Perennial Grassland Group
Poa pratensis – Agrostis gigantea – Agrostis stolonifera Semi-Natural Alliance (5720)
Holcus lanatus – Anthoxanthum odoratum Semi-Natural Alliance (5710)
Holcus lanatus – Anthoxanthum odoratum Semi-Natural Association
Western Cordilleran Montane Shrubland and Grassland Macrogroup
Western Cordilleran Montane Moist Graminoid Meadow Group
Hordeum brachyantherum Alliance
Hordeum brachyantherum Association
Vancouverian Lowland Grassland and Shrubland Macrogroup
Vancouverian Coastal Grassland Group
Calamagrostis nutkaensis Alliance (5910)
Calamagrostis nutkaensis / Baccharis pilularis Association
Calamagrostis nutkaensis – Carex (obnupta) – Juncus (patens) Association
Temperate and Boreal Scrub and Herb Coastal Vegetation Formation
Pacific Coast Scrub and Herb Littoral Vegetation Division
Vancouverian Coastal Dune and Bluff Macrogroup
California Coastal Evergreen Bluff and Dune Scrub Group
Lupinus arboreus Semi-Natural Alliance (3320)
Lupinus arboreus / *Bromus diandrus* Association
Vancouverian/Pacific Dune Mat Group
Abronia latifolia – Ambrosia chamissonis Alliance (3410)
Ambrosia chamissonis Association
Eriophyllum staechadifolium – Erigeron glaucus – Eriogonum latifolium Alliance
Eriophyllum staechadifolium – Eriogonum latifolium Association (3411)
Leymus mollis Alliance
California–Vancouverian Semi-Natural Littoral Scrub and Herb Group
Ammophila arenaria Semi-Natural Alliance (3510)
Mesembryanthemum spp. – *Carpobrotus* spp. Provisional Semi-Natural Alliance (3520)
Temperate and Boreal Freshwater Marsh Formation
Western North American Freshwater Marsh Division
Western North American Freshwater Marsh Macrogroup
Arid West Freshwater Emergent Marsh Group
Typha (angustifolia, domingensis, latifolia) Alliance (4010)
Vancouverian Coastal/Tidal Marsh and Meadow Group (4100)
Carex obnupta Alliance (4110)
Carex obnupta Association
Juncus (effusus, patens) Provisional Alliance (4120)
Juncus effusus Association
Juncus phaeocephalus Association
Juncus lescurii Alliance
Juncus breweri Provisional Association
Oenanthe sarmentosa Alliance (4140)
Oenanthe sarmentosa Association
Western North America Vernal Pool Macrogroup
Californian Mixed Annual/Perennial Freshwater Vernal Pool / Swale Group
Eleocharis (acicularis, macrostachya) Provisional Alliance (6210)

Eleocharis macrostachya Association
Western North America Wet Meadow and Low Shrub Carr Macrogroup
Californian Warm Temperate Marsh/Seep Group
Juncus arcticus (var. *balticus*, *mexicanus*) Alliance (6310)
Temperate and Boreal Salt Marsh Formation
Temperate and Boreal Pacific Coastal Salt Marsh Division
North American Pacific Coastal Salt Marsh Macrogroup
Temperate Pacific Tidal Salt and Brackish Meadow Group
Distichlis spicata Alliance (6510)
Hydromorphic Vegetation (Aquatic Vegetation) Formation Class
Freshwater Aquatic Vegetation Formation Subclass
Freshwater Aquatic Vegetation Formation
North American Freshwater Aquatic Vegetation Division
Western North American Freshwater Aquatic Vegetation Macrogroup
Temperate Pacific Freshwater Aquatic Bed Group
Nuphar spp. – *Potamogeton* spp. – *Lemna* spp. Freshwater Aquatic Alliance (5120)
Nuphar lutea ssp*. polysepala* Association
Potamogeton spp*.* Association
Sparganium (angustifolium) Alliance
Lithomorphic Vegetation (Nonvascular and Sparse Vascular Rock Vegetation) Formation Class
Mediterranean, Temperate, and Boreal Nonvascular and Sparse Vegetation Subclass
Mediterranean Cliff, Scree, and Rock Vegetation Formation
Mediterranean California Cliff, Scree & Rock Vegetation Division
California Cliff, Scree, and Other Rock Vegetation Macrogroup
Central California Coast Ranges Cliff and Canyon Group (8100)
Dudleya cymosa – *Dudleya lanceolata* – Lichen/Moss Sparse Alliance
Pastures and Crop Agriculture (7300)
Dune/Sand (8100)
Urban/Developed (9200)
Water (9400)

Appendix C

Hierarchical Vegetation Field and Mapping Key for Point Arena Vegetation

This key is for the vegetation types found in Point Arena, based on a classification developed in Sonoma county. It is intended as a guide to field-based and image interpretation-based identification of vegetation. This key is not dichotomous; instead it follows the hierarchy of the United States National Vegetation Classification (USNVC) as of the publication of the *Manual of California Vegetation* (Sawyer et al., 2009). The USNVC hierarchy is promoted by the Survey of California Vegetation (SCV), Federal Geographic Data Committee (FGDC) and the Ecological Society of America's Vegetation Panel (FGDC 2008, Faber-Langendoen et al. 2014). This key lists vegetation types starting at the USNVC macrogroup level and proceeding down to the association level.

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

1. It has compositional integrity. Throughout the stand, the combination of species is similar. The stand is differentiated from adjacent stands by a discernible boundary that may be abrupt or occur indistinctly along an ecological gradient.
2. It has structural integrity. It has a similar history or environmental setting that affords relatively similar horizontal and vertical spacing of plant species. For example, a hillside forest originally dominated by the same species that burned on the upper part of the slopes but not the lower would be divided into two stands. Likewise, a sparse woodland occupying a slope with very shallow rocky soils would be considered a different stand from an adjacent slope with deeper, moister soil and a denser woodland or forest of the same species.

The compositional and structural features of a stand are often combined into a term called homogeneity. For an area to meet the definition of a stand, it must be homogeneous at the scale being considered.
United States National Vegetation Classification (*USNVC*)*:* A central organizing framework for how all vegetation in the United States is inventoried and studied, from broad scale formations (biomes) to fine-scale plant communities. The purpose of the NVC is to produce uniform statistics about vegetation resources across the nation, based on vegetation data gathered at local, regional, or national levels. The latest classification standard was published in by the FGDC (2008).

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

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

Alliance: Plant communities based on dominant/diagnostic species of the uppermost or dominant stratum. Accepted alliances are part of the USNVC hierarchy. For the Point Arena Vegetation Map, map classes are typically at the alliance level of the USNVC hierarchy.

Association: The most botanically detailed or finest-scale plant community designation based on dominant species and multiple co-dominant or sub-dominant indicator species from any stratum. Associations are also part of the USNVC hierarchy.

Plant community nomenclature: Species separated by "–" are within the same stratum; species separated by "/" are in different strata.

Cover: The primary metric used to quantify the importance/abundance of a particular species or a particular vegetation layer within a stand. It is measured by estimating the aerial extent of the living plants, or the bird's-eye view looking from above, for each category. Cover in this mapping project uses the concept of "porosity" or foliar cover rather than "opacity" or crown cover. Thus, field crews are trained to estimate the amount of light versus shade produced by the canopy of a plant or a stratum by taking into account the amount of shade it casts excluding the openings it may have in the interstitial spaces (e.g., between leaves or branches). This is assumed to provide a more realistic estimate of the actual amount of shade cast by the individual or stratum which, in turn, relates to the actual amount of light available to individual species or strata beneath it. However, as a result, cover estimates can vary substantially between leaf-on versus leaf-off conditions. Stands dominated by deciduous species (e.g., *Alnus rubra, Toxicodendron diversilobum*) should be sampled during leaf-on since they will have substantially less cover when leaves are absent and may key to another type.

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

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

Dominance: Dominance refers to the preponderance of vegetation cover in a stand of uniform composition and site history. It may refer to cover of an individual species as in "dominated by tan oak," or it may refer to dominance by a physiognomic group, as in "dominated by shrubs." When we use the term in the key, a species is dominant if it is in relatively high cover in each stand. See "dominance by layer," below, for further explanation.

> *Strongly dominant*: A species in the dominant lifeform stratum has 60% or greater relative cover.
>
> *Co-dominant*: Co-dominance refers to two or more species in a stand with similar cover. Specifically, each species has between 30% and 60% relative cover. For example in a coastal scrub stand with 5% *Baccharis pilularis*, 4% *Frangula californica*, and 3% *Rubus ursinus* (total 13% shrub cover), technically only the *Baccharis* (5/13 = 39% relative cover) and the *Frangula* (4/13 = 31% relative cover) would be co-dominant because *Rubus* would only have 23% relative cover (3/13 = 23%).

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

Dominance by layer/stratum: Tree, shrub, and herbaceous layers are considered physiognomically distinct. Alliances are usually named by the dominant and/or characteristic species of the *tallest characteristic layer* (e.g., see shrub-characterized and herb-characterized vegetation definitions below). Average cover within the dominant layer reflect the "modal" concept of the health/age/ environment of a particular vegetation type. For example, a higher average cover of woody plants within a stand not recently affected by disturbance reflects a mode of general availability of water, nutrition, and equitable climate, while lower average cover under similar conditions may reflect lower availability of these things.

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

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

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

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

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

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

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

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

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

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

Botanical nomenclature: We use the PLANTS database (USDA NRCS 2015) as our standard for botanical names, except in two cases. When a more current name has been assigned in *The Jepson Manual, second edition* (Baldwin et al. 2012), that name is frequently used and a code beginning with "2JM" is assigned. General vegetation types, such as moss and lichen, have codes beginning with the number 2 (e.g., 2MOSS).

KEY TO NATURAL AND SEMI-NATURAL VEGETATION OF POINT ARENA

Class A. Vegetation dominated, co-dominated, or characterized by an even distribution of overstory trees. The tree canopy is generally greater than 10%, but may occasionally be less than 10% over a denser understory of shrubs and/or herbs **= Tree-Overstory (Woodland / Forest) Vegetation**

Class B. Vegetation dominated, co-dominated, or characterized by woody shrubs in the canopy. Shrubs usually have at least 5% cover. Tree species, if present, generally total less than 10% absolute cover. Herbaceous species may have higher cover than shrubs **= Shrubland Vegetation**

Class C. Vegetation dominated, co-dominated, or characterized by non-woody, herbaceous species in the canopy, including grasses, graminoids, and broad-leaved herbaceous species. Shrubs, if present, usually comprise less than 5% of the vegetation cover. Trees, if present, generally comprise less than 5% cover **= Herbaceous Vegetation**

Class A. Tree-Overstory (Woodland / Forest) Vegetation

Section I: Woodlands and forests dominated or characterized by needle or scale-leaved conifer trees. Includes *Hesperocyparis* and *Pinus*.

1. A closed-cone or xerophyllic conifer, including *Hesperocyparis macrocarpa*, *Pinus contorta* ssp. *contorta*, *Pinus muricata*, or *Pinus radiata* is dominant, co-dominant, or characteristic in the overstory.

Californian Semi-natural Forest Macrogroup
Californian Semi-natural Forest Group

1a. Stands dominated by planted species of *Hesperocyparis* or *Pinus*.
***Hesperocyparis macrocarpa – Pinus radiata* Semi-Natural Alliance**

1a1. Planted *Hesperocyparis macrocarpa* dominates in patches or along roads. In this region of California, stands are considered semi-natural since they are not naturally occurring.
Hesperocyparis macrocarpa Provisional Semi-Natural Association

1b2. Planted or naturalized stands of *Pinus radiata* are found along roadsides or on terraces where they were introduced after fires in the 1960's.
Pinus radiata plantations Semi-Natural Association

California Forest and Woodland Macrogroup
Californian Evergreen Coniferous Forest and Woodland Group

1b. Stands dominated by *Pinus contorta* ssp. *contorta*, or *P. muricata*.
1b1. *Pinus contorta* ssp. *contorta* is the dominant tree species. The understory may include moderate to dense cover of shrubs and herbs including *Calamagrostis nutkaensis*.
***Pinus contorta* ssp. *contorta* Alliance**
Pinus contorta ssp. *contorta* Association

1b2. *Pinus muricata* is the dominant tree species. The understory may include moderate to dense cover of shrubs such as *Gaultheria shallon*, and *Vaccinium ovatum*.
***Pinus muricata – Pinus radiata* Alliance**
Pinus muricata – (*Arbutus menziesii) / Vaccinium ovatum* Provisional Association

Section II. Woodlands, forests, and riparian vegetation characterized and/or dominated mainly by native and non-native broad-leaved evergreen and deciduous trees. Includes species of *Alnus, Salix* and *Eucalyptus*.

2. *Alnus rubra* and/or *Salix lucida* ssp. *lasiandra* are dominant, co-dominant, or characteristic of broadleaf riparian tree vegetation. Found along riparian corridors, incised canyons, seeps, stream banks, mid-channel bars, and terraces.

Western Cordilleran Montane–Boreal Riparian Scrub Macrogroup
Vancouverian Riparian Deciduous Forest Group

2a. *Alnus rubra* dominates in the tree canopy in riparian settings, typically within a few miles of the coast. The understory is often comprised of one to many species of *Rubus* and or *Salix*, which may exceed *Alnus* in cover.

***Acer macrophyllum – Alnus rubra* Alliance**
Alnus rubra / Rubus spp. Provisional Association

2b. *Salix lucida* ssp. *lasiandra* dominates in the overstory, sometimes with higher or similar cover by shrubs in the understory, such as *Rubus* spp. and shrubby *Salix* spp. Adjacent stands may be dominated by *Alnus* spp.

***Salix lucida* Alliance**
Salix lucida ssp. *lasiandra* Association

3 A tree species of *Eucalyptus* dominates in planted or naturalized stands. Often found in groves, windbreaks, and uplands.

Introduced North American Mediterranean Woodland and Forest Macrogroup and Group
***Eucalyptus* spp. – *Ailanthus altissima – Robinia pseudoacacia* Semi-Natural Alliance**
Eucalyptus (globulus, camaldulensis) Semi-Natural Association

Class B. Shrubland Vegetation
Section I. Riparian or moist hillside settings with vegetation dominated or co-dominated by the following shrubs: *Frangula californica*, *Morella californica*, *Rhododendron occidentale*, *R. columbianum, Rubus spectabilis*, *Salix hookeriana*, *S. sitchensis*, and/or *Sambucus nigra*. *Note: if *Rubus ursinus* dominates, key to the *Gaultheria shallon – Rubus* (*ursinus*) Alliance in Section II below (step 5b).

1. *Morella californica*, *Rubus parviflorus*, *R. spectabilis, Salix hookeriana* and/or *S. sitchensis* dominate or co-dominate with *Rubus* spp.

Western Cordilleran Montane–Boreal Riparian Scrub Macrogroup
Vancouverian Coastal Riparian Scrub Group

1a. Vegetation dominated or characterized by *Morella californica*, *Rubus parviflorus*, and/or *Rubus spectabilis*. Stands generally close to the coast on moist or wet soils. If *Morella californica* is sub-dominant with *Gaultheria*, key to the *Gaultheria shallon – Rubus* (*ursinus*) Alliance below.

***Rubus spectabilis – Morella californica* Alliance**
Morella californica – Rubus spp. Provisional Association
Rubus spectabilis Association

1b. *Salix sitchensis* and/or *S. hookeriana* dominate or co-dominate with *S. lasiolepis* along coastal or low elevation streams, lagoons. A variety of sub-dominant trees and shrubs may be present, including *Alnus*, *Morella,* and *Rubus*.

***Salix hookeriana – Salix sitchensis – Spiraea douglasii* Provisional Alliance**
Salix hookeriana Provisional Association
Salix sitchensis Provisional Association

2. *Frangula californica* and/or *Rhododendron occidentale* dominate or co-dominate with *Baccharis pilularis* or *Rubus* spp. Stands are found along springs, seeps, ravines and hillslopes, often on sedimentary and serpentine substrates that retain water much of the year.

Southwestern North American Riparian, Flooded and Swamp Forest Macrogroup
Southwestern North American Riparian/Wash Scrub Group

***Frangula californica – Rhododendron occidentale* Provisional Alliance**
Frangula californica ssp. *californica* Provisional Association

3. *Rhododendron columbianum* dominates in wet areas with other shrubs at lower cover including *Lonicera involucrata, Frangula californica* and *Gaultheria shallon.*

Western North American Montane/Boreal Peatland Macrogroup
North Pacific Acidic Open Bog & Fen Group

***Rhododendron columbianum* Alliance**

Section II. Coastal scrub, dune/bluff, and disturbance-following vegetation dominated or co-dominated by drought-deciduous or seral (both deciduous and evergreen) shrubs. Includes *Baccharis pilularis*, *Ceanothus thyrsiflorus*, *Ericameria ericoides*, *Garrya elliptica, Gaultheria shallon*, *Lupinus albifrons*, *L. arboreus*, *L. chamissonis*, *Rubus ursinus*, and *Toxicodendron diversilobum*. Resprouting, deep-rooted, sclerophyllous shrubs may at times be characteristic, but not dominant.

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

Vancouverian Coastal Dune and Bluff Macrogroup
California Coastal Evergreen Bluff and Dune Scrub Group

4a. *Lupinus arboreus* dominates or co-dominates with *Baccharis pilularis*, and may co-occur with high cover by *Festuca bromoides*, *Festuca perennis*, *Bromus diandrus* and other non-native grasses.

***Lupinus arboreus* Semi-Natural Alliance**
Lupinus arboreus / *Bromus diandrus* Association

4b. *Ericameria ericoides* and/or *Lupinus chamissonis* dominate as individuals or in combination with *Baccharis pilularis* or *Lupinus arboreus*.

***Lupinus chamissonis – Ericameria ericoides* Alliance**
Lupinus chamissonis – Ericameria ericoides Association

5. Shrublands dominated or co-dominated by native, disturbance-following, naturalized, or planted species including *Baccharis pilularis*, *Ceanothus thyrsiflorus*, *Gaultheria shallon*, *Rubus ursinus*, *Vaccinium ovatum* and/or *Toxicodendron diversilobum.* Found along cool, coastal strips or on sheltered inland ravines and lower slopes.

California North Coastal & Mesic Scrub Group

5a. *Baccharis pilularis* dominates or co-dominates with *Frangula californica*, *Garrya elliptica, Toxicodendron diversilobum*, or *Rubus* spp. in the shrub overstory. If *Calamagrostis nutkaensis* is co-dominant with *B. pilularis*, key to the *C. nutkaensis* Alliance (see Class C, step 8c3a). A variety of native and non-native forbs and grasses may intermix in the herbaceous layer, sometimes with higher cover than *Baccharis* – including *Avena, Bromus, Danthonia, Deschampsia, Elymus glaucus, Festuca, Hypochaeris, Nassella pulchra*, and others.

***Baccharis pilularis* Alliance**
Baccharis pilularis – (*Frangula californica*) – *Rubus* spp. Association
Baccharis pilularis / Polystichum munitum Association
Garrya elliptica Provisional Association

5b. *Gaultheria shallon* and/or *Rubus ursinus* dominate or co-dominate with *Anthoxanthum odoratum, Holcus lanatus,* or *Toxicodendron diversilobum* on hillslopes, rock outcrops, coastal bluffs, or flats.

***Gaultheria shallon – Rubus* (*ursinus*) Provisional Alliance**
Gaultheria shallon – Rubus spp. Provisional Association

Section III. Shrub vegetation dominated by evergreen sclerophyll-leaved species, including diagnostic species that are endemic to California such as *Arctostaphylos* and *Ceanothus* as well as invasive non-native shrubs such as *Cotoneaster* spp.

6a. *Arctostaphylos columbiana* and *A. uva-ursi* dominate with *Gaultheria shallon* and *Rubus ursinus* in maritime chaparral stands. *Pinus contorta* ssp. *contorta* and *Pteridium aquilinum* are often present.

***Arctostaphylos columbiana* Provisional Alliance**
Arctostaphylos columbiana Provisional Association

6b. *Cotoneaster* spp. or other shrub not native to Mendocino County dominates in naturalized or planted stands. May be found invading disturbed areas, grasslands, or forest openings.

Naturalized Non-Native Mediterranean Scrub Group (key to group level only)

Class C. Herbaceous Vegetation

Section I. Vegetation of: a) freshwater wetland or riparian settings with water or wet ground present temporarily, seasonally, or throughout the growing season, b) saline or alkaline lowlands where water accumulates in the winter, or c) tidal salt or brackish marshes with seasonal or ephemeral inundations. Includes herbaceous vegetation dominated, co-dominated, or characterized by: *Argentina, Azolla, Carex*, *Ceratophyllum*, *Distichlis*, *Eleocharis macrostachya*, *Grindelia stricta*, *Juncus arcticus*, *J. effusus*, *J. lescurii*, *J. patens*, *Lemna*, *Nuphar*, *Oenanthe*, *Persicaria*, *Schoenoplectus*, *Scirpus*, *Spartina*, *Typha,* and/or *Xanthium*.

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

Western North American Freshwater Aquatic Vegetation Macrogroup
Temperate Pacific Freshwater Aquatic Bed Group

1a. *Nuphar lutea* or *Potamogeton* spp. dominate on the water surface. Algae and a variety of hydrophytes may intermix, including *Alisma*, *Carex*, *Hippuris vulgaris*, *Polygonum*, and *Oenanthe*.

***Nuphar* spp. – *Potamogeton* spp. – *Lemna* spp. Freshwater Aquatic Provisional Alliance**
Nuphar lutea ssp. *polysepala* Provisional Association
Potamogeton ssp. Association

2b. *Sparganium eurycarpum* or another *Sparganium* spp. is dominant on the water surface with emergent aquatics including *Callitriche, Carex, Nuphar lutea, Potamogeton, Stuckenia,* and/or *Typha.* A small stand was noted along Hathaway Creek but not sampled.

***Sparganium (angustifolium)* Alliance**

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

Western North American Freshwater Marsh Macrogroup

2a. *Typha* dominates in the herbaceous layer. Stands are found along streams, ditches, shores, bars, and channels of river mouth estuaries; around ponds and lakes; and in sloughs, swamps, and freshwater to brackish marshes.

Arid West Freshwater Emergent Marsh Group

2a1. *Typha angustifolia*, *T. domingensis*, and/or *T. latifolia* dominate in semi-permanently flooded freshwater or brackish marshes.

***Typha* (*angustifolia, domingensis, latifolia*)** Alliance
Typha latifolia Association

2b. *Argentina egedii*, *Carex obnupta*, *Distichlis spicata*, *Eleocharis macrostachya*, *Juncus effusus*, *J. lescurii*, *J. patens*, *J. occidentalis*, *J. phaeocephalus*, *Oenanthe*, and/or *Scirpus microcarpus* dominate or co-dominate in mesic or wetland settings. *Holcus*, *Hypochaeris*, *Leontodon*, *Rumex* and *Festuca bromoides* may intermix with similar cover. Stands may be found along seasonally flooded brackish marshes, coastal sand dunes, swales and plains, shallowly inundated woods, meadows, roadside ditches, mudflats, coastal swamps, lakeshores, marshes, and riverbanks.

Vancouverian Coastal/Tidal Marsh and Meadow Group

2b1. *Argentina egedii* (=*A. anserina* or *Potentilla anserina* ssp. *pacifica*) dominates or co-dominates with *Bolboschoenus maritimus*, *Carex nudata*, *Distichlis spicata*, *Eleocharis*

macrostachya, *Holcus lanatus*, *Juncus lescurii*, *Leontodon taraxacoides*, and *Rumex acetosella*. If *Oenanthe sarmentosa* is co-dominant, key to the *O. sarmentosa* Alliance below.

***Argentina egedii* Alliance**
Argentina egedii Association

2b2. *Carex obnupta* dominates in the herbaceous layer in a variety of freshwater and brackish settings near the coast.

***Carex obnupta* Alliance**
Carex obnupta Association

2b3. *Juncus effusus*, *J. patens* and/or *J. phaeocephalus* dominate individually or in combination. Co-dominant species may include *Holcus lanatus*, *Hypochaeris radicata*, *Juncus bufonius*, and *Festuca bromoides*.

***Juncus* (*effusus*, *patens*) Provisional Alliance**
Juncus effusus Association
Juncus phaeocephalus Association

2b4. *Juncus breweri, and/or J. lescurii* dominates or co-dominates with *Agrostis stolonifera*, *Argentina egedii*, *Eleocharis macrostachya*, or *Juncus phaeocephalus* in slightly brackish marshes or seeps near salt marshes.

***Juncus lescurii* Alliance**
Juncus breweri Provisional Association

2b5. *Oenanthe sarmentosa* dominates or co-dominates with *Argentina egedii* or *Juncus patens* in freshwater to slightly brackish marshes.

***Oenanthe sarmentosa* Alliance**
Oenanthe sarmentosa Association

2b6. *Scirpus microcarpus* dominates in marshes, roadside ditches, and along stream banks. Larger forbs such as *Conium maculatum*, *Oenanthe*, *Heracleum maximum*, *and Urtica dioica* may be present as sub-dominants. Small stands noted along Miner's Hole Road but not sampled.

***Scirpus microcarpus* Alliance**
Scirpus microcarpus Association

3. Salt and brackish marshes dominated or co-dominated by *Distichlis*, *Sarcocornia* (=*Salicornia*), and/or *Spartina*. May appear as sparsely vegetated mudflats at low tide. Mudflats with trace amounts of cover by herbs are included here (see 3e).

North American Pacific Coastal Salt Marsh Macrogroup
Temperate Pacific Tidal Salt and Brackish Meadow Group

3a. *Distichlis spicata* dominates or co-dominates with *Frankenia salina, Hordeum brachyantherum,* and/or *Jaumea carnosa*.

***Distichlis spicata* Alliance**

4. Herbaceous stands dominated or characterized by *Eleocharis macrostachya*, *Grindelia stricta*, *Lasthenia glaberrima*, or *Pleuropogon californicus*. In the *Manual of California Vegetation* (Sawyer et al. 2009), these stands are recognized in a macrogroup associated with vernal pools, even though they do not always occur in vernal pool settings. Future versions of the hierarchy will likely split vernal pool and non–vernal pool stands into different alliances, groups, and macrogroups based on ecological and environmental differences.

Western North America Vernal Pool Macrogroup
Californian Mixed Annual/Perennial Freshwater Vernal Pool / Swale Bottomland Group

4a. *Eleocharis macrostachya* dominates in the herbaceous layer along lakeshores, streambeds, swales, vernal pools, pastures, ditches, and ponds.

***Eleocharis* (*acicularis*, *macrostachya*) Provisional Alliance**
Eleocharis macrostachya Association

5. Wetland herbaceous vegetation dominated or characterized by *Juncus arcticus*. Stands occupy settings where saturated soil or standing water throughout the growing season are key characteristics.

Western North America Wet Meadow and Low Shrub Carr Macrogroup
Californian Warm Temperate Marsh/Seep Group

5a. *Juncus arcticus* (var. *balticus* or *mexicanus*) dominates in freshwater, brackish, or alkaline settings. *Mentha pulegium*, *Poa pratensis,* and other hydrophytes may intermix as sub-dominants.

***Juncus arcticus* (var. *balticus*, *mexicanus*) Alliance**
Juncus arcticus (var. *balticus*, *mexicanus*) Association

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

6. *Dudleya* spp. characterize or dominate stands on exposed rock.

California Cliff, Scree, and Other Rock Vegetation Macrogroup
Central California Coast Ranges Cliff and Canyon Group

6a. *Dudleya* spp. characterize or dominate small stands on rock outcrops, cliff faces, or skeletal soils over gently to steeply sloping, impervious substrates. Moss and lichen species often intermix. Stands noted along coastal bluffs and sea stacks but not sampled.

***Dudleya cymosa* – *Dudleya lanceolata* – Lichen/Moss Sparse Alliance**
Dudleya (*farinosa*, *caespitosa*) Provisional Association

7. Native and non-native annual forb/grass vegetation and native perennial grasslands growing within the California Mediterranean climate. Includes vegetation characterized by, but not limited to, *Avena*, *Brassica*, *Bromus*, *Centaurea*, *Cynosurus*, *Elymus glaucus*, *Eschscholzia*, *Lasthenia californica*, *Nassella*, *Melica*, *Plantago erecta*, *Pteridium aquilinum*, *Festuca microstachys*, *F. perennis* and *Plagiobothrys nothofulvus*.

California Annual and Perennial Grassland Macrogroup

7a. Herbaceous vegetation dominated, co-dominated or characterized by native annual forbs and grasses such as *Eschscholzia*, *Lasthenia californica*, *Lupinus*, *Plagiobothrys*, *Plantago erecta*, and *Festuca microstachys*. Commonly occurring taxa include *Avena*, *Bromus*, *Cryptantha*, *Geranium*, *Dichelostemma*, *Lolium*, and *Festuca*. Stands are found on upland slopes, flats, and ridges.

California Annual Herb/Grass Group

7a1. *Plantago erecta, Festuca microstachys, Lasthenia californica*, *Hesperevax sparsiflora*, *Hemizonia congesta*, *Lomatium*, *Lotus* spp., and/or *Micropus californicus* dominate individually or in combination in the herbaceous layer. *Plantago erecta,* and/or *Festuca microstachys* are often present, sometimes with sparse cover in shallow soils and along bluff balds.

***Lasthenia californica – Plantago erecta – Vulpia microstachys* Alliance**
Lasthenia californica – Plantago erecta – Hesperevax sparsiflora Association

7b. *Bromus carinatus*, *Elymus glaucus*, *Melica californica*, *Nassella pulchra,* and/or *Pteridium aquilinum* are dominant or characteristic in stands, sometimes with equal or greater cover of non-native herbs.

California Perennial Grassland Group

7b1. *Pteridium aquilinum, Bromus carinatus* and/or *Elymus glaucus* dominate or co-dominate near meadows, in forested openings, and on elevated flats. *Anagallis arvensis*, *Bromus hordeaceus*, *Geranium dissectum*, *Rumex acetosella*, and *Festuca bromoides* are often present.

***Elymus glaucus – Bromus carinatus* Provisional Alliance**
Pteridium aquilinum – Grass Association

7b2. *Corethrogyne filaginifolia* is dominant, co-dominant or characteristic on bluff edges
***Corethrogyne filaginifolia – Eriogonum (elongatum, nudum)* Alliance**

7b3. *Melica californica* and/or *Nassella pulchra* (=*Stipa pulchra*) are dominant, co-dominant or characteristic in stands. *Achnatherum lemmonii*, *Avena*, *Bromus*, *Hemizonia congesta*, *Lolium perenne*, *Plantago erecta*, and/or *P. lanceolata* intermix as dominant, co-dominant or characteristic taxa in associations of this alliance.

***Nassella* spp. – *Melica* spp. Provisional Alliance**
Nassella pulchra Association
Nassella pulchra – Plantago lanceolata Provisional Association

8. Herbaceous vegetation dominated, co-dominated, or characterized by native or non-native perennial grasses. Stands are generally found in moister settings than those in the California Annual and Perennial Grassland Macrogroup (see step 7) and are often coastal. The grasses included are: *Agrostis gigantea*, *A. stolonifera*, *Anthoxanthum*, *Calamagrostis nutkaensis*, *Danthonia californica*, *Deschampsia cespitosa*, *Elymus elymoides*, *E. multisetus*, *Festuca arundinacea*, *F. idahoensis*, *Holcus*, *Hordeum brachyantherum, Iris douglasiana,* and/or *Phalaris aquatica*. Note: stands dominated by *Lolium perenne* key out in step 7 above.

8a. *Agrostis*, *Anthoxanthum*, *Festuca arundinacea*, *Holcus*, and/or *Phalaris* are dominant, co-dominant, or characteristic in herbaceous stands with less than 10% relative cover of native species.

Western North American Temperate Grassland and Meadow Macrogroup

8a1. Non-native, slightly mesic, disturbed pasturelands dominated or co-dominated by the following perennial grasses: *Agrostis gigantea*, *A. stolonifera*, *Anthoxanthum*, *Festuca arundinacea*, *Holcus*, and/or *Phalaris*. If native species are present and co-dominant, key to an alliance dominated or characterized by natives. Found in wet settings, including brackish marshes, meadows, stream terraces, wet pastures, agricultural wetlands, or tidal zones.

Vancouverian and Rocky Mountain Naturalized Perennial Grassland Group

8a1a. *Agrostis gigantea* and/or *A. stolonifera* dominate or co-dominate in the herbaceous layer. The stands encountered for this project were dominated by *Agrostis stolonifera*.

***Poa pratensis – Agrostis gigantea – Agrostis stolonifera* Semi-Natural Alliance**
Agrostis stolonifera Semi-Natural Association

8a1b. *Holcus lanatus* and/or *Anthoxanthum odoratum* dominate individually or in combination. Other co-dominants may include *Briza maxima*, *Rumex acetosella*, and *Festuca bromoides*.

***Holcus lanatus – Anthoxanthum odoratum* Semi-Natural Alliance**
Holcus lanatus – Anthoxanthum odoratum Semi-Natural Association

8b. Native grasslands dominated, co-dominated, or characterized by the following perennial grasses: *Bromus carinatus*, *Elymus elymoides*, *E. glaucus*, *E. multisetus*, *Festuca californica*, *F. idahoensis*, or *Pteridium aquilinum* with at least 10% relative cover of native species.

Western Dry Upland Perennial Grassland Group

8c. Native, mesic to moist, primarily coastal grasslands dominated, co-dominated, or characterized by *Calamagrostis nutkaensis*, *Deschampsia cespitosa*, *Danthonia californica*, *Eryngium armatum,* and/or *Hordeum brachyantherum*. *Baccharis pilularis*, *Briza maxima*, *Holcus lanatus*, *Nassella pulchra*, and/or *Festuca bromoides* commonly intermix in stands. Found in a variety of settings, including dunes, bluffs, meadows, alluvial slopes, terraces, and seasonally flooded areas with moderate salinity.

8c1. *Deschampsia cespitosa*, *Danthonia californica*, and/or *Eryngium armatum* dominate or co-dominate individually or in combination (if *Holcus lanatus* has the highest cover, but these three species have at least 10% combined cover, key to *Deschampsia*). Typical settings include coastal bluffs and terraces.

Western Cordilleran Montane-Boreal Wet Meadow Macrogroup
Western Cordilleran Montane-Boreal Mesic Wet Meadow Group

***Deschampsia cespitosa* coastal Alliance**
Deschampsia cespitosa var. *holciformis* Association
Deschampsia cespitosa – Eryngium armatum Association
Deschampsia cespitosa / Rosa nutkana Provisional Association

8c2. *Hordeum brachyantherum* dominates or co-dominates with *Bromus carinatus*, *Hypochaeris*, *Lolium perenne*, *Lotus corniculatus*, *Plantago erecta*, and *Trifolium subterraneum* in moist meadows, along stream terraces and coastal bluffs, and near seeps and springs. A stand was noted north of the mouth of the Garcia River, but was not sampled.

Western Cordilleran Montane Shrubland and Grassland Macrogroup
Western Cordilleran Montane Moist Graminoid Meadow Group

***Hordeum brachyantherum* Alliance**
Hordeum brachyantherum Association

8c3. *Calamagrostis nutkaensis* dominates or co-dominates with *Baccharis pilularis* or other wet graminoids at lower cover including *Carex obnupta* and/or *Juncus* spp. Stands are found along lower portions of alluvial slopes, terraces, and floodplains.

Vancouverian Lowland Grassland and Shrubland Macrogroup
Vancouverian Coastal Grassland Group

8c3a. *Calamagrostis nutkaensis* dominates or co-dominates with *Baccharis pilularis*. *Heracleum maximum*, *Holcus lanatus*, *Juncus patens*, and/or *Rubus ursinus* often intermix in stands.

***Calamagrostis nutkaensis* Alliance**
Calamagrostis nutkaensis / *Baccharis pilularis* Association
Calamagrostis nutkaensis – Carex (obnupta) – Juncus (patens) Association

9. Coastal dune, bluff, meadow, and other vegetation dominated by herbaceous species such as *Abronia*, *Ambrosia*, *Ammophila*, *Carpobrotus*, *Eriophyllum staechadifolium, Erigeron glaucus, Eriogonum latifolium, Leymus mollis*, and *Mesembryanthemum*.

9a. Native species, including *Abronia latifolia*, *Ambrosia chamissonis*, *Artemisia pycnocephala*, and/or *Leymus mollis* dominate or co-dominate on dunes or bluffs sometimes with low cover. Plants are adapted to salt spray, wind and shifting sands and are thus capable of colonizing relatively unstable and sterile substrates.

Vancouverian Coastal Dune and Bluff Macrogroup
Vancouverian/Pacific Dune Mat Group

9a1. *Abronia latifolia* and/or *Ambrosia chamissonis* dominate, sometimes with *Calystegia soldanella* or *Polygonum paronychia* occurring as associated species. *Cakile maritima*, *Ammophila arenaria*, and *Camissonia cheiranthifolia* may be present.

***Abronia latifolia – Ambrosia chamissonis* Alliance**
Ambrosia chamissonis Association

9a2. *Leymus mollis* dominates in the herbaceous layer. *Abronia*, *Artemisia pycnocephala*, *Cakile*, and other herbaceous species may be present as sub-dominants.

***Leymus mollis* Alliance**
Leymus mollis – Abronia latifolia – (*Cakile* spp.) Association

9a3. *Eriogonum latifolium* dominates or co-dominates with *Eriophyllum staechadifolium* on steep slopes and coastal bluffs. Other bluff species such as *Dudleya farinosa* and *Erigeron glaucus* may be present.

***Eriophyllum staechadifolium – Erigeron glaucus – Eriogonum latifolium* Alliance**
Eriophyllum staechadifolium – Eriogonum latifolium Association

9b. Non-natives, including *Ammophila*, *Carpobrotus*, and/or *Mesembryanthemum* dominate on dunes, bluffs, or disturbed lands. Emergent shrubs such as *Baccharis pilularis* or *Lupinus arboreus* may be present.

California–Vancouverian Semi-Natural Littoral Scrub and Herb Vegetation Group

9b1. *Ammophila arenaria* is strongly dominant in the herbaceous layer.

***Ammophila arenaria* Semi-Natural Alliance**
Ammophila arenaria Semi-Natural Association

9b2. *Carpobrotus* and/or *Mesembryanthemum* dominate on bluffs, dunes, or disturbed lands, often forming impenetrable mats that prevent natives from establishing.

***Mesembryanthemum* spp. – *Carpobrotus* spp. Provisional Semi-Natural Alliance**
Carpobrotus (*edulis*) Provisional Semi-Natural Association

Appendix D

Sample Field Verification Form

Field Verification Form: Vegetation Mapping (9/4/2018)

Surveyors (circle recorder):	(JJB), RLP — **Date:** 9/12/18
Base Waypoint ID: ✓	**GPS name:** CAMA **Projected? Yes (No)**
	Bearing: ___ (degrees) **Distance:** ___ (meters) **Inclination:** ___ (degrees)
Polygon UID: 1	UTMs UTME ___ UTMN ___ PDOP: +/- 5m
	Latitude 38.947920 Longitude --- 123.718052

Strata	Species	% cover	Strata	Species	% cover	Strata	Species	% cover
H	Ammophila arena	70	H	Achillea millefol	+	H	Abronia latif	+
S	Lupinus arboreus	+	H	Ranunculus repens	+			
S	Baccharis pilular	+	H	Juncus breweri	1			
H	Rumex acetose	+	H	Tanacetum bimnat	1			

Notes: (including # and type of roads, recommendations for line-work revision, state of veg. "discernability" based on season and topography, classification interpretation, homogeneity and unusual sightings of plants or animals)	Heavily grazed Ammophila stand following upper dunes next to fenced lots of opening + cow punch w/ cowpies due to cattle congregation.
Primary Map Unit (code and name)	Ammophila arenaria
Secondary field call	—
Camera Name/Photo #s	ROSA 852–855 (M)
CWHR Tree size	Seedlings (<1") Saplings (1-6") Pole (6-11") Small (11-24") Medium-Large (>24) Multi-Layered Med-Lrg Trees over smaller trees in densities >60%
Tree Height	<1/2 m. 1/2-1 m. 1-2 m. 2-5 m. 5-10 m. 10-15 m. 15-20 m. 20-35 m. 35-50 m. >50 m.
Conifer / Hardwood / Total Tree Cover	___ / ___ / ___
Shrub Cover	+
Herb Cover	<2% 2–9% (10–40%) >40% NA
Exotics	None visible Low (<33%) Medium (33-66%) (High (>66%)) Not Applicable
Roadedness	(None visible) Low (<33%) Medium (33-66%) High (>66%) Not Applicable
Human Disturbance/Development	None visible Low (<33%) (Medium (33-66%)) High (>66%) Not Applicable
Percent of delineated poly viewed	rough % of polygon viewed from this point 100
% of the delineated polygon occupied by stand?	rough % of polygon covered by type 100 ; Denote any other types in notes above —
Is this a "multiple" point assessment?	(NO) YES if yes: ___ of ___ points for this polygon
If 'multiple point', what is est. % viewed total for this stand?	___ % Is/are the other point(s) a different veg type? Yes No

Appendix E

Vegetation Descriptions

Acer macrophyllum – Alnus rubra Forest Alliance

Common Name: Big-leaf maple – red alder forest

NVC Alliance Code: A3745. *Acer macrophyllum - Alnus rubra* Riparian Forest Alliance

Statewide Description: *Alnus rubra* is dominant or co-dominant in the tree canopy with *Abies grandis*, *Garrya elliptica*, *Picea sitchensis*, *Populus trichocarpa*, *Pseudotsuga menziesii*, *Salix hookeriana*, *Salix lasiolepis*, *Salix sitchensis*, *Sequoia sempervirens*, *Tsuga heterophylla,* and *Umbellularia californica*. In California, the *Alnus rubra* Alliance occurs as both riparian and upland stands, primarily near the coast. Stands typically include a well-developed shrub understory of species such as *Rubus spectabilis*, *R. ursinus*, and *Sambucus racemosa* (Cheng 2004, Keeler-Wolf et al. 2003a, Evens and Kentner 2006). From Mendocino County northward, *Alnus rubra* stands were much more restricted in the past, occurring chiefly along streams or natural landslides; today, however, seedlings and stands of *Alnus rubra* easily establish in upland areas that have been recently logged (Sawyer 2006).

Associations Sampled	Sample Size	NVC Code
Acer macrophyllum – Alnus rubra alliance		2

Classification Comments: More data is needed along the northern coast of California to fully define stands at the association level under this broad alliance.

Plot/Sample Data Summary:

Elevation:16 m
Slope: 2°
Aspect: NW-facing

Tree Cover: Mean 23.5%, Range 17 – 30%
Shrub Cover: Mean 25.0%, Range 15 – 35%
Herb Cover: Mean 19.0%, Range 13 – 25%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 10%
Litter: 60%

Conservation Status Rank: Global G5; **State (California)** S4

Surveys Used in Description (N = 2):

2017 Classification Surveys (n=1): PTAR0025

2018 AA Surveys (n=1): PTAA0122

Acer macrophyllum – Alnus rubra Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Alnus rubra	100	94.1	22.5	15.0	30.0	**X**	**X**		**X**
	Pinus contorta	50	5.9	1.0	2.0	2.0				**X**
Shrub										
	Rubus ursinus	100	38.0	6.0	5.0	7.0	**X**		**X**	**X**
	Frangula californica	100	22.0	2.1	0.2	4.0	**X**			**X**
	Salix hookeriana	50	30.9	10.0	20.0	20.0				**X**
	Morella californica	50	4.6	1.5	3.0	3.0				**X**
	Lonicera involucrata var. *ledebourii*	50	3.1	1.0	2.0	2.0				**X**
	Vaccinium ovatum	50	1.1	0.1	0.2	0.2				**X**
	Rubus spectabilis	50	0.3	0.1	0.2	0.2				**X**
Herb										
	Calamagrostis nutkaensis	50	22.9	6.0	12.0	12.0				**X**
	Pteridium aquilinum	50	38.5	5.0	10.0	10.0				**X**
	Carex obnupta	50	15.3	4.0	8.0	8.0				**X**
	Polystichum munitum	50	9.5	2.5	5.0	5.0				**X**
	Equisetum arvense	50	11.5	1.5	3.0	3.0				**X**
	Athyrium filix-femina ssp. *cyclosorum*	50	1.9	0.5	1.0	1.0				**X**
	Urtica dioica	50	0.4	0.1	0.2	0.2				**X**
Non-vasc										
	Lichen	50	50.0	3.5	7.0	7.0				**X**

Hesperocyparis macrocarpa – Pinus radiata Woodland Semi-Natural Alliance

Common Name: Monterey cypress – Monterey pine stands

NVC Alliance Code: none

Statewide Description: *Hesperocyparis macrocarpa* and/or *Pinus radiata* are dominant or co-dominant in the tree canopy. While native groves of these conifers are rare, they both are invasive along the California coast. They have been planted along roads, as hedgerows, and as ornamentals throughout the region, where they continue to spread through natural regeneration.

Associations Sampled	Sample Size	NVC Code
Hesperocyparis macrocarpa		1
Pinus radiata plantations		2

Classification Comments:

Plot/Sample Data Summary:

Elevation: Mean 17 m, Range 9 – 24 m
Slope: Mean 1°, Range 0 – 2°
Aspect: variable

Tree Cover: Mean 29.3%, Range 23 – 35%
Shrub Cover: Mean 4.0%, Range 2 – 5%
Herb Cover: Mean 8.1%, Range 1 – 15%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 0.2%
Litter: 97%

Conservation Status Rank: Global GNA; **State (California)** SNA

Surveys Used in Description (N = 3):

2017 Classification Surveys (n=2): PTAR0016, PTAR0021

2018 AA Surveys (n=1): PTAA0127

Hesperocyparis macrocarpa – Pinus radiata Semi-Natural Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Pinus radiata	267	69.7	19.3	0.2	30.0	**X**	**X**		**X**
	Hesperocyparis macrocarpa	67	29.2	11.7	2.0	33.0				**X**
	Pinus contorta	33	0.3	0.1	0.2	0.2				
	Pinus muricata	33	0.3	0.1	0.2	0.2				
Shrub										
	Rubus ursinus	100	60.8	2.3	1.0	5.0	**X**	**X**		**X**
	Vaccinium ovatum	100	30.7	1.5	0.2	4.0	**X**		**X**	**X**
	Frangula californica	67	6.0	0.1	0.2	0.2				**X**
	Baccharis pilularis	33	1.2	0.1	0.2	0.2				
	Morella californica	33	1.2	0.1	0.2	0.2				
Herb										
	Iris douglasiana	100	18.5	1.1	0.2	2.0	**X**			**X**
	Erechtites minimus	100	5.3	0.2	0.2	0.2	**X**			**X**
	Pteridium aquilinum var. *pubescens*	67	18.2	0.7	0.2	2.0				**X**
	Holcus lanatus	67	7.0	0.4	0.2	1.0				**X**
	Erechtites glomeratus	67	3.8	0.1	0.2	0.2				**X**
	Galium aparine	67	4.5	0.1	0.2	0.2				**X**
	Pteridium aquilinum	33	11.9	1.0	3.0	3.0				
	Rumex acetosella	33	7.9	0.7	2.0	2.0				
	Prunella vulgaris	33	3.0	0.1	0.2	0.2				
	Zigadenus fremontii	33	1.5	0.1	0.2	0.2				
	Viola sempervirens	33	1.5	0.1	0.2	0.2				
	Viola adunca	33	3.0	0.1	0.2	0.2				
	Polypodium scouleri	33	1.5	0.1	0.2	0.2				
	Lathyrus vestitus	33	1.5	0.1	0.2	0.2				
	Cerastium arvense	33	3.0	0.1	0.2	0.2				
	Anthoxanthum odoratum	33	3.0	0.1	0.2	0.2				
	Bromus laevipes	33	1.5	0.1	0.2	0.2				
	Stellaria media	33	3.0	0.1	0.2	0.2				
Non-vasc										
	Lichen	67	33.7	0.1	0.2	0.2				**X**
	Moss	33	33.0	6.7	20.0	20.0				

Hesperocyparis macrocarpa Provisional Semi-natural Association

Common Name: Monterey cypress plantations Association

Classification Comments: Some stands located away from the immediate coast show infection by cypress canker (*Coryneum cardinale*) and significant die-back, though there is also regeneration present.

Plot/Sample Data Summary:

Elevation: 9 m
Slope: 2°
Aspect: NW-facing

Tree Cover: 35%
Shrub Cover: 5%
Herb Cover: 15%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 0.2%
Litter: 97%

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0021

2018 AA Surveys (n=0):

Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Hesperocyparis macrocarpa	100	87.5	35.0	35.0	35.0	**X**	**X**		**X**
	Pinus radiata	100	12.5	5.0	5.0	5.0	**X**			**X**
Shrub										
	Vaccinium ovatum	100	74.1	4.0	4.0	4.0	**X**	**X**		**X**
	Rubus ursinus	100	18.5	1.0	1.0	1.0	**X**			**X**
	Baccharis pilularis	100	3.7	0.2	0.2	0.2	**X**			**X**
	Frangula californica	100	3.7	0.2	0.2	0.2	**X**			**X**
Herb										
	Pteridium aquilinum var. *pubescens*	100	45.5	2.0	2.0	2.0	**X**		**X**	**X**
	Iris douglasiana	100	22.7	1.0	1.0	1.0	**X**			**X**
	Bromus laevipes	100	4.5	0.2	0.2	0.2	**X**			**X**
	Lathyrus vestitus	100	4.5	0.2	0.2	0.2	**X**			**X**
	Polypodium scouleri	100	4.5	0.2	0.2	0.2	**X**			**X**
	Galium aparine	100	4.5	0.2	0.2	0.2	**X**			**X**
	Zigadenus fremontii	100	4.5	0.2	0.2	0.2	**X**			**X**
	Viola sempervirens	100	4.5	0.2	0.2	0.2	**X**			**X**
	Erechtites minimus	100	4.5	0.2	0.2	0.2	**X**			**X**
Non-vasc										
	Moss	100	99.0	20.0	20.0	20.0	**X**	**X**		**X**
	Lichen	100	1.0	0.2	0.2	0.2	**X**			**X**

Pinus radiata plantations Provisional Semi-natural Association

Common Name: Monterey pine plantations

Classification Comments: Plantations of *P. radiata* may serve as a surrogate host for pathogens that attack the native bishop pine, *Pinus muricata*.

Plot/Sample Data Summary:

Elevation: 24 m
Slope: 0°
Aspect: SW-facing

Tree Cover: Mean 26.5%, Range 23 – 30%
Shrub Cover: Mean 3.5%, Range 2 – 5%
Herb Cover: Mean 4.7%, Range 1 – 8%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 0.2%
Litter: 97%

Surveys Used in Description (N = 2):

2017 Classification Surveys (n=1): PTAR0016

2018 AA Surveys (n=1): PTAA0127

Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Pinus radiata	100	99.1	26.4	22.4	30.4	**X**	**X**		**X**
	Pinus muricata	50	0.4	0.1	0.2	0.2				**X**
	Pinus contorta	50	0.4	0.1	0.2	0.2				**X**
Shrub										
	Rubus ursinus	100	82.0	3.0	1.0	5.0	**X**	**X**		**X**
	Vaccinium ovatum	100	9.0	0.2	0.2	0.2	**X**			**X**
	Morella californica	50	1.9	0.1	0.2	0.2				**X**
	Frangula californica	50	7.1	0.1	0.2	0.2				**X**
Herb										
	Iris douglasiana	100	16.5	1.1	0.2	2.0	**X**			**X**
	Holcus lanatus	100	10.5	0.6	0.2	1.0	**X**			**X**
	Erechtites glomeratus	100	5.7	0.2	0.2	0.2	**X**			**X**
	Erechtites minimus	100	5.7	0.2	0.2	0.2	**X**			**X**
	Pteridium aquilinum	50	17.9	1.5	3.0	3.0				**X**
	Rumex acetosella	50	11.9	1.0	2.0	2.0				**X**
	Viola adunca	50	4.5	0.1	0.2	0.2				**X**
	Stellaria media	50	4.5	0.1	0.2	0.2				**X**
	Anthoxanthum odoratum	50	4.5	0.1	0.2	0.2				**X**
	Pteridium aquilinum var. *pubescens*	50	4.5	0.1	0.2	0.2				**X**
	Prunella vulgaris	50	4.5	0.1	0.2	0.2				**X**
	Cerastium arvense	50	4.5	0.1	0.2	0.2				**X**
	Galium aparine	50	4.5	0.1	0.2	0.2				**X**
Non-vasc										
	Lichen	50	50.0	0.1	0.2	0.2				**X**

Pinus contorta ssp*. contorta* Forest Alliance

Common Name: Beach pine forest

NVC Alliance Code: A3717. *Pinus contorta* var. *contorta* Sand Dune Woodland Alliance

Statewide Description: *Pinus contorta* ssp. *contorta* is dominant in the tree canopy with *Abies grandis, Arbutus menziesii, Picea sitchensis, Pinus muricata, Pseudotsuga menziesii,* and *Tsuga heterophylla.* Stands occur on the North Coast of California and north along the coastline to Alaska. They occur on the leeward sides of active sand, stabilized dunes, marshy sloughs, rocky headlands, and bluffs subject to fog drip, heavy wind, and salt spray. In California, stands are small and scattered (Barbour 2007, Pickart and Barbour 2007, Vogl et al. 1977). Stands typically have abundant growth of nonvascular plants on the ground and trees, including two rare maritime lichens, *Bryoria spiralifer* and *B. pseudocapillaris (*Glavich 2003*).*

Associations Sampled	Sample Size	NVC Code
Pinus contorta ssp. *contorta*	1	

Classification Comments: This tree has been cleared in some areas of the Point Arena – Stornetta Unit leaving stands dominated by *Vaccinium ovatum* with low cut stumps scattered throughout. The association circumscription is the same as that of the alliance.

Plot/Sample Data Summary:

Elevation: 16 m
Slope: 1°
Aspect: SE-facing

Tree Cover: 55%
Shrub Cover: 13%
Herb Cover: 11%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 0%
Litter: 98%

Conservation Status Rank: Global G5; **State (California)** S3

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0022

2018 AA Surveys (n=0):

Pinus contorta ssp*. contorta* Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Pinus contorta var*. contorta*	100	100.0	55.0	55.0	55.0	**X**	**X**		**X**
Shrub										
	Vaccinium ovatum	100	37.5	6.0	6.0	6.0	**X**		**X**	**X**
	Morella californica	100	25.0	4.0	4.0	4.0	**X**			**X**
	Frangula californica	100	18.8	3.0	3.0	3.0	**X**			**X**
	Rubus spectabilis	100	6.3	1.0	1.0	1.0	**X**			**X**
	Gaultheria shallon	100	6.3	1.0	1.0	1.0	**X**			**X**
	Rubus ursinus	100	6.3	1.0	1.0	1.0	**X**			**X**
Herb										
	Pteridium aquilinum var. *pubescens*	100	51.5	7.0	7.0	7.0	**X**	**X**		**X**
	Carex obnupta	100	36.8	5.0	5.0	5.0	**X**		**X**	**X**
	Juncus	100	1.5	0.2	0.2	0.2	**X**			**X**
	Polystichum munitum	100	1.5	0.2	0.2	0.2	**X**			**X**
	Erechtites minimus	100	1.5	0.2	0.2	0.2	**X**			**X**
Non-vasc										
	Moss	100	83.3	1.0	1.0	1.0	**X**	**X**		**X**
	Lichen	100	16.7	0.2	0.2	0.2	**X**			**X**

Pinus muricata – Pinus radiata Forest Alliance

Common Name: Bishop pine – Monterey pine forest

NVC Alliance Code: A4097. *Pinus muricata - Pinus radiata* Woodland Alliance

Statewide Description: *Pinus muricata* is dominant or co-dominant in the tree canopy with *Abies grandis*, *Acer macrophyllum*, *Alnus rhombifolia*, *Arbutus menziesii*, *Hesperocyparis goveniana*, *Hesperocyparis pygmaea*, *Notholithocarpus densiflorus*, *Pinus attenuata*, *Pinus contorta* ssp. *bolanderi*, *Pinus contorta* ssp. *contorta*, *Pinus radiata*, *Pseudotsuga menziesii*, *Quercus agrifolia*, *Quercus tomentella*, *Quercus wislizeni*, *Salix lasiolepis*, *Salix scouleriana*, *Sequoia sempervirens*, *Tsuga heterophylla* or *Umbellularia californica*. Dry ridges, headlands, maritime terraces, rocky ridges, and sand dunes. Soils in dry sites are shallow and acidic; soils on seasonally flooded sites are sterile with cemented hardpans. *Pinus muricata* sometimes occurs in palustrine habitats, for example the pygmy forest of Mendocino County, but it is not listed in the National Wetland Inventory.

Associations Sampled	Sample Size	NVC Code
Pinus muricata – (Arbutus menziesii) / Vaccinium ovatum	*3*	*CEGL003164*
Pinus muricata – Pinus radiata alliance	*1*	

Classification Comments:

Plot/Sample Data Summary:

Elevation: 7 m
Slope: 0°
Aspect: Flat

Tree Cover: Mean 19.3%, Range 12 – 25%
Shrub Cover: Mean 25.5%, Range 20 – 35%
Herb Cover: Mean 21.0%, Range 7 – 28%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 81%
Litter: 15%

Conservation Status Rank: Global G3; **State (California)** S3

Surveys Used in Description (N = 4):

2017 Classification Surveys (n=1): PTAR0005

2018 AA Surveys (n=3): PTAA0020, PTAA0128, PTAA0299

Pinus muricata – Pinus radiata Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Pinus muricata	100	81.8	17.6	11.2	25.0	**X**	**X**		**X**
	Pinus radiata	50	8.6	1.9	0.4	7.2				**X**
	Pinus contorta var. *contorta*	25	8.9	1.6	6.2	6.2				
	Pinus contorta	25	0.2	0.1	0.2	0.2				
	Abies grandis	25	0.2	0.1	0.2	0.2				
	Pseudotsuga menziesii	25	0.2	0.1	0.2	0.2				
Shrub										
	Rubus ursinus	75	26.1	6.0	2.0	12.0	**X**			**X**
	Vaccinium ovatum	50	37.2	8.0	14.0	18.0				**X**
	Frangula californica	50	19.5	4.8	9.0	10.0				**X**
	Lonicera interrupta	25	8.2	1.8	7.0	7.0				
	Frangula californica ssp. *californica*	25	4.7	1.0	4.0	4.0				
	Gaultheria shallon	25	2.0	0.5	2.0	2.0				
	Rubus spectabilis	25	1.0	0.3	1.0	1.0				
	Corylus cornuta var. *californica*	25	0.2	0.1	0.2	0.2				
	Morella californica	25	0.2	0.1	0.2	0.2				
	Ceanothus thyrsiflorus	25	0.2	0.1	0.2	0.2				
	Cotoneaster	25	0.2	0.1	0.2	0.2				
	Cytisus scoparius	25	0.2	0.1	0.2	0.2				
	Baccharis pilularis	25	0.2	0.1	0.2	0.2				
Herb										
	Holcus lanatus	75	25.7	6.5	4.0	15.0	**X**			**X**
	Pteridium aquilinum	75	12.6	1.3	1.0	3.0	**X**			**X**
	Iris douglasiana	75	10.0	1.3	1.0	2.0	**X**			**X**
	Anthoxanthum odoratum	50	24.3	6.8	7.0	20.0				**X**
	Rytidosperma pilosum	50	6.3	1.0	1.0	3.0				**X**
	Polystichum munitum	50	6.7	1.0	1.0	3.0				**X**
	Deschampsia cespitosa	25	4.6	1.3	5.0	5.0				
	Agrostis	25	2.8	0.8	3.0	3.0				
	Cirsium arvense	25	2.1	0.5	2.0	2.0				
	Calamagrostis nutkaensis	25	2.1	0.5	2.0	2.0				
	Hypochaeris radicata	25	0.9	0.3	1.0	1.0				
	Pteridium aquilinum var. *pubescens*	25	0.9	0.3	1.0	1.0				
	Grindelia stricta	25	0.2	0.1	0.2	0.2				
	Sisyrinchium bellum	25	0.2	0.1	0.2	0.2				
	Juncus phaeocephalus	25	0.2	0.1	0.2	0.2				
	Fragaria chiloensis	25	0.2	0.1	0.2	0.2				
	Viola adunca	25	0.2	0.1	0.2	0.2				
Non-vasc										
	Moss	25	25.0	0.1	0.2	0.2				

Pinus muricata – (Arbutus menziesii) / Vaccinium ovatum Association

Common Name: Bishop pine – pacific madrone / black huckleberry Association

Plot/Sample Data Summary:

Elevation: 7 m
Slope: 0°
Aspect: Flat

Tree Cover: Mean 19.0%, Range 12 – 25%
Shrub Cover: Mean 26.7%, Range 20 – 35%
Herb Cover: Mean 18.7%, Range 7 – 25%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 81%
Litter: 15%

Surveys Used in Description (N = 3):

2017 Classification Surveys (n=1): PTAR0005

2018 AA Surveys (n=2): PTAA0128, PTAA0299

Pinus muricata – (Arbutus menziesii) / *Vaccinium ovatum* Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Pinus muricata	100	87.3	18.7	11.2	25.0	**X**	**X**		**X**
	Pinus contorta var. *contorta*	33	11.9	2.1	6.2	6.2				
	Pinus radiata	33	0.5	0.1	0.4	0.4				
	Abies grandis	33	0.3	0.1	0.2	0.2				
Shrub										
	Rubus ursinus	100	34.7	8.0	2.0	12.0	**X**		**X**	**X**
	Vaccinium ovatum	33	29.7	6.0	18.0	18.0				
	Frangula californica	33	13.2	3.3	10.0	10.0				
	Lonicera interrupta	33	10.9	2.3	7.0	7.0				
	Frangula californica ssp. *californica*	33	6.2	1.3	4.0	4.0				
	Gaultheria shallon	33	2.6	0.7	2.0	2.0				
	Rubus spectabilis	33	1.3	0.3	1.0	1.0				
	Ceanothus thyrsiflorus	33	0.3	0.1	0.2	0.2				
	Corylus cornuta var. *californica*	33	0.3	0.1	0.2	0.2				
	Morella californica	33	0.3	0.1	0.2	0.2				
	Cotoneaster	33	0.3	0.1	0.2	0.2				
Herb										
	Iris douglasiana	100	13.4	1.7	1.0	2.0	**X**			**X**
	Holcus lanatus	67	29.5	7.3	7.0	15.0				**X**
	Pteridium aquilinum	67	15.7	1.3	1.0	3.0				**X**
	Polystichum munitum	67	8.9	1.3	1.0	3.0				**X**
	Anthoxanthum odoratum	33	8.6	2.3	7.0	7.0				
	Deschampsia cespitosa	33	6.2	1.7	5.0	5.0				
	Agrostis	33	3.7	1.0	3.0	3.0				
	Cirsium arvense	33	2.8	0.7	2.0	2.0				
	Calamagrostis nutkaensis	33	2.8	0.7	2.0	2.0				
	Rytidosperma pilosum	33	4.8	0.3	1.0	1.0				
	Hypochaeris radicata	33	1.2	0.3	1.0	1.0				
	Pteridium aquilinum var. *pubescens*	33	1.2	0.3	1.0	1.0				
	Fragaria chiloensis	33	0.2	0.1	0.2	0.2				
	Juncus phaeocephalus	33	0.2	0.1	0.2	0.2				
	Grindelia stricta	33	0.2	0.1	0.2	0.2				
	Viola adunca	33	0.2	0.1	0.2	0.2				
	Sisyrinchium bellum	33	0.2	0.1	0.2	0.2				
Non-vasc										
	Moss	33	33.3	0.1	0.2	0.2				

Salix lucida ssp. *lasiandra* Woodland Alliance

Common Name: Shining willow groves

NVC Alliance Code: A3748. *Salix lucida* Scrub Swamp Alliance

Statewide Description: *Salix lucida* is dominant or co-dominant in the tree or shrub canopy with *Acer macrophyllum*, *Alnus rhombifolia*, *Cornus sericea*, *Platanus racemosa*, *Populus fremontii*, *Populus trichocarpa*, *Quercus agrifolia*, *Salix* spp., and *Sambucus nigra*. In California, *Salix lucida* stands appear to be limited to relatively moist coastal areas, permanently flooded bottomlands, saturated montane meadows, or along low-gradient streams. Disturbances during winter floods modify stands; the timing of seed dispersal and spring flood patterns determine seedling success. There are two subspecies of *Salix lucida*: *S. lucida* ssp. *lasiandra*, which is usually a tree, and *S. lucida* ssp. *caudata,* a montane shrub. Only *Salix lucida* ssp. *lasiandra* is included in this alliance.

Associations Sampled	Sample Size	NVC Code
Salix lucida ssp. *lasiandra*	1	CEGL003118

Classification Comments: The association circumscription is the same as that of the alliance

Plot/Sample Data Summary:

Elevation: no data
Slope: no data
Aspect: no data

Tree Cover: 12%
Shrub Cover: 15%
Herb Cover: Mean 3.6%, Range 4%

Surface Covers:
Large Rock: no data
Small Rock: no data
Fines: no data
Litter: no data

Conservation Status Rank: Global G4; **State (California)** S3

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=0):

2018 AA Surveys (n=1): PTAA0303

Salix lucida ssp*. lasiandra* Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Salix lucida ssp*. lasiandra*	100	98.4	12.0	12.0	12.0	**X**	**X**		**X**
	Alnus rubra	100	1.6	0.2	0.2	0.2	**X**			**X**
Shrub										
	Salix sitchensis	100	80.6	10.0	10.0	10.0	**X**	**X**		**X**
	Salix hookeriana	100	8.1	1.0	1.0	1.0	**X**			**X**
	Rubus ursinus	100	8.1	1.0	1.0	1.0	**X**			**X**
	Sambucus racemosa	100	1.6	0.2	0.2	0.2	**X**			**X**
	Lonicera involucrata	100	1.6	0.2	0.2	0.2	**X**			**X**
Herb										
	Carex obnupta	100	83.3	3.0	3.0	3.0	**X**	**X**		**X**
	Lysichiton americanus	100	5.6	0.2	0.2	0.2	**X**			**X**
	Polystichum munitum	100	5.6	0.2	0.2	0.2	**X**			**X**
	Urtica dioica	100	5.6	0.2	0.2	0.2	**X**			**X**

Arctostaphylos columbiana Provisional Shrubland Alliance

Common Name: Hairy manzanita chaparral

NVC Alliance Code: ANEW2. *Arctostaphylos columbiana* Shrubland Alliance

Statewide Description: *Arctostaphylos columbiana* dominates in the shrub canopy with other shrubs such as *A. uva-ursi, Rubus ursinus, and Gaultheria shallon*. Emergent trees may be present at low cover, including *Pinus contorta* ssp*. contorta.* The relationships between this and other maritime chaparral alliances and associations will be better understood after additional data has been collected and analyzed.

Associations Sampled	Sample Size	NVC Code
Arctostaphylos columbiana Provisional	1	

Classification Comments: Stands in this region are dominated by *A. columbiana,* which is placed within this provisional alliance. There is a related type named *Pinus contorta* var. *contorta* / *Arctostaphylos columbiana* Woodland (CEGL002682) from the coastal dunes of Oregon and Humboldt County, California. Additional sampling across these habitats is needed to understand the correct alliance placement for stands in northern California, especially with disturbances from previous and on-going timber harvest practices. The association circumscription is the same as that of the alliance

Plot/Sample Data Summary:

Elevation: no data
Slope: no data
Aspect: no data

Tree Cover: 1%

Shrub Cover: 35%
Herb Cover: 15.2%

Surface Covers:
Large Rock: no data
Small Rock: no data
Fines: no data
Litter: no data

Conservation Status Rank: Global G2G3; **State (California)** S2S3

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=0):

2018 AA Surveys (n=1): PTAA0349

Arctostaphylos columbiana Provisional Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft	
Tree											
	Pinus contorta	100	100.0	0.2	0.2	0.2	**X**	**X**			**X**
Shrub											
	Arctostaphylos columbiana	100	60.2	20.0	20.0	20.0	**X**	**X**			**X**
	Rubus ursinus	100	15.1	5.0	5.0	5.0	**X**				**X**
	Gaultheria shallon	100	15.1	5.0	5.0	5.0	**X**				**X**
	Arctostaphylos uva-ursi	100	9.0	3.0	3.0	3.0	**X**				**X**
	Salix sitchensis	100	0.6	0.2	0.2	0.2	**X**				**X**
Herb											
	Deschampsia cespitosa	100	32.9	5.0	5.0	5.0	**X**			**X**	**X**
	Grindelia stricta	100	19.7	3.0	3.0	3.0	**X**				**X**
	Pteridium aquilinum	100	19.7	3.0	3.0	3.0	**X**				**X**
	Solidago simplex ssp. *simplex* var. *spathulata*	100	13.2	2.0	2.0	2.0	**X**				**X**
	Calamagrostis nutkaensis	100	13.2	2.0	2.0	2.0	**X**				**X**
	Iris douglasiana	100	1.3	0.2	0.2	0.2	**X**				**X**

Baccharis pilularis Shrubland Alliance

Common Name: Coyote brush scrub

NVC Alliance Code: A0836. *Baccharis pilularis* Scrub Alliance

Statewide Description: *Baccharis pilularis* is dominant or co-dominant in the shrub canopy with *Artemisia californica, Ceanothus thyrsiflorus, Corylus cornuta, Diplacus aurantiacus, Eriogonum fasciculatum, Eriophyllum staechadifolium, Frangula californica, Garrya elliptica, Gaultheria shallon, Holodiscus discolor, Lotus scoparius, Lupinus arboreus, Morella californica, Rubus ursinus, Salvia apiana, Salvia leucophylla,* and *Toxicodendron diversilobum*. Emergent trees may be present at low cover, including *Pinus muricata, Pseudotsuga menziesii, Quercus agrifolia,* or *Umbellularia californica*. Stands can be transitory to forest and woodland types or persistent for a long time (Heady et al. 1977). Seedlings of *Baccharis pilularis* invade grasslands in the central coast, forming stands when grazing and fire decrease (McBride and Heady 1968). Older, shady stands are transitional to forest types with *Pinus muricata, Pseudotsuga menziesii, Quercus agrifolia,* and *Umbellularia californica* (Grams et al. 1977, McBride 1974). *Baccharis pilularis* invades recently logged land in northern California well away from the coast. *B*. *pilularis* also invades coastal dunes stabilized by *Ammophila arenaria* or *Lupinus arboreus* (Pickart and Sawyer 1998).

Associations Sampled	Sample Size	NVC Code
Baccharis pilularis alliance	2	
Baccharis pilularis – (Frangula californica) – Rubus spp.	2	CEGL003191
Garrya elliptica	1	

Classification Comments:

Plot/Sample Data Summary:

Elevation: Mean 15 m, Range 7 – 21 m
Slope: Mean 31°, Range 15 – 42°
Aspect: Variable

Tree Cover: 0%
Shrub Cover: Mean 29%, Range 12 – 50%
Herb Cover: Mean 27%, Range 3 – 65%

Surface Covers:
Large Rock: Mean 9%, Range 0.2 –26%
Small Rock: Mean 18%, Range 0 – 55%
Fines: Mean 37%, Range 0.2 – 96%
Litter: Mean 33%, Range 0 – 96%

Conservation Status Rank: Global G5; **State (California)** S5

Surveys Used in Description (N = 5):

2017 Classification Surveys (n=2): PTAR0007, PTAR0029, PTAR0036

2018 AA Surveys (n=2): PTAA0069_1, PTAA0185

Baccharis pilularis Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Pinus radiata	20	20.0	0.0	0.2	0.2				
Shrub										
	Baccharis pilularis	100	50.0	14.8	7.0	25.0	**X**	**X**		**X**
	Rubus ursinus	100	10.9	2.4	2.0	3.0	**X**			**X**
	Toxicodendron diversilobum	80	8.3	3.6	0.2	15.0	**X**			**X**
	Rubus parviflorus	40	6.5	3.4	5.0	12.0				
	Garrya elliptica	40	11.8	3.0	0.2	15.0				
	Frangula californica	40	1.9	1.0	2.0	3.0				
	Corylus cornuta var. *californica*	20	3.1	1.6	8.0	8.0				
	Gaultheria shallon	20	1.9	1.0	5.0	5.0				
	Lupinus arboreus	20	2.1	0.4	2.0	2.0				
	Sambucus racemosa	20	0.8	0.4	2.0	2.0				
	Lonicera involucrata	20	0.4	0.2	1.0	1.0				
	Ceanothus thyrsiflorus	20	1.6	0.2	1.0	1.0				
	Cotoneaster lacteus	20	0.3	0.0	0.2	0.2				
	Holodiscus discolor	20	0.2	0.0	0.2	0.2				
	Ribes sanguineum	20	0.2	0.0	0.2	0.2				
Herb										
	Polystichum munitum	40	12.1	5.0	3.0	22.0				
	Plantago lanceolata	40	6.4	4.0	0.2	20.0				
	Pteridium aquilinum var. *pubescens*	40	1.0	0.6	0.2	3.0				
	Bromus carinatus var. *maritimus*	40	2.7	0.6	0.2	3.0				
	Angelica hendersonii	40	0.6	0.2	0.2	1.0				
	Scrophularia californica	40	6.0	0.2	0.2	1.0				
	Galium californicum	40	0.3	0.1	0.2	0.2				
	Rumex acetosella	40	1.2	0.1	0.2	0.2				
	Bromus diandrus	40	1.3	0.1	0.2	0.2				
	Anthoxanthum odoratum	20	6.2	4.0	20.0	20.0				
	Calamagrostis nutkaensis	20	6.4	3.0	15.0	15.0				
	Vulpia bromoides	20	3.1	2.0	10.0	10.0				
	Stachys ajugoides	20	2.1	1.0	5.0	5.0				
	Sherardia arvensis	20	1.6	1.0	5.0	5.0				
	Melica torreyana	20	4.4	1.0	5.0	5.0				
	Leontodon taraxacoides	20	0.9	0.6	3.0	3.0				
	Stachys rigida	20	2.6	0.6	3.0	3.0				
	Ammophila arenaria	20	11.8	0.4	2.0	2.0				
	Achillea millefolium	20	1.7	0.4	2.0	2.0				
	Castilleja affinis ssp. *affinis*	20	1.7	0.4	2.0	2.0				
	Juncus breweri	20	11.1	0.4	2.0	2.0				
	Maianthemum stellatum	20	0.9	0.4	2.0	2.0				
	Fragaria chiloensis	20	0.9	0.2	1.0	1.0				
	Iris douglasiana	20	0.3	0.2	1.0	1.0				
	Abronia latifolia	20	1.1	0.0	0.2	0.2				
	Cerastium arvense	20	0.1	0.0	0.2	0.2				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb (continued)										
	Deschampsia cespitosa	20	0.1	0.0	0.2	0.2				
	Elymus glaucus	20	0.2	0.0	0.2	0.2				
	Eriophyllum lanatum	20	0.2	0.0	0.2	0.2				
	Erodium cicutarium	20	0.1	0.0	0.2	0.2				
	Fragaria vesca	20	0.2	0.0	0.2	0.2				
	Heracleum maximum	20	1.2	0.0	0.2	0.2				
	Hypochaeris radicata	20	0.1	0.0	0.2	0.2				
	Lathyrus vestitus	20	0.1	0.0	0.2	0.2				
	Lolium perenne ssp. *multiflorum*	20	0.1	0.0	0.2	0.2				
	Marah fabaceus	20	0.1	0.0	0.2	0.2				
	Briza maxima	20	0.1	0.0	0.2	0.2				
	Petasites frigidus var. *palmatus*	20	0.2	0.0	0.2	0.2				
	Marah oreganus	20	0.2	0.0	0.2	0.2				
	Galium aparine	20	0.2	0.0	0.2	0.2				
	Phacelia heterophylla ssp. *virgata*	20	0.2	0.0	0.2	0.2				
	Carduus pycnocephalus	20	0.1	0.0	0.2	0.2				
	Linum usitatissimum	20	0.1	0.0	0.2	0.2				
	Vicia lutea	20	0.2	0.0	0.2	0.2				
	Sonchus oleraceus	20	0.2	0.0	0.2	0.2				
	Pseudognaphalium	20	1.1	0.0	0.2	0.2				
	Poa douglasii	20	1.1	0.0	0.2	0.2				
	Raphanus sativus	20	0.2	0.0	0.2	0.2				
	Sanicula crassicaulis	20	0.2	0.0	0.2	0.2				
	Sedum spathulifolium	20	0.2	0.0	0.2	0.2				
	Senecio	20	0.1	0.0	0.2	0.2				
	Briza minor	20	0.1	0.0	0.2	0.2				
	Symphyotrichum chilense var. *chilense*	20	1.2	0.0	0.2	0.2				
	Vicia nigricans ssp. *gigantea*	20	0.2	0.0	0.2	0.2				
	Vicia sativa ssp. *nigra*	20	0.1	0.0	0.2	0.2				
	Camissonia cheiranthifolia	20	1.1	0.0	0.2	0.2				
	Silene gallica	20	0.1	0.0	0.2	0.2				
	Pteridium aquilinum	20	1.1	0.0	0.2	0.2				
	Phacelia	20	1.1	0.0	0.2	0.2				
	Aira caryophyllea	20	0.1	0.0	0.2	0.2				
	Anaphalis margaritacea	20	0.2	0.0	0.2	0.2				
	Sonchus asper	20	0.2	0.0	0.2	0.2				
	Holcus lanatus	20	0.1	0.0	0.1	0.1				

Baccharis pilularis – (Frangula californica) – Rubus spp. Association

Common Name: Coyote brush – coffeeberry – berry bramble Association

Plot/Sample Data Summary:

Elevation: Mean 19 m, Range 17 – 21 m
Slope: Mean 25°, Range 15 – 35°
Aspect: W-facing

Tree Cover: 0%
Shrub Cover: Mean 31%, Range 12 – 50%
Herb Cover: Mean 55%, Range 45 – 65%

Surface Covers:
Large Rock: 0.2%
Small Rock: Mean 0.1%, Range 0.0 – 0.2%
Fines: Mean 48%, Range 0.2 – 96%
Litter: Mean 48%, Range 0.0 – 96%

Surveys Used in Description (N = 2):

2017 Classification Surveys (n=2): PTAR0007, PTAR0036

2018 AA Surveys (n=0):

Baccharis pilularis – (Frangula californica) – Rubus spp. Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Pinus radiata	50	50.0	0.1	0.2	0.2				**X**
Shrub										
	Baccharis pilularis	100	47.9	13.5	7.0	20.0	**X**		**X**	**X**
	Rubus ursinus	100	14.2	2.5	2.0	3.0	**X**			**X**
	Toxicodendron diversilobum	100	6.0	1.5	1.0	2.0	**X**			**X**
	Rubus parviflorus	50	11.5	6.0	12.0	12.0				**X**
	Corylus cornuta var. *californica*	50	7.7	4.0	8.0	8.0				**X**
	Gaultheria shallon	50	4.8	2.5	5.0	5.0				**X**
	Frangula californica	50	2.9	1.5	3.0	3.0				**X**
	Ceanothus thyrsiflorus	50	4.1	0.5	1.0	1.0				**X**
	Cotoneaster lacteus	50	0.8	0.1	0.2	0.2				**X**
Herb										
	Pteridium aquilinum var. *pubescens*	100	2.5	1.6	0.2	3.0	**X**			**X**
	Polystichum munitum	50	23.6	11.0	22.0	22.0				**X**
	Anthoxanthum odoratum	50	15.5	10.0	20.0	20.0				**X**
	Plantago lanceolata	50	15.5	10.0	20.0	20.0				**X**
	Calamagrostis nutkaensis	50	16.1	7.5	15.0	15.0				**X**
	Vulpia bromoides	50	7.8	5.0	10.0	10.0				**X**
	Stachys ajugoides	50	5.4	2.5	5.0	5.0				**X**
	Sherardia arvensis	50	3.9	2.5	5.0	5.0				**X**
	Leontodon taraxacoides	50	2.3	1.5	3.0	3.0				**X**
	Maianthemum stellatum	50	2.1	1.0	2.0	2.0				**X**
	Iris douglasiana	50	0.8	0.5	1.0	1.0				**X**
	Angelica hendersonii	50	1.1	0.5	1.0	1.0				**X**
	Bromus carinatus var. *maritimus*	50	0.2	0.1	0.2	0.2				**X**
	Lolium perenne ssp. *multiflorum*	50	0.2	0.1	0.2	0.2				**X**
	Deschampsia cespitosa	50	0.2	0.1	0.2	0.2				**X**
	Linum usitatissimum	50	0.2	0.1	0.2	0.2				**X**
	Lathyrus vestitus	50	0.2	0.1	0.2	0.2				**X**
	Hypochaeris radicata	50	0.2	0.1	0.2	0.2				**X**
	Galium californicum	50	0.2	0.1	0.2	0.2				**X**
	Erodium cicutarium	50	0.2	0.1	0.2	0.2				**X**
	Cerastium arvense	50	0.2	0.1	0.2	0.2				**X**
	Carduus pycnocephalus	50	0.2	0.1	0.2	0.2				**X**
	Rumex acetosella	50	0.2	0.1	0.2	0.2				**X**
	Marah fabaceus	50	0.2	0.1	0.2	0.2				**X**
	Senecio	50	0.2	0.1	0.2	0.2				**X**
	Vicia sativa ssp. *nigra*	50	0.2	0.1	0.2	0.2				**X**
	Silene gallica	50	0.2	0.1	0.2	0.2				**X**
	Briza minor	50	0.2	0.1	0.2	0.2				**X**
	Aira caryophyllea	50	0.2	0.1	0.2	0.2				**X**
	Scrophularia californica	50	0.2	0.1	0.2	0.2				**X**
	Briza maxima	50	0.2	0.1	0.2	0.2				**X**

Garrya elliptica Provisional Association

Common Name: Coastal silk tassel Association

Statewide Description: *Garrya elliptica* is dominant in the shrub canopy with *Baccharis pilularis*, *Gaultheria shallon*, *Lonicera involucrata*, *Ribes menziesii*, *Rubus parviflorus*, *Rubus spectabilis*, *Rubus ursinus* and *Sambucus racemosa*. Emergent trees may be present at low cover, including *Picea sitchensis* or *Umbellularia californica*. Stands exist along the Northern California Coast (263A), where Keeler-Wolf et al. (2003a) assigned a single plot dominated by *Garrya elliptica* at Point Reyes National Seashore to the *Umbellularia californica* alliance. Other ecologists have discovered other small stands (D. Shirokauer pers. comm. 2003) in the region. Further north in Humboldt Co., an extensive stand is conspicuous along the bluff east of U.S. 101 and Clam Beach. Whether these stands, often small, represent a separate alliance, or should be nested within the *Baccharis pilularis* alliance, requires more sampling.

Plot/Sample Data Summary:

Elevation: 7 m
Slope: 42°
Aspect: NE-facing

Tree Cover: 0%
Shrub Cover: 25%
Herb Cover: 20%

Surface Covers:
Large Rock: 26%
Small Rock: 55%
Fines: 15%
Litter: 2%

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0029

2018 AA Surveys (n=0):

Garrya elliptica Provisional Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Garrya elliptica	100	58.6	15.0	15.0	15.0	**X**	**X**		**X**
	Baccharis pilularis	100	27.3	7.0	7.0	7.0	**X**			**X**
	Rubus ursinus	100	11.7	3.0	3.0	3.0	**X**			**X**
	Ribes sanguineum	100	0.8	0.2	0.2	0.2	**X**			**X**
	Toxicodendron diversilobum	100	0.8	0.2	0.2	0.2	**X**			**X**
	Holodiscus discolor	100	0.8	0.2	0.2	0.2	**X**			**X**
Herb										
	Melica torreyana	100	21.8	5.0	5.0	5.0	**X**			**X**
	Polystichum munitum	100	13.1	3.0	3.0	3.0	**X**			**X**
	Stachys rigida	100	13.1	3.0	3.0	3.0	**X**			**X**
	Bromus carinatus var. *maritimus*	100	13.1	3.0	3.0	3.0	**X**			**X**
	Castilleja affinis ssp. *affinis*	100	8.7	2.0	2.0	2.0	**X**			**X**
	Achillea millefolium	100	8.7	2.0	2.0	2.0	**X**			**X**
	Fragaria chiloensis	100	4.4	1.0	1.0	1.0	**X**			**X**
	Vicia nigricans ssp. *gigantea*	100	0.9	0.2	0.2	0.2	**X**			**X**
	Bromus diandrus	100	0.9	0.2	0.2	0.2	**X**			**X**
	Marah oreganus	100	0.9	0.2	0.2	0.2	**X**			**X**
	Galium californicum	100	0.9	0.2	0.2	0.2	**X**			**X**
	Fragaria vesca	100	0.9	0.2	0.2	0.2	**X**			**X**
	Petasites frigidus var. *palmatus*	100	0.9	0.2	0.2	0.2	**X**			**X**
	Elymus glaucus	100	0.9	0.2	0.2	0.2	**X**			**X**
	Galium aparine	100	0.9	0.2	0.2	0.2	**X**			**X**
	Angelica hendersonii	100	0.9	0.2	0.2	0.2	**X**			**X**
	Eriophyllum lanatum	100	0.9	0.2	0.2	0.2	**X**			**X**
	Plantago lanceolata	100	0.9	0.2	0.2	0.2	**X**			**X**
	Raphanus sativus	100	0.9	0.2	0.2	0.2	**X**			**X**
	Sanicula crassicaulis	100	0.9	0.2	0.2	0.2	**X**			**X**
	Sedum spathulifolium	100	0.9	0.2	0.2	0.2	**X**			**X**
	Sonchus asper	100	0.9	0.2	0.2	0.2	**X**			**X**
	Sonchus oleraceus	100	0.9	0.2	0.2	0.2	**X**			**X**
	Phacelia heterophylla ssp. *virgata*	100	0.9	0.2	0.2	0.2	**X**			**X**
	Vicia lutea	100	0.9	0.2	0.2	0.2	**X**			**X**
	Anaphalis margaritacea	100	0.9	0.2	0.2	0.2	**X**			**X**
	Holcus lanatus	100	0.5	0.1	0.1	0.1	**X**			**X**

Frangula californica – Rhododendron occidentale Shrubland Provisional Alliance

Common Name: California coffee berry – western azalea scrub

NVC Alliance Code: none

Statewide Description: The two nominate species of the alliance were given separate alliance status in Sawyer et al. (2009). Recently the peer review panel of the NVC has suggested merging them into a single alliance; the new convention is followed here. *Frangula californica* or *Rhododendron occidentale* dominates or co-dominate in the shrub canopy with *Baccharis pilularis, Calycanthus occidentalis, Corylus cornuta, Ericameria pinifolia, Eriogonum wrightii, Frangula purshiana, Garrya veatchii, Hoita macrostachya, Malus fusca, Oemleria cerasiformis, Prunus virginiana, Ribes roezlii, Rubus parviflorus*, *Salix breweri, Sambucus nigra,* and *Toxicodendron diversilobum*. Emergent trees may be present at low cover, including *Abies grandis, Alnus rubra, Picea sitchensis, Pseudotsuga menziesii, Quercus agrifolia, Quercus chrysolepis,* or *Tsuga heterophylla. Frangula californica* is a morphologically variable and widespread species. It has six subspecies, which have somewhat different ranges but similar ecologies. In coastal California, *Frangula californica* stands appear to be the result of a gradual transition from early-seral coastal scrub types (e.g., *Baccharis pilularis* Alliance) to a scrub type with little disturbance. These stands exist in a fine mosaic of grassland, shrubland, and woodland alliances. Ford and Hayes (2007) report *Frangula californica* stands on both north- and south-facing slopes along the coast from Big Sur to Point Reyes. *Rhododendron occidentale* is a common shrub along streams, seeps, and moist slopes at low to montane elevations throughout most of cismontane California. The *Rhododendron occidentale* Alliance is also recognized for the Klamath Mountains in southwestern Oregon (Kagan et al. 2004).

Associations Sampled	Sample Size	NVC Code
Frangula californica – Rhododendron occidentale alliance	1	

Classification Comments: No surveys were classified to the association level

Plot/Sample Data Summary:

Elevation: no data
Slope: no data
Aspect: no data

Tree Cover: 16%
Shrub Cover: 15%
Herb Cover: 27%

Surface Covers:
Large Rock: no data
Small Rock: no data
Fines: no data
Litter: no data

Conservation Status Rank: Global ?; **State (California)** ?

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=0):

2018 AA Surveys (n=1): PTAA0131

***Frangula californica – Rhododendron occidentale* Alliance Stand Table:**

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Picea sitchensis	100	65.2	3.0	3.0	3.0	**X**	**X**		**X**
	Pinus radiata	100	21.7	1.0	1.0	1.0	**X**			**X**
	Alnus rubra	100	8.7	0.4	0.4	0.4	**X**			**X**
	Pinus contorta var. *contorta*	100	4.3	0.2	0.2	0.2	**X**			**X**
Shrub										
	Frangula californica	100	75.0	12.0	12.0	12.0	**X**	**X**		**X**
	Rubus parviflorus	100	18.8	3.0	3.0	3.0	**X**			**X**
	Baccharis pilularis	100	6.3	1.0	1.0	1.0	**X**			**X**
Herb										
	Polystichum munitum	100	91.2	25.0	25.0	25.0	**X**	**X**		**X**
	Athyrium filix-femina	100	3.6	1.0	1.0	1.0	**X**			**X**
	Juncus effusus	100	3.6	1.0	1.0	1.0	**X**			**X**
	Equisetum arvense	100	0.7	0.2	0.2	0.2	**X**			**X**
	Cirsium arvense	100	0.7	0.2	0.2	0.2	**X**			**X**

Gaultheria shallon – Rubus (ursinus) Shrubland Provisional Alliance

Common Name: Salal – berry brambles

NVC Alliance Code: none

Statewide Description: The two nominate species of this alliance were segregated from the *Rubus* spp. Alliance in Sawyer et al. (2009) based on suggestions from the peer review panel of the NVC. The new convention is as follows.

Rubus ursinus or *Gaultheria shallon* dominates solely or co-dominate, forming various mixtures in the shrub canopy with *Baccharis pilularis, Garrya elliptica, Gaultheria shallon, Heracleum maximum, Lonicera involucrata, Marah oreganus, Morella californica, Ribes menziesii, Sambucus racemosa*, *Toxicodendron diversilobum,* and *Vaccinium ovatum*. Emergent trees may be present at low cover, including *Picea sitchensis, Pinus muricata,* or *Pseudotsuga menziesii. Rubus ursinus* and *Gaultheria shallon* are both widespread, low, sprawling shrubs found in mesic woodlands and forests in the coastal areas of central and northern California. Both species tend to emerge from forest or woodland cover on exposed coastal bluffs or in coastal grasslands.

Associations Sampled	Sample Size	NVC Code
Gaultheria shallon – Rubus spp.		1
Gaultheria shallon – Rubus (ursinus) alliance		5

Plot/Sample Data Summary:

Elevation: 17 m
Slope: 1°
Aspect: SW-facing

Tree Cover: Mean 2.2%, Range 0 – 8%
Shrub Cover: Mean 28.5%, Range 12 – 70%
Herb Cover: Mean 30.2%, Range 10 – 54%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 5%
Litter: 93%

Conservation Status Rank: Global ?; State (California) ?

Surveys Used in Description (N = 6):

2017 Classification Surveys (n=1): PTAR0015

2018 AA Surveys (n=5): PTAA0031, PTAA0052, PTAA0237_2, PTAA0293, PTAA0353

Gaultheria shallon – Rubus (ursinus) Provisional Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Hesperocyparis macrocarpa	50	16.5	0.3	0.2	1.0				**X**
	Pinus contorta	33	22.2	1.5	1.0	8.0				
	Pinus contorta var. *contorta*	33	25.0	0.1	0.2	0.2				
Shrub										
	Vaccinium ovatum	100	42.6	11.7	6.0	17.0	**X**		**X**	**X**
	Rubus ursinus	100	26.7	7.2	3.0	12.0	**X**			**X**
	Gaultheria shallon	100	13.0	6.9	0.2	35.0	**X**			**X**
	Morella californica	67	11.5	4.8	3.0	15.0				**X**
	Frangula californica	33	3.2	0.8	1.0	4.0				
Herb										
	Carex obnupta	67	33.4	7.3	1.0	22.0				**X**
	Anthoxanthum odoratum	67	11.3	5.4	0.2	20.0				**X**
	Deschampsia cespitosa	67	14.6	5.0	2.0	13.0				**X**
	Holcus lanatus	67	11.7	4.7	0.2	15.0				**X**
	Agrostis stolonifera	50	5.0	2.3	2.0	10.0				**X**
	Iris douglasiana	50	4.7	1.5	2.0	5.0				**X**
	Rytidosperma pilosum	33	0.8	0.2	0.2	1.0				

Gaultheria shallon – Rubus spp. Provisional Association

Common Name: Salal – berry brambles Association

Classification Comments:

Plot/Sample Data Summary:

Elevation: 17 m
Slope: 1°
Aspect: no data

Tree Cover: 0%
Shrub Cover: 70%
Herb Cover: 20%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 5%
Litter: 93%

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0015

2018 AA Surveys (n=0):

Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Pinus contorta var. *contorta*	100	100	0.2	0.2	0.2	**X**	**X**		**X**
Shrub										
	Gaultheria shallon	100	48.6	35.0	35.0	35.0	**X**		**X**	**X**
	Vaccinium ovatum	100	20.8	15.0	15.0	15.0	**X**			**X**
	Morella californica	100	20.8	15.0	15.0	15.0	**X**			**X**
	Rubus ursinus	100	9.7	7.0	7.0	7.0	**X**			**X**
Herb										
	Pteridium aquilinum var. *pubescens*	100	44.6	15.0	15.0	15.0	**X**		**X**	**X**
	Deschampsia cespitosa	100	38.7	13.0	13.0	13.0	**X**		**X**	**X**
	Iris douglasiana	100	6.0	2.0	2.0	2.0	**X**			**X**
	Juncus	100	3.0	1.0	1.0	1.0	**X**			**X**
	Carex obnupta	100	3.0	1.0	1.0	1.0	**X**			**X**
	Trifolium wormskioldii	100	0.6	0.2	0.2	0.2	**X**			**X**
	Viola adunca	100	0.6	0.2	0.2	0.2	**X**			**X**
	Plantago lanceolata	100	0.6	0.2	0.2	0.2	**X**			**X**
	Gentiana affinis	100	0.6	0.2	0.2	0.2	**X**			**X**
	Fragaria chiloensis	100	0.6	0.2	0.2	0.2	**X**			**X**
	Anthoxanthum odoratum	100	0.6	0.2	0.2	0.2	**X**			**X**
	Agrostis	100	0.6	0.2	0.2	0.2	**X**			**X**
	Holcus lanatus	100	0.6	0.2	0.2	0.2	**X**			**X**

Lupinus arboreus Shrubland Semi-Natural Alliance

Common Name: Yellow bush lupine scrub

NVC Alliance Code: A4120. *Lupinus arboreus* Dune Scrub Alliance

Statewide Description: *Lupinus arboreus* is dominant or co-dominant in the shrub canopy with *Ammophila arenaria, Baccharis pilularis, Ericameria ericoides,* and *Lupinus chamissonis*. Emergent trees or tall shrubs may be present at low cover, including *Alnus rubra* or *Morella californica*.

Stands of *Lupinus arboreus* occur natively in southern and central California from Ventura to Sonoma Counties. They have become widely naturalized in northern California along the coast from Mendocino and Humboldt Counties to Vancouver, Canada. However, demarcation between native and naturalized populations is still disputed (Pickart 2000). Native stands often occupy stabilized dunes, coastal bluffs, and disturbed areas (e.g., pastures) near the coast, and they appear to have a short temporal nature (Keeler-Wolf et al. 2003a, Ross 2002b). North of Sonoma County, *Lupinus arboreus* is an invasive shrub on dune systems and disturbed coastal areas, where it has been widely planted as a sand stabilizer and ornamental (Pickart and Sawyer 1998). Dune scrub, which includes stands of the native *Lupinus arboreus*, is characteristic of backdunes along the coast south of Bodega Head in Sonoma County. Dune mat, a collection of annuals and perennials of the *Abronia latifolia* – *Ambrosia chamissonis* and *Festuca* spp. Alliances, exists on the northern California coast (Pickart and Barbour 2007) where it covers nearshore dune ridges. Dune mat is now rare. *Lupinus arboreus* aggressively invades dune mat and modifies environmental conditions to facilitate the invasion of non-native annual grasses, other weeds, and long-lived natives that replaces the dune mat (Pickart 2000, Pickart and Sawyer 1998, Ross2002b).

Associations Sampled	Sample Size	NVC Code
Lupinus arboreus / *Bromus diandrus*	1	
Lupinus arboreus alliance	1	

Plot/Sample Data Summary:

Elevation: 19 m
Slope: 4°
Aspect: Flat

Tree Cover: 0%
Shrub Cover: Mean 13.5%, Range 12 – 15%
Herb Cover: Mean 35.5%, Range 26 – 45%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 28%
Litter: 70%

Conservation Status Rank: **Global** G4; **State (California)** S4

Surveys Used in Description (N = 2):

2017 Classification Surveys (n=1): PTAR0042

2018 AA Surveys (n=1): PTAA0067

Lupinus arboreus Semi-Natural Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Baccharis pilularis	100	62.7	9.0	5.0	13.0	**X**	**X**		**X**
	Lupinus arboreus	100	35.2	4.5	2.0	7.0	**X**		**X**	**X**
	Salix hookeriana	50	0.6	0.1	0.2	0.2				**X**
	Lonicera hispidula	50	0.8	0.1	0.2	0.2				**X**
	Frangula californica	50	0.6	0.1	0.2	0.2				**X**
Herb										
	Ammophila arenaria	100	40.5	12.5	10.0	15.0	**X**		**X**	**X**
	Bromus diandrus	50	11.6	5.0	10.0	10.0				**X**
	Vulpia myuros	50	11.6	5.0	10.0	10.0				**X**
	Carex obnupta	50	15.4	4.0	8.0	8.0				**X**
	Rumex acetosella	50	5.8	2.5	5.0	5.0				**X**
	Juncus breweri	50	3.5	1.5	3.0	3.0				**X**
	Holcus lanatus	50	2.3	1.0	2.0	2.0				**X**
	Pteridium aquilinum	50	3.8	1.0	2.0	2.0				**X**
	Polygonum paronychia	50	1.2	0.5	1.0	1.0				**X**
	Anaphalis margaritacea	50	1.9	0.5	1.0	1.0				**X**
	Vulpia bromoides	50	0.2	0.1	0.2	0.2				**X**
	Galium aparine	50	0.2	0.1	0.2	0.2				**X**
	Agoseris apargioides	50	0.2	0.1	0.2	0.2				**X**
	Aira caryophyllea	50	0.2	0.1	0.2	0.2				**X**
	Daucus pusillus	50	0.2	0.1	0.2	0.2				**X**
	Hypochaeris radicata	50	0.2	0.1	0.2	0.2				**X**
	Pseudognaphalium luteoalbum	50	0.2	0.1	0.2	0.2				**X**
	Tanacetum camphoratum	50	0.2	0.1	0.2	0.2				**X**
	Vicia sativa ssp. *nigra*	50	0.2	0.1	0.2	0.2				**X**
	Plantago lanceolata	50	0.2	0.1	0.2	0.2				**X**
Non-vasc										
	Lichen	50	50.0	0.1	0.2	0.2				**X**

Lupinus arboreus / *Bromus diandrus* Association

Common Name: Yellow bush lupine – ripgut brome Association

Classification Comments:

Plot/Sample Data Summary:

Elevation: 19 m
Slope: 4°
Aspect: Flat

Tree Cover: 0%
Shrub Cover: 12%
Herb Cover: 45%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 28%
Litter: 70%

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0042

2018 AA Surveys (n=0):

Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Lupinus arboreus	100	57.4	7.0	7.0	7.0	**X**	**X**		**X**
	Baccharis pilularis	100	41.0	5.0	5.0	5.0	**X**		**X**	**X**
	Lonicera hispidula	100	1.6	0.2	0.2	0.2	**X**			**X**
Herb										
	Ammophila arenaria	100	23.3	10.0	10.0	10.0	**X**			**X**
	Bromus diandrus	100	23.3	10.0	10.0	10.0	**X**			**X**
	Vulpia myuros	100	23.3	10.0	10.0	10.0	**X**			**X**
	Rumex acetosella	100	11.6	5.0	5.0	5.0	**X**			**X**
	Juncus breweri	100	7.0	3.0	3.0	3.0	**X**			**X**
	Holcus lanatus	100	4.7	2.0	2.0	2.0	**X**			**X**
	Polygonum paronychia	100	2.3	1.0	1.0	1.0	**X**			**X**
	Agoseris apargioides	100	0.5	0.2	0.2	0.2	**X**			**X**
	Vulpia bromoides	100	0.5	0.2	0.2	0.2	**X**			**X**
	Plantago lanceolata	100	0.5	0.2	0.2	0.2	**X**			**X**
	Galium aparine	100	0.5	0.2	0.2	0.2	**X**			**X**
	Hypochaeris radicata	100	0.5	0.2	0.2	0.2	**X**			**X**
	Daucus pusillus	100	0.5	0.2	0.2	0.2	**X**			**X**
	Pseudognaphalium luteoalbum	100	0.5	0.2	0.2	0.2	**X**			**X**
	Aira caryophyllea	100	0.5	0.2	0.2	0.2	**X**			**X**
	Tanacetum camphoratum	100	0.5	0.2	0.2	0.2	**X**			**X**
	Vicia sativa ssp. *nigra*	100	0.5	0.2	0.2	0.2	**X**			**X**
Non-vasc										
	Lichen	100	100	0.2	0.2	0.2	**X**	**X**		**X**

Rubus spectabilis – Morella californica Shrubland Alliance

Common Name: Salmonberry – wax myrtle scrub

NVC Alliance Code: A2609. *Rubus spectabilis* Wet Shrubland Alliance

Statewide Description: Sawyer et al. (2009) treated *Morella californica* in a separate alliance, and *Rubus spectabilis* and *R. parviflorus* were considered more broadly within the mixed *Rubus (parviflorus, spectabilis, ursinus)* Alliance. Recently, the peer review panel of the NVC has determined that these species should be merged into a single alliance due to similar ecological conditions and overlapping species. Thus, *Morella* and either *Rubus spectabilis* or *R. parviflorus,* or both, are considered together in a single alliance. The treatment below incorporates these new changes.

Morella californica and/or *Rubus spectabilis* dominate or form various mixtures in the shrub canopy with *Baccharis pilularis, Garrya elliptica, Gaultheria shallon, Holodiscus discolor, Lonicera involucrata, Marah fabaceus, Ribes sanguineum, Rubus parviflorus, Rubus ursinus, Sambucus racemosa, Toxicodendron diversilobum,* and *Vaccinium ovatum*. Emergent trees may be present at low cover, including *Picea sitchensis* or *Pinus contorta* ssp. *contorta*. *Morella californica – Rubus spectabilis* stands are generally small (< 1 ha) and close to the coast on moist or wet soils with high water tables. Stands at Point Reyes National Seashore (Keeler-Wolf et al. 2003a), at Bodega Bay and other Sonoma County coastal settings (this report), and in the Lanphere Dunes unit of Humboldt Bay Refuge characterize the alliance. *Rubus spectabilis* and *R. parviflorus* have similar environmental requirements along the coast of northern California. Both tend to occupy swales, moist bluffs, seeps, or riparian borders along with other cold-deciduous shrubs such as *Lonicera involucrata* ssp. *ledebourii*. All stands dominated or co-dominated by these species are considered part of this alliance.

Associations Sampled	Sample Size	NVC Code
Morella californica – Rubus spp.	2	CEGL003340
Rubus spectabilis	2	CEGL003472
Rubus spectabilis – Morella californica alliance	3	

Plot/Sample Data Summary:

Elevation: Mean 36 m, Range 12 – 57 m
Slope: Mean 11°, Range 2 – 22°
Aspect: W-facing

Tree Cover: Mean 3.2%, Range 0 – 13%
Shrub Cover: Mean 42.1%, Range 15 – 70%
Herb Cover: Mean 31.1%, Range 12 – 55%

Surface Covers:
Large Rock: Mean 0.1%, Range 0 – 0.2%
Small Rock: Mean 1.3%, Range 0 – 5%
Fines: Mean 25.3%, Range 3 – 47%
Litter: Mean 64.5%, Range 50 – 90%

Conservation Status Rank: Global ? ; State (California) ?

Surveys Used in Description (N = 7):

2017 Classification Surveys (n=4): PTAR0023, PTAR0028, PTAR0034, PTAR0048

2018 AA Surveys (n=3): PTAA0289_2, PTAA0297, PTAA0354

Rubus spectabilis – Morella californica Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Pinus muricata	29	14.7	0.1	0.2	0.2				
Shrub										
	Rubus ursinus	86	9.2	3.0	0.2	10.0	**X**			**X**
	Morella californica	71	29.1	11.6	5.0	30.0				**X**
	Frangula californica	57	5.3	3.3	0.2	20.0				**X**
	Gaultheria shallon	57	2.0	1.1	0.2	5.0				**X**
	Rubus spectabilis	43	22.0	11.4	5.0	40.0				
	Vaccinium ovatum	43	13.8	4.0	3.0	15.0				
	Rubus parviflorus	43	3.3	1.7	0.2	10.0				
	Toxicodendron diversilobum	43	0.2	0.1	0.2	0.2				
	Baccharis pilularis	29	2.7	1.4	3.0	7.0				
	Ledum ×columbianum	29	3.1	1.4	3.0	7.0				
	Ceanothus thyrsiflorus	29	0.6	0.3	0.2	2.0				
Herb										
	Polystichum munitum	43	21.4	8.6	5.0	30.0				
	Equisetum arvense	43	7.7	3.6	0.2	25.0				
	Calamagrostis nutkaensis	43	5.3	2.4	2.0	10.0				
	Holcus lanatus	43	9.8	2.3	0.2	15.0				
	Carex obnupta	43	4.8	1.5	0.2	5.0				
	Pteridium aquilinum	29	20.1	2.4	7.0	10.0				
	Achillea millefolium	29	1.0	0.3	0.2	2.0				
	Pteridium aquilinum var. *pubescens*	29	0.8	0.3	1.0	1.0				
	Marah oreganus	29	0.5	0.2	0.2	1.0				
	Iris douglasiana	29	0.6	0.2	0.2	1.0				
	Galium	29	0.2	0.1	0.2	0.2				
	Scrophularia californica	29	0.2	0.1	0.2	0.2				
	Oenanthe sarmentosa	29	0.1	0.1	0.2	0.2				
	Mimulus moschatus	29	0.1	0.1	0.2	0.2				
	Epilobium ciliatum	29	0.1	0.1	0.2	0.2				
Non-vasc										
	Moss	43	35.7	0.1	0.2	0.2				
	Lichen	29	21.4	1.5	0.2	10.0				

Morella californica – Rubus spp. Provisional Association

Common Name: Wax myrtle – berry brambles Association

Plot/Sample Data Summary:

Elevation: Mean 56 m, Range 55 – 57 m
Slope: 2°
Aspect: W-facing

Tree Cover: Mean 6.5%, Range 0 – 13%
Shrub Cover: Mean 30.0%, Range 20 – 40%
Herb Cover: Mean 52.5%, Range 50 – 55%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: Mean 25.5%, Range 5 – 46%
Litter: Mean 59.0%, Range 50 – 68%

Surveys Used in Description (N = 2):

2017 Classification Surveys (n=2): PTAR0023, PTAR0028

2018 AA Surveys (n=0):

Morella californica – Rubus spp. Provisional Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Alnus rubra	50	50.0	7.5	15.0	15.0				**X**
Shrub										
	Morella californica	100	53.9	18.0	10.0	26.0	**X**	**X**		**X**
	Rubus ursinus	100	9.0	2.5	2.0	3.0	**X**			**X**
	Sambucus racemosa	50	15.1	3.5	7.0	7.0				**X**
	Ledum ×columbianum	50	8.7	3.5	7.0	7.0				**X**
	Salix hookeriana	50	6.2	2.5	5.0	5.0				**X**
	Lonicera involucrata var. *ledebourii*	50	6.5	1.5	3.0	3.0				**X**
	Rubus parviflorus	50	0.4	0.1	0.2	0.2				**X**
	Cotoneaster	50	0.2	0.1	0.2	0.2				**X**
Herb										
	Equisetum arvense	100	26.6	12.6	0.2	25.0	**X**			**X**
	Calamagrostis nutkaensis	100	15.7	7.5	5.0	10.0	**X**			**X**
	Carex obnupta	100	5.2	2.5	0.2	5.0	**X**			**X**
	Oenanthe sarmentosa	100	0.4	0.2	0.2	0.2	**X**			**X**
	Mimulus moschatus	100	0.4	0.2	0.2	0.2	**X**			**X**
	Polystichum munitum	50	26.0	12.5	25.0	25.0				**X**
	Athyrium filix-femina ssp. *cyclosorum*	50	10.5	5.0	10.0	10.0				**X**
	Lysichiton americanus	50	4.2	2.0	4.0	4.0				**X**
	Juncus effusus	50	3.2	1.5	3.0	3.0				**X**
	Urtica dioica	50	2.1	1.0	2.0	2.0				**X**
	Juncus	50	2.1	1.0	2.0	2.0				**X**
	Carex	50	1.0	0.5	1.0	1.0				**X**
	Pteridium aquilinum var. *pubescens*	50	1.1	0.5	1.0	1.0				**X**
	Galium	50	0.2	0.1	0.2	0.2				**X**
	Epilobium ciliatum	50	0.2	0.1	0.2	0.2				**X**
	Stellaria borealis	50	0.2	0.1	0.2	0.2				**X**
	Hypericum anagalloides	50	0.2	0.1	0.2	0.2				**X**
	Stachys chamissonis	50	0.2	0.1	0.2	0.2				**X**
	Mimulus guttatus	50	0.2	0.1	0.2	0.2				**X**
Non-vasc										
	Lichen	100	75.0	5.1	0.2	10.0	**X**	**X**		**X**
	Moss	50	25.0	0.1	0.2	0.2				**X**

Rubus spectabilis Association

Common Name: Salmonberry Association

Plot/Sample Data Summary:

Elevation: Mean 16 m, Range 12 – 20 m
Slope: Mean 20°, Range 18 – 22°
Aspect: N-facing

Tree Cover: Mean 0.1%, Range 0 – 0.2%
Shrub Cover: Mean 57.5%, Range 50 – 65%
Herb Cover: Mean 32.5%, Range 30 – 35%

Surface Covers:
Large Rock: Mean 0.1%, Range 0 –0.2%
Small Rock: Mean 2.6%, Range 0 – 5%
Fines: Mean 25.0%, Range 3 – 47%
Litter: Mean 70.0%, Range 50 – 90%

Surveys Used in Description (N = 2):

2017 Classification Surveys (n=2): PTAR0034, PTAR0048

2018 AA Surveys (n=0):

Rubus spectabilis Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Rubus spectabilis	100	73.5	37.5	35.0	40.0	**X**	**X**		**X**
	Rubus parviflorus	100	11.2	6.0	2.0	10.0	**X**			**X**
	Baccharis pilularis	100	9.5	5.0	3.0	7.0	**X**			**X**
	Frangula californica	100	0.4	0.2	0.2	0.2	**X**			**X**
	Toxicodendron diversilobum	100	0.4	0.2	0.2	0.2	**X**			**X**
	Ceanothus thyrsiflorus	50	1.8	1.0	2.0	2.0				**X**
	Symphoricarpos mollis	50	1.0	0.5	1.0	1.0				**X**
	Corylus cornuta var. *californica*	50	1.0	0.5	1.0	1.0				**X**
	Malus	50	0.2	0.1	0.2	0.2				**X**
	Oemleria cerasiformis	50	0.2	0.1	0.2	0.2				**X**
	Rubus ursinus	50	0.2	0.1	0.2	0.2				**X**
	Gaultheria shallon	50	0.2	0.1	0.2	0.2				**X**
	Rosa rubiginosa	50	0.2	0.1	0.2	0.2				**X**
Herb										
	Polystichum munitum	100	48.9	17.5	5.0	30.0	**X**		**X**	**X**
	Achillea millefolium	100	3.6	1.1	0.2	2.0	**X**			**X**
	Holcus lanatus	100	1.9	0.6	0.2	1.0	**X**			**X**
	Iris douglasiana	100	1.9	0.6	0.2	1.0	**X**			**X**
	Marah oreganus	100	1.7	0.6	0.2	1.0	**X**			**X**
	Scrophularia californica	100	0.6	0.2	0.2	0.2	**X**			**X**
	Angelica hendersonii	50	11.7	3.5	7.0	7.0				**X**
	Artemisia douglasiana	50	8.4	2.5	5.0	5.0				**X**
	Anthoxanthum odoratum	50	8.4	2.5	5.0	5.0				**X**
	Stachys ajugoides	50	2.7	1.0	2.0	2.0				**X**
	Calamagrostis nutkaensis	50	2.7	1.0	2.0	2.0				**X**
	Pteridium aquilinum var. *pubescens*	50	1.7	0.5	1.0	1.0				**X**
	Anaphalis margaritacea	50	1.7	0.5	1.0	1.0				**X**
	Calystegia purpurata	50	0.3	0.1	0.2	0.2				**X**
	Aquilegia formosa	50	0.3	0.1	0.2	0.2				**X**
	Chlorogalum pomeridianum	50	0.3	0.1	0.2	0.2				**X**
	Cirsium vulgare	50	0.3	0.1	0.2	0.2				**X**
	Epilobium ciliatum	50	0.3	0.1	0.2	0.2				**X**
	Equisetum arvense	50	0.3	0.1	0.2	0.2				**X**
	Galium	50	0.3	0.1	0.2	0.2				**X**
	Glyceria leptostachya	50	0.3	0.1	0.2	0.2				**X**
	Marah fabaceus	50	0.3	0.1	0.2	0.2				**X**
	Ligusticum apiifolium	50	0.3	0.1	0.2	0.2				**X**
	unknown *Rosaceae*	50	0.3	0.1	0.2	0.2				**X**
	Prunella vulgaris	50	0.3	0.1	0.2	0.2				**X**
	Fritillaria affinis	50	0.3	0.1	0.2	0.2				**X**
Non-vasc										
	Moss	100	100	0.2	0.2	0.2	**X**	**X**		**X**

Salix hookeriana – Salix sitchensis – Spiraea douglasii Shrubland Alliance

Common Name: Coastal dune willow – Sitka willow – Douglas spiraea thickets

NVC Alliance Code: A3835. *Salix hookeriana - Salix sitchensis - Spiraea douglasii* Wet Shrubland Alliance

Statewide Description: Sawyer et al. (2009) treated *Salix hookeriana* in a separate alliance from the provisional *Salix sitchensis* Alliance. Recently, the peer review panel of the NVC has determined that these two species should be merged into a single alliance due to similar ecological conditions and overlapping species. The treatment below incorporates these new changes.

Salix hookeriana and/or *Salix sitchensis* is dominant or co-dominant in the tall shrub or low tree canopy with *Baccharis pilularis, Morella californica, Rubus* spp., and *Salix lasiolepis*. As a shrubland, emergent trees may be present at low cover including *Alnus rubra, Picea sitchensis,* and *Salix lucida*. *Salix hookeriana* and *Salix sitchensis* form a moisture-loving, disturbance-related alliance. It commonly occurs in road banks and along shores of creeks, rivers, lagoons, and dune hollows. It is the major willow scrub along the moist, northwestern coastal belt of California.

Associations Sampled	Sample Size	NVC Code
Salix hookeriana	7	
Salix hookeriana – Salix sitchensis – Spiraea douglasii alliance	3	
Salix sitchensis	1	CEGL002896

Classification Comments:
Plot/Sample Data Summary:

Elevation: Mean 33 m, Range 7 – 66 m
Slope: Mean 4°, Range 1 – 15°
Aspect: W-facing

Tree Cover: Mean 2.5%, Range 0 – 20%
Shrub Cover: Mean 60.9%, Range 25 – 80%
Herb Cover: Mean 14.4%, Range 3 – 40%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: Mean 59.2%, Range 25 – 92%
Litter: Mean 31.0%, Range 5 – 70%

Conservation Status Rank: Global ?; **State (California)** ?

Surveys Used in Description (N = 11):

2017 Classification Surveys (n=6): PTAR0004, PTAR0027, PTAR0030, PTAR0031, PTAR0032, PTAR0033

2018 AA Surveys (n=5): PTAA0069_2, PTAA0070_2, PTAA0183, PTAA0189, PTAA0332

Salix hookeriana – Salix sitchensis – Spiraea douglasii Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Salix hookeriana	91	72.1	47.8	18.0	78.0	**X**	**X**		**X**
	Rubus ursinus	82	7.7	4.4	0.2	15.0	**X**			**X**
	Baccharis pilularis	55	0.2	0.1	0.2	0.2				**X**
	Salix sitchensis	45	13.8	8.3	4.0	40.0				
	Morella californica	45	2.4	1.8	0.2	15.0				
	Rubus spectabilis	45	1.2	0.8	0.2	6.0				
	Rubus parviflorus	27	1.5	1.1	0.2	12.0				
	Lonicera involucrata	27	0.4	0.3	0.2	2.0				
Herb										
	Carex obnupta	55	32.0	5.8	2.0	35.0				**X**
	Polystichum munitum	55	11.8	0.6	0.2	4.0				**X**
	Athyrium filix-femina ssp. *cyclosorum*	45	3.2	0.6	0.2	2.0				
	Oenanthe sarmentosa	45	1.5	0.3	0.2	2.0				
	Urtica dioica	36	3.8	0.6	1.0	3.0				
	Juncus patens	36	1.7	0.5	0.2	5.0				
	Scrophularia californica	36	1.2	0.1	0.2	0.2				
	Galium aparine	36	0.8	0.1	0.2	0.2				
	Cirsium vulgare	36	1.3	0.1	0.2	0.2				
	Ranunculus repens	27	4.7	1.5	2.0	10.0				
	Stachys chamissonis	27	1.8	0.5	0.2	3.0				
	Conium maculatum	27	2.6	0.3	0.2	2.0				
	Equisetum hyemale	27	3.2	0.1	0.2	1.0				
	Heracleum maximum	27	0.3	0.1	0.2	0.2				
	Argentina egedii ssp. *egedii*	27	0.4	0.1	0.2	0.2				
	Equisetum arvense	27	0.5	0.1	0.2	0.2				
Non-vasc										
	Lichen	36	36.4	0.7	0.2	5.0				

Salix hookeriana Association

Common Name: Coastal dune willow Association

Plot/Sample Data Summary:

Elevation: Mean 38 m, Range 10 – 66 m
Slope: Mean 5°, Range 1 – 15°
Aspect: NW-facing

Tree Cover: Mean 3.1%, Range 0 – 20%
Shrub Cover: Mean 60.0%, Range 25 – 75%
Herb Cover: Mean 15.6%, Range 3 – 36%

Surface Covers:
Large Rock: Mean 0.1%, Range 0 –0.2%
Small Rock: 0%
Fines: Mean 57.8%, Range 25 – 92%
Litter: Mean 31.3%, Range 5 – 70%

Surveys Used in Description (N = 7):

2017 Classification Surveys (n=5): PTAR0004, PTAR0027, PTAR0030, PTAR0031, PTAR0033

2018 AA Surveys (n=2): PTAA0183, PTAA0189

Salix hookeriana Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Salix hookeriana	100	80.5	50.4	18.0	70.0	**X**	**X**		**X**
	Rubus ursinus	86	6.6	3.7	0.2	15.0	**X**			**X**
	Baccharis pilularis	57	0.2	0.1	0.2	0.2				**X**
	Rubus parviflorus	43	2.4	1.8	0.2	12.0				
	Rubus spectabilis	43	1.3	0.9	0.2	6.0				
	Salix sitchensis	29	5.5	2.4	7.0	10.0				
	Morella californica	29	2.9	2.2	0.2	15.0				
	Lonicera involucrata var. *ledebourii*	29	0.5	0.3	0.2	2.0				
Herb										
	Carex obnupta	100	33.1	6.3	0.2	35.0				**X**
	Athyrium filix-femina ssp. *cyclosorum*	57	4.4	0.6	0.2	2.0				**X**
	Oenanthe sarmentosa	57	2.0	0.4	0.2	2.0				**X**
	Polystichum munitum	57	4.1	0.3	0.2	1.0				**X**
	Urtica dioica	43	4.9	0.6	1.0	2.0				
	Conium maculatum	43	4.0	0.5	0.2	2.0				
	Cirsium vulgare	43	1.0	0.1	0.2	0.2				
	Galium aparine	43	1.2	0.1	0.2	0.2				
	Juncus patens	43	1.0	0.1	0.2	0.2				
	Scrophularia californica	43	0.8	0.1	0.2	0.2				
	Scirpus microcarpus	29	6.4	1.6	1.0	10.0				
	Ranunculus repens	29	4.0	1.0	2.0	5.0				
	Stachys chamissonis	29	2.8	0.7	2.0	3.0				
	Glyceria	29	2.8	0.3	1.0	1.0				
	Pteridium aquilinum var. *pubescens*	29	2.1	0.2	0.2	1.0				
	Carduus pycnocephalus	29	0.8	0.1	0.2	0.2				
	Equisetum arvense	29	0.7	0.1	0.2	0.2				
	Heracleum maximum	29	0.4	0.1	0.2	0.2				
	Holcus lanatus	29	0.5	0.1	0.2	0.2				
	Vicia nigricans ssp. *gigantea*	29	0.7	0.1	0.2	0.2				
	Argentina egedii ssp. *egedii*	29	0.5	0.1	0.2	0.2				
Non-vasc										
	Lichen	57	57.1	1.0	0.2	5.0				**X**

Salix sitchensis Provisional Association

Common Name: Sitka willow Association

Classification Comments: The national classification (NatureServe 2007a) recognizes a *Salix sitchensis* alliance in Oregon and Washington under similar environmental conditions as stands found along the Northern and Central California Coast. Small stands observed along the Garcia River in Mendocino Co. (Philip Williams and Associates 1996) are inland a few kilometers from the coast and adjacent to stands of *Sequoia sempervirens, Umbellularia californica*, and other *Salix* alliances.

Plot/Sample Data Summary:

Elevation: 7 m
Slope: 1°
Aspect: NW-facing

Tree Cover: 0%
Shrub Cover: 40%
Herb Cover: 40%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 65.0%
Litter: 30%

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0032

Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Salix sitchensis	100	72.5	40.0	40.0	40.0	**X**	**X**		**X**
	Rubus ursinus	100	27.2	15.0	15.0	15.0	**X**			**X**
	Rubus spectabilis	100	0.4	0.2	0.2	0.2	**X**			**X**
Herb										
	Carex obnupta	100	43.5	18.0	18.0	18.0	**X**		**X**	**X**
	Ranunculus repens	100	24.2	10.0	10.0	10.0	**X**			**X**
	Juncus patens	100	12.1	5.0	5.0	5.0	**X**			**X**
	Urtica dioica	100	7.2	3.0	3.0	3.0	**X**			**X**
	Athyrium filix-femina ssp. *cyclosorum*	100	4.8	2.0	2.0	2.0	**X**			**X**
	Oenanthe sarmentosa	100	2.4	1.0	1.0	1.0	**X**			**X**
	Polystichum munitum	100	0.5	0.2	0.2	0.2	**X**			**X**
	Stachys chamissonis	100	0.5	0.2	0.2	0.2	**X**			**X**
	Equisetum arvense	100	0.5	0.2	0.2	0.2	**X**			**X**
	Sonchus asper	100	0.5	0.2	0.2	0.2	**X**			**X**
	Argentina egedii ssp. *egedii*	100	0.5	0.2	0.2	0.2	**X**			**X**
	Equisetum hyemale	100	0.5	0.2	0.2	0.2	**X**			**X**
	Marah oreganus	100	0.5	0.2	0.2	0.2	**X**			**X**
	Heracleum maximum	100	0.5	0.2	0.2	0.2	**X**			**X**
	Phalaris arundinacea	100	0.5	0.2	0.2	0.2	**X**			**X**
	Galium aparine	100	0.5	0.2	0.2	0.2	**X**			**X**
	Cyperus eragrostis	100	0.5	0.2	0.2	0.2	**X**			**X**
	Mentha arvensis	100	0.5	0.2	0.2	0.2	**X**			**X**

Abronia latifolia – Ambrosia chamissonis Herbaceous Alliance

Common Name: Dune mat

NVC Alliance Code: A1614. *Abronia latifolia - Ambrosia chamissonis* Dune Grassland Alliance

Statewide Description: *Abronia latifolia* and/or *Ambrosia chamissonis* mix with other perennial herbs, grasses, and low shrubs to form a low canopy with *Abronia maritima*, *Abronia umbellata*, *Achillea millefolium*, *Artemisia pycnocephala*, *Atriplex* spp., *Cakile maritima*, *Calystegia macrostegia*, *Calystegia soldanella*, *Camissonia cheiranthifolia*, *Cardionema ramosissimum*, *Carpobrotus* spp., *Croton californicus*, *Erigeron glaucus*, *Eriogonum latifolium*, *Eriogonum parvifolium*, *Eriophyllum staechadifolium*, *Erysimum spp*., *Fragaria chiloensis*, *Grindelia stricta*, *Lathyrus littoralis*, *Malacothrix incana,* and *Poa douglasii*. Emergent shrubs may be present at low cover, including *Baccharis pilularis*, *Ericameria ericoides*, *Lupinus arboreus,* or *Lupinus chamissonis*.

Plants of dune mat are well adapted to shifts both temporally and spatially as a result of variable environmental conditions. In some areas, local mound-by-mound dominance of *Abronia latifolia*, *Ambrosia chamissonis*, *Artemisia pycnocephala*, *Eriophyllum staechadifolium*, *Poa douglasii*, and other species suggests fine-scale microsite patterning; however, the scale of disturbance and the clonal mat-forming characteristics of many of the major species suggest that stands should be considered on a larger spatial scale. For these reasons, this alliance is presented broadly and variation is described at the association level.

Associations Sampled	Sample Size	NVC Code
Ambrosia chamissonis	1	CEGL003005
Abronia latifolia – Ambrosia chamissonis alliance	1	

Plot/Sample Data Summary:

Elevation: Mean 15 m, Range 4 – 26 m
Slope: 7°
Aspect: Variable

Tree Cover: 0%
Shrub Cover: 0.2%
Herb Cover: Mean 3%, Range 1 – 5%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 98%
Litter: 1%

Conservation Status Rank: Global G3; **State (California)** S3

Surveys Used in Description (N = 2):

2017 Classification Surveys (n=1): PTAR0043

2018 AA Surveys (n=1): PTAA0179

Abronia latifolia – Ambrosia chamissonis Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Lupinus arboreus	100	75.0	0.2	0.2	0.2	**X**	**X**		**X**
	Baccharis pilularis	50	25.0	0.1	0.2	0.2				**X**
Herb										
	Abronia latifolia	50	10.9	0.5	1.0	1.0				**X**
	Ambrosia chamissonis	50	10.9	0.5	1.0	1.0				**X**
	Calystegia soldanella	50	10.9	0.5	1.0	1.0				**X**
	Poa douglasii	50	2.2	0.1	0.2	0.2				**X**
	Daucus pusillus	50	2.2	0.1	0.2	0.2				**X**
	Rumex acetosella	50	2.2	0.1	0.2	0.2				**X**
	Ammophila arenaria	50	12.5	0.1	0.2	0.2				**X**
	Atriplex leucophylla	50	12.5	0.1	0.2	0.2				**X**
	Camissonia chamaenerioides	50	2.2	0.1	0.2	0.2				**X**
	Cryptantha leiocarpa	50	2.2	0.1	0.2	0.2				**X**
	unknown *Asteraceae*	50	2.2	0.1	0.2	0.2				**X**
	Pseudognaphalium stramineum	50	12.5	0.1	0.2	0.2				**X**
	Polygonum paronychia	50	2.2	0.1	0.2	0.2				**X**
	Juncus breweri	50	2.2	0.1	0.2	0.2				**X**
	Camissonia cheiranthifolia	50	12.5	0.1	0.2	0.2				**X**

Ambrosia chamissonis Association

Common Name: Beach bursage Association

Plot/Sample Data Summary:

Elevation: 4 m
Slope: 7°
Aspect: Variable

Tree Cover: 0%
Shrub Cover: 0.2%
Herb Cover: 5%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 98%
Litter: 1%

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0043

2018 AA Surveys (n=0):

Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Lupinus arboreus	100	50.0	0.2	0.2	0.2	**X**	**X**		**X**
	Baccharis pilularis	100	50.0	0.2	0.2	0.2	**X**	**X**		**X**
Herb										
	Ambrosia chamissonis	100	21.7	1.0	1.0	1.0	**X**			**X**
	Abronia latifolia	100	21.7	1.0	1.0	1.0	**X**			**X**
	Calystegia soldanella	100	21.7	1.0	1.0	1.0	**X**			**X**
	Polygonum paronychia	100	4.3	0.2	0.2	0.2	**X**			**X**
	unknown *Asteraceae*	100	4.3	0.2	0.2	0.2	**X**			**X**
	Daucus pusillus	100	4.3	0.2	0.2	0.2	**X**			**X**
	Camissonia chamaenerioides	100	4.3	0.2	0.2	0.2	**X**			**X**
	Juncus breweri	100	4.3	0.2	0.2	0.2	**X**			**X**
	Rumex acetosella	100	4.3	0.2	0.2	0.2	**X**			**X**
	Cryptantha leiocarpa	100	4.3	0.2	0.2	0.2	**X**			**X**
	Poa douglasii	100	4.3	0.2	0.2	0.2	**X**			**X**

Ammophila arenaria Herbaceous Semi-Natural Alliance

Common Name: European beach grass swards

NVC Alliance Code: A2061. *Ammophila arenaria* Coastal Dunegrass Ruderal Grassland

Statewide Description: *Ammophila arenaria* is dominant in the herbaceous layer. Emergent shrubs may be present at low cover, including *Baccharis pilularis* or *Lupinus arboreus*. *Ammophila arenaria* is now the predominant vegetation type in many dune systems along the Pacific coast from Ventura County to British Columbia. Many habitat changes occur with its presence: dune stabilization, alteration of dune morphology, reduction in native stands of the *Abronia latifolia* – *Ambrosia chamissonis*, *Leymus mollis*, and other alliances, and a reduction in habitat for both rare animals (e.g., snowy plover, *Charadrius alexandrinus*) and rare plants (e.g., *Erysimum menziesii* listed as a California rare plant with a rank of 1B.1).

Associations Sampled	Sample Size	NVC Code
Ammophila arenaria	1	CEGL003006
Ammophila arenaria alliance	5	

Plot/Sample Data Summary:

Elevation: 20 m
Slope: 12°
Aspect: Variable

Tree Cover: 0%
Shrub Cover: Mean 1.3%, Range 0 – 5%
Herb Cover: Mean 23.7%, Range 11 – 40%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 40%
Litter: 56%

Conservation Status Rank: Global GNA; **State (California)** SNA

Surveys Used in Description (N = 6):

2017 Classification Surveys (n=1): PTAR0039

2018 AA Surveys (n=5): PTAA0001, PTAA0068, PTAA0184, PTAA0190, PTAA0225

Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Baccharis pilularis	83	51.1	0.5	0.2	2.0	**X**	**X**		**X**
	Lupinus arboreus	50	35.0	0.6	0.2	3.0				**X**
Herb										
	Ammophila arenaria	100	85.2	19.8	10.0	40.0	**X**	**X**		**X**
	Rumex acetosella	67	3.4	1.3	0.2	7.0				**X**
	Camissonia cheiranthifolia	50	0.7	0.1	0.2	0.2				**X**
	Hypochaeris radicata	50	0.6	0.1	0.2	0.2				**X**
	Aira praecox	33	0.6	0.1	0.2	0.2				

Ammophila arenaria Semi-natural Association

Common Name: Beachgrass Association

Plot/Sample Data Summary:

Elevation: 20 m
Slope: 12°
Aspect: variable

Tree Cover: 0%
Shrub Cover: 0.2%
Herb Cover: 40%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 40%
Litter: 56%

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0039

2018 AA Surveys (n=0):

Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Lupinus arboreus	100	100	0.2	0.2	0.2	**X**	**X**		**X**
Herb										
	Ammophila arenaria	100	51.6	22.0	22.0	22.0	**X**	**X**		**X**
	Rumex acetosella	100	16.4	7.0	7.0	7.0	**X**			**X**
	Vulpia myuros	100	14.1	6.0	6.0	6.0	**X**			**X**
	Bromus diandrus	100	11.7	5.0	5.0	5.0	**X**			**X**
	Hypochaeris glabra	100	2.3	1.0	1.0	1.0	**X**			**X**
	Gamochaeta ustulata	100	0.5	0.2	0.2	0.2	**X**			**X**
	Aira caryophyllea	100	0.5	0.2	0.2	0.2	**X**			**X**
	Hypochaeris radicata	100	0.5	0.2	0.2	0.2	**X**			**X**
	Daucus pusillus	100	0.5	0.2	0.2	0.2	**X**			**X**
	Cryptantha leiocarpa	100	0.5	0.2	0.2	0.2	**X**			**X**
	Camissonia chamaenerioides	100	0.5	0.2	0.2	0.2	**X**			**X**
	Pseudognaphalium luteoalbum	100	0.5	0.2	0.2	0.2	**X**			**X**
	Senecio sylvaticus	100	0.5	0.2	0.2	0.2	**X**			**X**

Bromus carinatus – Elymus glaucus Herbaceous Alliance

Common Name: California brome – blue wildrye prairie

NVC Alliance Code: A4244. *Bromus carinatus - Elymus glaucus* Mesic Meadow Alliance

Statewide Description: *Elymus glaucus, Bromus carinatus, Bromus maritimus,* and/or *Pteridium aquilinum* dominate or co-dominate in the herbaceous layer with *Agrostis scabra*, *Anagallis arvensis*, *Bromus diandrus*, *Calamagrostis canadensis*, *Carex feta*, *Carex pellita*, *Glyceria striata*, *Heracleum maximum*, *Juncus oxymeris*, *Phleum pratense*, *Poa pratensis*, *Senecio clarkianus*, *Senecio triangularis*, *Solidago canadensis*, *Stachys albens*, *Veratrum californicum*, and *Vulpia bromoides*.

This alliance is represented by four different taxa, *Elymus glaucus, Bromus carinatus, B. maritimus,* and *Pteridium aquilinum,* which because of their ecological relatedness, have been combined into a single alliance. The *Pteridium aquilinum* Association is currently known only from the northern Coast Ranges.

Sawyer (2009) stands dominated by *E. glaucus*, *B. carinatus,* or *P. aquilinum* were assigned to the *Elymus glaucus, Bromus carinatus,* or *Pteridium aquilinum* Association respectively, each within its own provisional alliance. Based on recent county-wide analyses, we now recognize one alliance which contains elements of these three associations. Mixes of *Bromus carinatus* and *Elymus glaucus* with a high cover of *Pteridium* are placed in the *Pteridium aquilinum* Association.

Associations Sampled	Sample Size	NVC Code
Pteridium aquilinum – Grass	2	

Classification Comments: The association circumscription is the same as that of the alliance.

Plot/Sample Data Summary:

Elevation: 44 m
Slope: 2°
Aspect: NE-facing

Tree Cover: Mean 0.1%, Range 0 – 0.2%
Shrub Cover: Mean 3.0%, Range 0 – 6%
Herb Cover: Mean 57.7%, Range 45 – 70%

Surface Covers:
Large Rock: 0%
Small Rock: Mean 0.2%
Fines: 67%
Litter: 30%

Conservation Status Rank: Global G3; **State (California)** S3

Surveys Used in Description (N = 2):

2017 Classification Surveys (n=1): PTAR0010

2018 AA Surveys (n=1): PTAA0063

Bromus carinatus – Elymus glaucus Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Pinus muricata	50	50.0	0.1	0.2	0.2				**X**
Shrub										
	Rubus ursinus	50	33.3	2.0	4.0	4.0				**X**
	Baccharis pilularis	50	8.3	0.5	1.0	1.0				**X**
	Frangula californica	50	8.3	0.5	1.0	1.0				**X**
Herb										
	Anthoxanthum odoratum	100	35.1	18.5	12.0	25.0	**X**		**X**	**X**
	Aira praecox	100	9.9	6.0	5.0	7.0	**X**			**X**
	Holcus lanatus	100	7.2	5.0	2.0	8.0	**X**			**X**
	Fragaria chiloensis	100	2.1	1.6	0.2	3.0	**X**			**X**
	Plantago lanceolata	100	2.3	1.1	0.2	2.0	**X**			**X**
	Rumex acetosella	100	1.7	1.0	1.0	1.0	**X**			**X**
	Pteridium aquilinum var. *pubescens*	50	12.6	10.0	20.0	20.0				**X**
	Bromus carinatus var. *maritimus*	50	8.8	7.0	14.0	14.0				**X**
	Pteridium aquilinum	50	11.0	5.0	10.0	10.0				**X**
	Hypochaeris radicata	50	4.4	3.5	7.0	7.0				**X**
	Plantago erecta	50	1.3	1.0	2.0	2.0				**X**
	Vulpia myuros	50	1.3	1.0	2.0	2.0				**X**
	Corethrogyne filaginifolia	50	0.6	0.5	1.0	1.0				**X**
	Brodiaea terrestris	50	0.1	0.1	0.2	0.2				**X**
	Achillea millefolium	50	0.1	0.1	0.2	0.2				**X**
	Bromus hordeaceus	50	0.1	0.1	0.2	0.2				**X**
	Danthonia californica	50	0.1	0.1	0.2	0.2				**X**
	Lotus	50	0.1	0.1	0.2	0.2				**X**
	Trifolium	50	0.1	0.1	0.2	0.2				**X**
	Vicia sativa ssp. *nigra*	50	0.1	0.1	0.2	0.2				**X**
	Trifolium dubium	50	0.1	0.1	0.2	0.2				**X**
	Lupinus bicolor	50	0.1	0.1	0.2	0.2				**X**
	Silene gallica	50	0.1	0.1	0.2	0.2				**X**
	Rytidosperma pilosum	50	0.2	0.1	0.2	0.2				**X**
	Luzula comosa	50	0.1	0.1	0.2	0.2				**X**

Calamagrostis nutkaensis Herbaceous Alliance

Common Name: Pacific reed grass meadows

NVC Alliance Code: A3739. *Festuca rubra - Calamagrostis nutkaensis* Exposed Coastal Headland Grassland Alliance

Statewide Description: *Calamagrostis nutkaensis* is dominant or co-dominant in the herbaceous layer with *Anthoxanthum odoratum*, *Artemisia suksdorfii*, *Elymus glaucus*, *Festuca arundinacea*, *Festuca rubra*, *Heracleum maximum*, *Holcus lanatus,* and *Pteridium aquilinum*. Emergent trees and shrubs may be present at low cover, including *Picea sitchensis, Baccharis pilularis*, *Gaultheria shallon*, *Rubus* spp., or *Vaccinium ovatum*. Often considered part of the coastal prairie (Bartolome 1994, Hektner and Foin 1977), the alliance occupies the coastal terraces and mixes with the *Danthonia californica* and *Deschampsia cespitosa* Alliances at a fine scale. The alliance also occurs in freshwater swales, depressions, and springs, mixed with other wetland herbaceous types. It forms tall grasslands on moist coastal bluffs at the southern extent of its range. On the broad scale, *Calamagrostis nutkaensis* stands mix with forested stands of the *Alnus rubra* and *Picea sitchensis* Alliances, and shrublands of the *Baccharis pilularis*, *Lupinus arboreus*, *Salix hookeriana*, and *Rubus* spp. Alliances.

Associations Sampled	Sample Size	NVC Code
Calamagrostis nutkaensis – Carex (obnupta) – Juncus (patens)	4	CEGL001564

Classification Comments: The association circumscription is the same as that of the alliance.

Plot/Sample Data Summary:

Elevation: Mean 19 m, Range 4 – 44 m
Slope: 1°
Aspect: W-facing

Tree Cover: 0%
Shrub Cover: Mean 18.0%, Range 4 – 30%
Herb Cover: Mean 55.4%, Range 45 – 80%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: Mean 49.7%, Range 0 – 77%
Litter: Mean 45.0%, Range 20 – 90%

Conservation Status Rank: Global G4; **State (California)** S2

Surveys Used in Description (N = 4):

2017 Classification Surveys (n=3): PTAR0009, PTAR0014, PTAR0024

2018 AA Surveys (n=1): PTAA0227

Calamagrostis nutkaensis Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Pinus contorta var. *contorta*	25	25.0	0.1	0.2	0.2				
Shrub										
	Rubus ursinus	100	72.8	11.8	3.0	30.0	**X**	**X**		**X**
	Vaccinium ovatum	50	25.7	6.5	1.0	25.0				**X**
	Gaultheria shallon	50	0.8	0.1	0.2	0.2				**X**
	Baccharis pilularis	25	0.7	0.1	0.2	0.2				
Herb										
	Calamagrostis nutkaensis	100	74.2	41.3	30.0	70.0	**X**	**X**		**X**
	Carex obnupta	100	4.2	2.6	0.2	5.0	**X**			**X**
	Holcus lanatus	75	2.7	1.4	0.2	5.0	**X**			**X**
	Iris douglasiana	75	1.7	0.8	0.2	2.0	**X**			**X**
	Pteridium aquilinum var. *pubescens*	50	1.7	1.3	1.0	4.0				**X**
	Anthoxanthum odoratum	50	1.3	0.8	1.0	2.0				**X**
	Fragaria chiloensis	50	1.1	0.5	1.0	1.0				**X**
	Juncus bufonius	50	0.6	0.3	0.2	1.0				**X**
	Forb (herbaceous, not grass nor grasslike)	50	0.2	0.1	0.2	0.2				**X**
	Rumex acetosella	50	0.2	0.1	0.2	0.2				**X**
	Trifolium	50	0.2	0.1	0.2	0.2				**X**
	Cirsium arvense	50	0.2	0.1	0.2	0.2				**X**
	Luzula comosa	50	0.2	0.1	0.2	0.2				**X**
	Polystichum munitum	25	5.4	2.5	10.0	10.0				
	Juncus effusus	25	1.6	0.8	3.0	3.0				
	Athyrium filix-femina	25	1.1	0.5	2.0	2.0				
	Aster	25	0.5	0.3	1.0	1.0				
	Lilium maritimum	25	0.5	0.3	1.0	1.0				
	Gentiana affinis	25	0.6	0.3	1.0	1.0				
	Epilobium ciliatum	25	0.1	0.1	0.2	0.2				
	Aira praecox	25	0.1	0.1	0.2	0.2				
	Hypericum anagalloides	25	0.1	0.1	0.2	0.2				
	Leontodon taraxacoides	25	0.1	0.1	0.2	0.2				
	Juncus tenuis	25	0.1	0.1	0.2	0.2				
	Vicia sativa ssp. *nigra*	25	0.1	0.1	0.2	0.2				
	Mimulus guttatus	25	0.1	0.1	0.2	0.2				
	Juncus	25	0.1	0.1	0.2	0.2				
	Hypochaeris radicata	25	0.1	0.1	0.2	0.2				
	Grindelia stricta	25	0.1	0.1	0.2	0.2				
	Galium aparine	25	0.1	0.1	0.2	0.2				
	Vicia nigricans ssp. *gigantea*	25	0.1	0.1	0.2	0.2				
	Camassia quamash	25	0.1	0.1	0.2	0.2				
	Plantago lanceolata	25	0.1	0.1	0.2	0.2				
	Sisyrinchium bellum	25	0.1	0.1	0.2	0.2				
	Trifolium wormskioldii	25	0.1	0.1	0.2	0.2				
	Symphyotrichum chilense var. *chilense*	25	0.1	0.1	0.2	0.2				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	Vulpia bromoides	25	0.1	0.1	0.2	0.2				
	Deschampsia cespitosa	25	0.1	0.1	0.2	0.2				
	Lotus formosissimus	25	0.1	0.1	0.2	0.2				
	Achillea millefolium	25	0.1	0.1	0.2	0.2				
	unknown *Poaceae*	25	0.1	0.1	0.2	0.2				
Non-vasc										
	Moss	25	25.0	3.8	15.0	15.0				

Carex obnupta Herbaceous Alliance

Common Name: Slough sedge swards

NVC Alliance Code: A3822. *Carex obnupta* Wet Meadow Alliance

Statewide Description: *Carex obnupta* is dominant or co-dominant in the herbaceous layer with A*rgentina egedii*, *Athyrium filix-femina*, *Cynosurus echinatus*, *Eleocharis macrostachya*, *Holcus lanatus*, *Juncus lescurii*, *Juncus patens*, *Luzula comosa*, *Lysichiton americanus*, *Sidalcea malviflora,* and *Symphyotrichum chilense*. Emergent trees and shrubs may be present at low cover, including trees: *Alnus rubra,* and shrubs: *Baccharis pilularis*, *Morella californica*, *Rubus* spp., *Salix hookeriana,* and *Salix lasiolepis*. *Carex obnupta* stands occur in moist to saturated swales, edges of coastal lagoons, tidally influenced wetlands, and other areas where fresh and brackish water meet. The plants may occur under shrub or forest canopies or they can form dense, continuous stands that may be found in the open. This species becomes an understory plant in wet but more sheltered settings, which favor tree development. *Carex obnupta* may form understories in the *Alnus rubra*, *Morella californica*, *Picea sitchensis*, *Pinus contorta* ssp. *contorta*, and *Salix hookeriana* Alliances. Trees and shrubs do not typically colonize the more coastal areas due to the exposure to strong salt-laden winds; stands of *Carex obnupta* occur in this environment. The open stands, which lack an overstory or have only a few emergent shrubs or trees, are included in this alliance.

Associations Sampled	Sample Size	NVC Code
Carex obnupta	3	CEGL003313
Carex obnupta alliance	4	

Classification Comments: The association circumscription is the same as that of the alliance.

Plot/Sample Data Summary:

Elevation: Mean 30 m, Range 3 – 62 m
Slope: Mean 1°, Range 0 – 2°
Aspect: W-facing

Tree Cover: 0%
Shrub Cover: Mean 12.9%, Range 0 – 55%
Herb Cover: Mean 44.8%, Range 9 – 56%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: Mean 21.7%, Range 0 – 65%
Litter: Mean 41.1%, Range 0 – 92%

Conservation Status Rank: Global G4; **State (California)** S3

Surveys Used in Description (N = 7):

2017 Classification Surveys (n=3): PTAR0008, PTAR0019, PTAR0040

2018 AA Surveys (n=4): PTAA0048, PTAA0130, PTAA0182, PTAA0360

Carex obnupta Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Rubus ursinus	43	40.9	11.9	3.0	55.0				
	Lupinus arboreus	29	8.9	0.2	0.2	1.0				
	Morella californica	29	15.1	0.1	0.2	0.2				
	Baccharis pilularis	29	7.5	0.1	0.2	0.2				
Herb										
	Carex obnupta	100	65.5	32.6	3.0	50.0	**X**	**X**		**X**
	Holcus lanatus	57	8.4	3.3	2.0	13.0				**X**
	Trifolium wormskioldii	43	0.4	0.1	0.2	0.2				
	Anthoxanthum odoratum	29	4.1	2.4	2.0	15.0				
	Argentina egedii ssp. *egedii*	29	4.2	2.3	1.0	15.0				
	Galium trifidum	29	0.1	0.1	0.2	0.2				
	Hypochaeris radicata	29	0.4	0.1	0.2	0.2				
	Rumex acetosella	29	0.4	0.1	0.2	0.2				
	Equisetum arvense	29	0.1	0.1	0.2	0.2				

Deschampsia cespitosa coastal Herbaceous Alliance

Common Name: Tufted hair grass coastal meadows

NVC Alliance Code: A3820. *Danthonia californica - Carex lenticularis - Deschampsia cespitosa* Coastal & Lowland Marsh Alliance

Statewide Description: *Deschampsia cespitosa* is dominant or co-dominant in the herbaceous layer with other herbs that vary regionally; species associated in coastal regions include *Agrostis stolonifera, Argentina egedii, Cirsium vulgare, Danthonia californica, Distichlis spicata, Holcus lanatus, Horkelia marinensis, Lilaeopsis masonii, Senecio hydrophiloides* and *Triglochin striata.* Stands occur on coastal bluffs, terraces, sand dunes and seasonally flooded areas of moderate salinity. Stands along the coast interdigitate on a fine scale with herbaceous stands of the *Calamagrostis nutkaensis, Danthonia californica, Carex obnupta,* and *Juncus effusus* alliances, and woody stands of *Baccharis pilularis, Pinus muricata*, and *Pseudotsuga menziesii* alliances, as well as non-native types.

Associations Sampled	Sample Size	NVC Code
Deschampsia cespitosa – Eryngium armatum	3	
Deschampsia cespitosa / Rosa nutkana	1	CEGL003344
Deschampsia cespitosa coastal alliance	1	
Deschampsia cespitosa var. *holciformis*	1	

Plot/Sample Data Summary:

Elevation: Mean 41 m, Range 22 – 66 m
Slope: Mean 1°, Range 0 – 2°
Aspect: SW-facing

Tree Cover: 0%
Shrub Cover: Mean 4.5%, Range 0 – 20%
Herb Cover: Mean 48.3%, Range 25 – 89%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: Mean 73.6%, Range 0 – 97%
Litter: Mean 4.4%, Range 0 – 10%

Conservation Status Rank: Global G5; **State (California)** S4?

Surveys Used in Description (N = 6):

2017 Classification Surveys (n=5): MECO0001, PTAR0002, PTAR0012, PTAR0013, PTAR0047

2018 AA Surveys (n=1): PTAA0288

Deschampsia cespitosa coastal Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Vaccinium ovatum	50	33.9	0.4	0.2	2.0				**X**
	Rubus ursinus	33	16.1	1.0	1.0	5.0				
	Baccharis pilularis	33	0.8	0.1	0.2	0.2				
Herb										
	Deschampsia cespitosa	100	23.8	13.0	3.0	20.0	**X**			**X**
	Armeria maritima	67	3.8	2.4	0.2	10.0				**X**
	Iris douglasiana	67	2.2	1.4	0.2	5.0				**X**
	Eryngium armatum	50	10.1	4.5	4.0	17.0				**X**
	Poa unilateralis	50	4.4	2.2	0.2	13.0				**X**
	Hypochaeris radicata	50	2.7	1.0	0.2	4.0				**X**
	Plantago lanceolata	50	1.6	0.7	0.2	2.0				**X**
	Plantago erecta	50	0.5	0.4	0.2	2.0				**X**
	Lupinus littoralis	50	1.0	0.4	0.2	1.0				**X**
	Sisyrinchium bellum	50	0.4	0.2	0.2	1.0				**X**
	Bromus carinatus var. *maritimus*	50	0.2	0.1	0.2	0.2				**X**
	Solidago simplex var. *spathulata*	33	7.2	6.2	2.0	35.0				
	Plantago maritima	33	5.4	3.0	1.0	17.0				
	Hordeum brachyantherum ssp. *brachyantherum*	33	1.8	1.0	0.2	6.0				
	Grindelia stricta	33	1.1	0.8	1.0	4.0				
	Leontodon taraxacoides	33	1.2	0.5	0.2	3.0				
	Holcus lanatus	33	1.3	0.5	0.2	3.0				
	Triphysaria eriantha ssp. *rosea*	33	1.2	0.4	0.2	2.0				
	Castilleja ambigua ssp. *ambigua*	33	0.9	0.3	1.0	1.0				
	Luzula comosa	33	0.6	0.2	0.2	1.0				
	Rumex acetosella	33	0.3	0.2	0.2	1.0				
	Trifolium barbigerum	33	0.2	0.1	0.2	0.2				
	Trifolium subterraneum	33	0.2	0.1	0.2	0.2				
	Gamochaeta ustulata	33	0.2	0.1	0.2	0.2				
	Isolepis	33	0.2	0.1	0.2	0.2				

Deschampsia cespitosa – Eryngium armatum Association

Common Name: Tufted hairgrass – coastal button-celery Association

Sensitive Natural Community: Yes

Plot/Sample Data Summary:

Elevation: Mean 37 m, Range 22 – 64 m
Slope: Mean 1°, Range 0 – 2°
Aspect: SW

Tree Cover: 0%
Shrub Cover: Mean 0.1%, Range 0 – 0.2%
Herb Cover: Mean 40.0%, Range 25 – 55%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: Mean 93.7%, Range 88 – 97%
Litter: Mean 4.1%, Range 0 – 10%

Surveys Used in Description (N = 3):

2017 Classification Surveys (n=3): PTAR0002, PTAR0012, PTAR0013

2018 AA Surveys (n=0):

Deschampsia cespitosa – Eryngium armatum Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Vaccinium ovatum	33	33.3	0.1	0.2	0.2				
Herb										
	Deschampsia cespitosa	100	20.4	10.3	3.0	15.0	**X**			**X**
	Eryngium armatum	100	20.2	9.0	4.0	17.0	**X**			**X**
	Poa unilateralis	100	8.8	4.5	0.2	13.0	**X**			**X**
	Armeria maritima	100	6.6	3.7	0.2	10.0	**X**			**X**
	Lupinus littoralis	100	1.9	0.7	0.2	1.0	**X**			**X**
	Bromus carinatus var. *maritimus*	100	0.5	0.2	0.2	0.2	**X**			**X**
	Plantago maritima	67	10.8	6.0	1.0	17.0				**X**
	Hordeum brachyantherum ssp. *brachyantherum*	67	3.5	2.1	0.2	6.0				**X**
	Hypochaeris radicata	67	4.7	1.4	0.2	4.0				**X**
	Plantago lanceolata	67	2.4	0.7	0.2	2.0				**X**
	Triphysaria eriantha ssp. *rosea*	67	2.4	0.7	0.2	2.0				**X**
	Castilleja ambigua ssp. *ambigua*	67	1.8	0.7	1.0	1.0				**X**
	Luzula comosa	67	1.3	0.4	0.2	1.0				**X**
	Iris douglasiana	67	0.2	0.1	0.2	0.2				**X**
	Trifolium barbigerum	67	0.4	0.1	0.2	0.2				**X**
	Trifolium subterraneum	67	0.4	0.1	0.2	0.2				**X**
	Gamochaeta ustulata	67	0.3	0.1	0.2	0.2				**X**
	Sisyrinchium bellum	67	0.4	0.1	0.2	0.2				**X**
	Plantago erecta	67	0.4	0.1	0.2	0.2				**X**
	Isolepis	67	0.3	0.1	0.2	0.2				**X**
	Erigeron glaucus	33	2.3	1.3	4.0	4.0				
	Agrostis	33	3.4	1.0	3.0	3.0				
	Anthoxanthum odoratum	33	1.1	0.3	1.0	1.0				
	Cyperus	33	0.7	0.3	1.0	1.0				
	Lotus formosissimus	33	1.1	0.3	1.0	1.0				
	Grindelia stricta	33	0.7	0.3	1.0	1.0				
	Sagina maxima ssp. *crassicaulis*	33	0.6	0.3	1.0	1.0				
	unknown *Poaceae*	33	0.1	0.1	0.2	0.2				
	Leontodon taraxacoides	33	0.1	0.1	0.2	0.2				
	Holcus lanatus	33	0.2	0.1	0.2	0.2				
	Rumex acetosella	33	0.2	0.1	0.2	0.2				
	Hesperevax sparsiflora var. *brevifolia*	33	0.1	0.1	0.2	0.2				
	Lupinus bicolor	33	0.2	0.1	0.2	0.2				
	Soliva sessilis	33	0.1	0.1	0.2	0.2				
	Aira praecox	33	0.2	0.1	0.2	0.2				
	Eleocharis macrostachya	33	0.1	0.1	0.2	0.2				
	Allium dichlamydeum	33	0.1	0.1	0.2	0.2				
	Trifolium dubium	33	0.2	0.1	0.2	0.2				
	Plantago coronopus	33	0.2	0.1	0.2	0.2				
	Gnaphalium	33	0.1	0.1	0.2	0.2				

Deschampsia cespitosa / Rosa nutkana Provisional Association

Common Name: Tufted hairgrass – Nootka rose Association

Classification Comments: This provisional association has been sampled and described in Oregon as *Rosa nutkana* / *Deschampsia cespitosa* Shrubland and ranked as G2. More information is needed in order to understand the relationship of stands of this type in California.

Sensitive Natural Community: Yes

Plot/Sample Data Summary:

Elevation: 66 m
Slope: 0°
Aspect: Flat

Tree Cover: 0%
Shrub Cover: 20%
Herb Cover: 50%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 87%
Litter: 10%

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0047

2018 AA Surveys (n=0):

Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Rosa nutkana var. *nutkana*	100	90.9	12.0	12.0	12.0	**X**	**X**		**X**
	Rubus ursinus	100	7.6	1.0	1.0	1.0	**X**			**X**
	Baccharis pilularis	100	1.5	0.2	0.2	0.2	**X**			**X**
Herb										
	Deschampsia cespitosa	100	31.4	15.0	15.0	15.0	**X**		**X**	**X**
	Carex obnupta	100	27.2	13.0	13.0	13.0	**X**			**X**
	Argentina egedii ssp. *egedii*	100	20.9	10.0	10.0	10.0	**X**			**X**
	Veronica scutellata	100	8.4	4.0	4.0	4.0	**X**			**X**
	Isoetes howellii	100	4.2	2.0	2.0	2.0	**X**			**X**
	Ranunculus flammula	100	4.2	2.0	2.0	2.0	**X**			**X**
	Eleocharis acicularis	100	2.1	1.0	1.0	1.0	**X**			**X**
	Callitriche marginata	100	0.4	0.2	0.2	0.2	**X**			**X**
	Galium trifidum	100	0.4	0.2	0.2	0.2	**X**			**X**
	Juncus	100	0.4	0.2	0.2	0.2	**X**			**X**
	Juncus phaeocephalus	100	0.4	0.2	0.2	0.2	**X**			**X**
Non-vasc										
	Moss	100	100.0	0.2	0.2	0.2	**X**	**X**		**X**

Deschampsia cespitosa var. *holciformis* Association

Common Name: Coast hairgrass Association

Sensitive Natural Community: Yes

Plot/Sample Data Summary:

Elevation: 27 m
Slope: 0°
Aspect: Flat

Tree Cover: 0%
Shrub Cover: 2%
Herb Cover: 89%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 0%
Litter: 0%

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): MECO0001

2018 AA Surveys (n=0):

Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Vaccinium ovatum	100	100.0	2.0	2.0	2.0	**X**	**X**		**X**
Herb										
	Solidago simplex var. *spathulata*	100	38.4	35.0	35.0	35.0	**X**		**X**	**X**
	Deschampsia cespitosa	100	21.9	20.0	20.0	20.0	**X**			**X**
	Iris douglasiana	100	5.5	5.0	5.0	5.0	**X**			**X**
	Festuca	100	5.5	5.0	5.0	5.0	**X**			**X**
	Grindelia stricta	100	4.4	4.0	4.0	4.0	**X**			**X**
	Calandrinia menziesii	100	3.3	3.0	3.0	3.0	**X**			**X**
	Armeria maritima	100	3.3	3.0	3.0	3.0	**X**			**X**
	Lupinus	100	3.3	3.0	3.0	3.0	**X**			**X**
	Plantago erecta	100	2.2	2.0	2.0	2.0	**X**			**X**
	Anagallis arvensis	100	2.2	2.0	2.0	2.0	**X**			**X**
	Hypochaeris radicata	100	2.2	2.0	2.0	2.0	**X**			**X**
	Plantago lanceolata	100	2.2	2.0	2.0	2.0	**X**			**X**
	Chlorogalum pomeridianum	100	1.1	1.0	1.0	1.0	**X**			**X**
	Carpobrotus edulis	100	1.1	1.0	1.0	1.0	**X**			**X**
	Rumex acetosella	100	1.1	1.0	1.0	1.0	**X**			**X**
	Geranium	100	1.1	1.0	1.0	1.0	**X**			**X**
	Sisyrinchium bellum	100	1.1	1.0	1.0	1.0	**X**			**X**
	Petrorhagia prolifera	100	0.2	0.2	0.2	0.2	**X**			**X**

Distichlis spicata Herbaceous Alliance

Common Name: Salt grass flats

NVC Alliance Code: A3900. *Distichlis spicata* Alkaline Salt Marsh Alliance

Statewide Description: *Distichlis spicata*, *Juncus acutus* and/or *Juncus cooperi* is dominant or co-dominant in the herbaceous layer with *Agrostis viridis*, *Ambrosia chamissonis*, *Anemopsis californica*, *Atriplex prostrata*, *Batis maritima*, *Bromus diandrus*, *Cotula coronopifolia*, *Eleocharis palustris*, *Frankenia salina*, *Hordeum brachyantherum*, *Hordeum murinum*, *Jaumea carnosa*, *Juncus acutus*, *Juncus arcticus*, *Juncus cooperi*, *Lepidium latifolium*, *Leymus triticoides*, *Limonium californicum*, *Muhlenbergia asperifolia*, *Parapholis strigosa*, *Pascopyrum smithii*, *Poa secunda*, *Puccinellia nuttalliana*, *Sarcocornia pacifica*, *Sporobolus airoides* or *Triglochin maritima*. Emergent shrubs may be present at low cover, including *Allenrolfea occidentalis*, *Atriplex* spp., *Ericameria albida*, *Ericameria nauseosa*, *Sarcobatus vermiculatus* or *Suaeda moquinii*. Coastal salt marshes, inland habitats such as playas, swales, and terraces along washes that may be intermittently flooded. Soils are often deep, alkaline or saline, and poorly drained. When the soil is dry, the surface usually has salt accumulations. The USFWS Wetland Inventory (1996 national list) recognizes *Distichlis spicata* as a FACW plant.

Associations Sampled	Sample Size	NVC Code
Distichlis spicata alliance	1	

Classification Comments: No surveys were classified to the association level.

Plot/Sample Data Summary:

Elevation: 14 m
Slope: 1°
Aspect: Nw-facing

Tree Cover: 0%
Shrub Cover: 0%
Herb Cover: 55%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 75%
Litter: 22%

Conservation Status Rank: Global GNR; **State (California)** S4

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0044

2018 AA Surveys (n=0):

Distichlis spicata Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	Distichlis spicata	100	56.0	30.0	30.0	30.0	**X**	**X**		**X**
	Hordeum brachyantherum ssp. *brachyantherum*	100	28.0	15.0	15.0	15.0	**X**			**X**
	Hordeum murinum	100	3.7	2.0	2.0	2.0	**X**			**X**
	Cotula coronopifolia	100	3.7	2.0	2.0	2.0	**X**			**X**
	Lotus corniculatus	100	1.9	1.0	1.0	1.0	**X**			**X**
	Polypogon monspeliensis	100	1.9	1.0	1.0	1.0	**X**			**X**
	Logfia californica	100	0.4	0.2	0.2	0.2	**X**			**X**
	Lolium perenne ssp. *multiflorum*	100	0.4	0.2	0.2	0.2	**X**			**X**
	Atriplex prostrata	100	0.4	0.2	0.2	0.2	**X**			**X**
	Anagallis arvensis	100	0.4	0.2	0.2	0.2	**X**			**X**
	Spergularia macrotheca var. *macrotheca*	100	0.4	0.2	0.2	0.2	**X**			**X**
	Juncus bufonius	100	0.4	0.2	0.2	0.2	**X**			**X**
	Lythrum hyssopifolium	100	0.4	0.2	0.2	0.2	**X**			**X**
	Plantago maritima	100	0.4	0.2	0.2	0.2	**X**			**X**
	Bromus hordeaceus	100	0.4	0.2	0.2	0.2	**X**			**X**
	Pseudognaphalium luteoalbum	100	0.4	0.2	0.2	0.2	**X**			**X**
	Castilleja ambigua ssp. *humboldtiensis*	100	0.4	0.2	0.2	0.2	**X**			**X**
	Triglochin	100	0.4	0.2	0.2	0.2	**X**			**X**
	Juncus breweri	100	0.4	0.2	0.2	0.2	**X**			**X**
Non-vasc										
	Algae	100	100.0	1.0	1.0	1.0	**X**	**X**		**X**

Eleocharis (acicularis, macrostachya) Herbaceous Alliance

Common Name: Needle spike rush and pale spike rush marshes

NVC Alliance Code: A3807. *Eleocharis palustris - Eleocharis acicularis* Marsh Alliance

Statewide Description: Sawyer et al. (2009) treated *Eleocharis acicularis* and *E. macrostachya* in separate alliances, however a recent peer review panel of the NVC has determined that these species should be merged into a single alliance due to similar ecological conditions and overlapping species. The treatment below incorporates these new changes. *Eleocharis acicularis* and/or *E. macrostachya* dominate or co-dominate in the herbaceous layer with *Agrostis stolonifera*, *Alopecurus geniculatus*, *Argentina egedii*, *Arnica chamissonis*, *Carex spp.*, *Damasonium californicum*, *Deschampsia danthonioides*, *Eleocharis acicularis*, *Eleocharis macrostachya*, *Epilobium pallidum*, *Epilobium pygmaeum*, *Eryngium alismifolium*, *Eryngium aristulatum*, *Eryngium castrense*, *Eryngium mathiasiae*, *Eryngium vaseyi*, *Isoetes howellii*, *Juncus arcticus*, *Juncus nevadensis*, *Lasthenia glaberrima*, *Lemna minuta*, *Lolium perenne*, *Marsilea vestita*, *Mimulus guttatus*, *Muhlenbergia filiformis*, *Nasturtium officinale*, *Navarretia intertexta*, *Navarretia leucocephala*, *Paspalum dilatatum*, *Perideridia parishii*, *Plagiobothrys mollis, Polygonum* spp., *Psilocarphus oregonus, Ranunculus aquatilis*, *Ranunculus muricatus,* and *Trifolium wormskioldii. Eleocharis acicularis* and *E. macrostachya* occur separately or together in a variety of temporarily flooded or saturated sites in California. S. Smith (1998) described stands of *E. acicularis* co-dominant with other early-seral herbs, resulting from long-term grazing and natural disturbance. However, Klein et al. (2007) found stable, vernally moist *Eleocharis acicularis* stands in locations without major disturbances. A related type is the *Eleocharis acicularis* sub-association of the *Downingia insignis – Psilocarphus brevissimus* Association, which is found in alkaline claypan vernal pools in the Solano–Colusa region (Barbour et al. 2007b). *Eleocharis macrostachya* grows in many seasonally flooded habitats including vernal pools, brackish marshes, ponds, shallow lakes, steam sides, and wet meadows. *Eleocharis macrostachya* stands exist throughout much of the western United States and central Great Plains at elevations from sea level to alpine in shallow wetlands with slowed water or in ponds (NatureServe 2007a, Smith et al. 2002).

Associations Sampled	Sample Size	NVC Code
Eleocharis macrostachya	1	CEGL005303

Classification Comments: The association circumscription is the same as that of the alliance.

Plot/Sample Data Summary:

Elevation: 21 m
Slope: 7°
Aspect: NE-facing

Tree Cover: 0%
Shrub Cover: 0.2%
Herb Cover: 55%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 5%
Litter: 90%

Conservation Status Rank: Global G4; **State (California)** S4

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0037

2018 AA Surveys (n=0):

Eleocharis (acicularis, macrostachya) Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Salix	100	100.0	0.2	0.2	0.2	**X**	**X**		**X**
Herb										
	Eleocharis macrostachya	100	48.7	35.0	35.0	35.0	**X**		**X**	**X**
	Alopecurus aequalis var. *aequalis*	100	27.9	20.0	20.0	20.0	**X**			**X**
	Ranunculus repens	100	9.7	7.0	7.0	7.0	**X**			**X**
	Argentina egedii ssp. *egedii*	100	9.7	7.0	7.0	7.0	**X**			**X**
	Carex obnupta	100	1.4	1.0	1.0	1.0	**X**			**X**
	Veronica americana	100	1.4	1.0	1.0	1.0	**X**			**X**
	Ranunculus californicus	100	0.3	0.2	0.2	0.2	**X**			**X**
	Trifolium	100	0.3	0.2	0.2	0.2	**X**			**X**
	Glyceria	100	0.3	0.2	0.2	0.2	**X**			**X**
	Juncus phaeocephalus var. *phaeocephalus*	100	0.3	0.2	0.2	0.2	**X**			**X**

Eriophyllum staechadifolium – Erigeron glaucus – Eriogonum latifolium Herbaceous Alliance

Common Name: Seaside woolly-sunflower - seaside daisy - buckwheat patches

NVC Alliance Code: none

Statewide Description:

Associations Sampled	Sample Size	NVC Code
Eriophyllum staechadifolium – Eriogonum latifolium	1	

Classification Comments: The association circumscription is the same as that of the alliance.

Plot/Sample Data Summary:

Elevation: 26 m
Slope: no data
Aspect: no data

Tree Cover: 0%
Shrub Cover: 0%
Herb Cover: 10%

Surface Covers:
Large Rock: no data
Small Rock: no data
Fines: no data
Litter: no data

Conservation Status Rank: Global G4; **State (California)** S4

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0046

2018 AA Surveys (n=0):

Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	Eriogonum latifolium	100	90.0	10.0	10.0	10.0	**X**	**X**		**X**
	Eriophyllum staechadifolium	100	1.8	0.2	0.2	0.2	**X**			**X**
	Dudleya farinosa	100	1.8	0.2	0.2	0.2	**X**			**X**
	Erigeron glaucus	100	1.8	0.2	0.2	0.2	**X**			**X**
	Lupinus littoralis	100	1.8	0.2	0.2	0.2	**X**			**X**
	Hypochaeris radicata	100	1.8	0.2	0.2	0.2	**X**			**X**
	Silybum marianum	100	1.0	0.1	0.1	0.1	**X**			**X**

Holcus lanatus – Anthoxanthum odoratum Herbaceous Semi-Natural Alliance

Common Name: Common velvet grass – sweet vernal grass meadows

NVC Alliance Code: A2063. *Anthoxanthum odoratum - Holcus lanatus* Ruderal Coastal Grassland Alliance

Statewide Description: *Anthoxanthum odoratum* and/or *Holcus lanatus* dominate or co-dominate in the herbaceous layer with *Anagallis arvensis*, *Briza maxima*, *Cirsium vulgare*, *Hypochaeris radicata*, *Plantago lanceolata*, *Rumex acetosella*, and *Vulpia bromoides*. Stands of *Holcus lanatus – Anthoxanthum odoratum* are similar to those of *Agrostis stolonifera – Festuca arundinacea;* however, the latter species occur in wetter and more brackish sites of managed wetlands (Pickart 2006). Both *H. lanatus* and *A. odoratum* occur along coastal terraces and moist pastures in central and northern California. Both plants particularly invade stands of the *Calamagrostis nutkaensis*, *Carex obnupta*, *Danthonia californica*, *Deschampsia cespitosa*, and *Hordeum brachyantherum* Alliances (CNPS 2005, Ford and Hayes 2007, Heady et al. 1977, Keeler-Wolf et al. 2003a). *Holcus lanatus* is a recent invader, now dominating many coastal prairies of California. It has a high capacity for rapid vegetative growth in open areas, but it has a disadvantage against taller natives that create shaded conditions (Grime 1979).

Associations Sampled	Sample Size	NVC Code
Holcus lanatus – Anthoxanthum odoratum	2	
Holcus lanatus – Anthoxanthum odoratum alliance	1	

Classification Comments: The association circumscription is the same as that of the alliance.

Plot/Sample Data Summary:

Elevation: Mean 12 m, Range 6 – 17 m
Slope: Mean 4°, Range 2 – 6°
Aspect: SW-facing

Tree Cover: Mean 1.0%, Range 0 – 3%
Shrub Cover: Mean 2.0%, Range 0 – 4%
Herb Cover: Mean 49.1%, Range 39 – 63%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: Mean 51.5%, Range 6 – 97%
Litter: Mean 45.1%, Range 0 – 90%

Conservation Status Rank: Global GNA; **State (California)** SNA

Surveys Used in Description (N = 3):

2017 Classification Surveys (n=2): PTAR0001, PTAR0045

2018 AA Surveys (n=1): PTAA0129

Holcus lanatus – Anthoxanthum odoratum Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Hesperocyparis macrocarpa	33	19.6	0.7	2.0	2.0				
	Pinus radiata	33	11.8	0.4	1.2	1.2				
	Pinus muricata	33	2.0	0.1	0.2	0.2				
Shrub										
	Rubus ursinus	67	28.0	1.1	0.2	3.0				**X**
	Baccharis pilularis	33	30.3	0.7	2.0	2.0				
	Vaccinium ovatum	33	8.3	0.3	1.0	1.0				
Herb										
	Anthoxanthum odoratum	100	34.2	16.0	13.0	20.0	**X**		**X**	**X**
	Plantago lanceolata	100	20.3	10.7	2.0	15.0	**X**			**X**
	Hypochaeris radicata	100	5.7	3.0	1.0	6.0	**X**			**X**
	Iris douglasiana	100	4.1	1.7	0.2	4.0	**X**			**X**
	Holcus lanatus	100	0.9	0.5	0.2	1.0	**X**			**X**
	Vulpia bromoides	67	8.8	5.0	3.0	12.0				**X**
	Agrostis	67	8.9	4.4	0.2	13.0				**X**
	Bromus carinatus var. *maritimus*	67	0.2	0.1	0.2	0.2				**X**
	Leontodon taraxacoides	67	0.2	0.1	0.2	0.2				**X**
	Vicia sativa ssp. *nigra*	67	0.2	0.1	0.2	0.2				**X**
	Rumex acetosella	67	0.2	0.1	0.2	0.2				**X**
	Anagallis arvensis	67	0.2	0.1	0.2	0.2				**X**
	Danthonia californica	67	0.2	0.1	0.2	0.2				**X**
	Fragaria chiloensis	67	0.2	0.1	0.2	0.2				**X**
	Linum usitatissimum	67	0.2	0.1	0.2	0.2				**X**
	Bromus hordeaceus	67	0.2	0.1	0.2	0.2				**X**
	Rytidosperma pilosum	33	8.5	3.3	10.0	10.0				
	Vulpia myuros	33	1.7	1.0	3.0	3.0				
	Lotus micranthus	33	1.1	0.7	2.0	2.0				
	Pteridium aquilinum	33	0.9	0.3	1.0	1.0				
	Danthonia	33	0.7	0.3	1.0	1.0				
	Lotus unifoliolatus var. *unifoliolatus*	33	0.1	0.1	0.2	0.2				
	Luzula comosa	33	0.1	0.1	0.2	0.2				
	Eschscholzia californica	33	0.1	0.1	0.2	0.2				
	Plantago erecta	33	0.1	0.1	0.2	0.2				
	Lupinus bicolor	33	0.1	0.1	0.2	0.2				
	Vulpia microstachys var. *confusa*	33	0.1	0.1	0.2	0.2				
	Gentiana affinis	33	0.1	0.1	0.2	0.2				
	Gamochaeta ustulata	33	0.1	0.1	0.2	0.2				
	Trifolium dubium	33	0.1	0.1	0.2	0.2				
	unknown *Poaceae*	33	0.1	0.1	0.2	0.2				
	Aira caryophyllea	33	0.1	0.1	0.2	0.2				
	Briza minor	33	0.1	0.1	0.2	0.2				
	Polygala californica	33	0.1	0.1	0.2	0.2				
	Aira praecox	33	0.1	0.1	0.2	0.2				
	Juncus bufonius	33	0.1	0.1	0.2	0.2				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
	Soliva sessilis	33	0.1	0.1	0.2	0.2				
	Sherardia arvensis	33	0.1	0.1	0.2	0.2				

Juncus (effusus, patens) Herbaceous Alliance

Common Name: Soft and western rush marshes

NVC Alliance Code: A3822. *Carex obnupta* Wet Meadow Alliance

Statewide Description: *Juncus effusus* and/or *J. patens* dominate in the herbaceous layer with *Argentina egedii*, *Bromus tectorum*, *Carex* spp., *Cirsium vulgare*, *Epilobium ciliatum*, *Helminthotheca echioides*, *Holcus lanatus*, *Juncus arcticus*, *Juncus bufonius*, *Juncus lescurii*, *Juncus phaeocephalus*, *Lactuca serriola*, *Lolium perenne*, *Luzula comosa*, *Senecio minimus*, *Trifolium* spp., *Typha latifolia*, and *Urtica dioica*. Emergent shrubs may be present at low cover, including *Baccharis pilularis* or *Rubus armeniacus*. Several *Juncus* species overlap ecologically in moist coastal terraces, seeps, and pond edges along the northern and central coast of California. *Juncus effusus* and *J. patens* overlap geographically and tend to be the most common stand formers, perhaps due to their tolerance of relatively heavy cattle browsing. However, *Juncus phaeocephalus*, *J. occidentalis*, and other *Juncus* species may also occur in similar settings.

Associations Sampled	Sample Size	NVC Code
Juncus (effusus, patens) alliance	1	
Juncus effusus	2	
Juncus phaeocephalus	1	

Plot/Sample Data Summary:

Elevation: Mean 11 m, Range 7 – 13 m
Slope: Mean 5°, Range 0 – 9°
Aspect: Flat

Tree Cover: 0%
Shrub Cover: Mean 2.6%, Range 0 – 10%
Herb Cover: Mean 60.9%, Range 32 – 90%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: Mean 61.0%, Range 10 – 96%
Litter: Mean 30.1%, Range 0 – 80%

Conservation Status Rank: Global G4?; **State (California)** S4?

Surveys Used in Description (N = 4):

2017 Classification Surveys (n=3): PTAR0003, PTAR0006, PTAR0026

2018 AA Surveys (n=1): PTAA0226

Juncus (effusus, patens) Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Rubus ursinus	75	75.0	2.6	0.2	10.0	**X**	**X**		**X**
Herb										
	Holcus lanatus	100	4.9	1.9	0.2	5.0	**X**			**X**
	Juncus effusus	75	44.7	28.0	17.0	55.0	**X**		**X**	**X**
	Carex obnupta	75	1.0	0.6	0.2	2.0	**X**			**X**
	Epilobium ciliatum	75	0.8	0.6	0.2	1.0	**X**			**X**
	Myosotis discolor	75	0.8	0.6	0.2	1.0	**X**			**X**
	Lythrum hyssopifolium	75	0.4	0.4	0.2	1.0	**X**			**X**
	Isolepis	75	0.3	0.2	0.2	0.4	**X**			**X**
	Trifolium	75	0.2	0.2	0.2	0.2	**X**			**X**
	Juncus phaeocephalus	50	16.8	10.1	0.2	40.0				**X**
	Anthoxanthum odoratum	50	3.7	3.3	1.0	12.0				**X**
	Sisyrinchium californicum	50	3.1	2.8	1.0	10.0				**X**
	Athyrium filix-femina ssp. *cyclosorum*	50	4.2	2.6	0.2	10.0				**X**
	Leontodon taraxacoides	50	1.7	1.1	0.2	4.0				**X**
	Juncus	50	0.6	0.6	0.2	2.0				**X**
	Anagallis arvensis	50	0.4	0.3	0.2	1.0				**X**
	Stellaria borealis	50	0.1	0.1	0.2	0.2				**X**
	Juncus patens	50	0.2	0.1	0.2	0.2				**X**
	Plantago subnuda	50	0.1	0.1	0.2	0.2				**X**
	Argentina egedii ssp. *egedii*	50	0.2	0.1	0.2	0.2				**X**
	Mimulus moschatus	50	0.1	0.1	0.2	0.2				**X**
	Galium trifidum	50	0.2	0.1	0.2	0.2				**X**
	Mimulus guttatus	50	0.2	0.1	0.2	0.2				**X**
	Equisetum arvense	50	0.1	0.1	0.2	0.2				**X**
	Limnanthes douglasii ssp. *douglasii*	25	2.9	1.8	7.0	7.0				
	Athyrium filix-femina	25	5.5	1.8	7.0	7.0				
	Hypericum anagalloides	25	1.1	1.0	4.0	4.0				
	Polystichum munitum	25	1.6	0.5	2.0	2.0				
	Ranunculus californicus	25	0.8	0.5	2.0	2.0				
	Cyperus eragrostis	25	0.8	0.5	2.0	2.0				
	Oenanthe sarmentosa	25	0.3	0.3	1.0	1.0				
	Eleocharis acicularis	25	0.4	0.3	1.0	1.0				
	Briza minor	25	0.1	0.1	0.2	0.2				
	Forb (herbaceous, not grass nor grasslike)	25	0.1	0.1	0.2	0.2				
	Galium	25	0.1	0.1	0.2	0.2				
	Lotus formosissimus	25	0.1	0.1	0.2	0.2				
	Lolium perenne ssp. *multiflorum*	25	0.1	0.1	0.2	0.2				
	Juncus occidentalis	25	0.1	0.1	0.2	0.2				
	Cirsium arvense	25	0.1	0.1	0.2	0.2				
	Danthonia californica	25	0.1	0.1	0.2	0.2				
	Iris douglasiana	25	0.1	0.1	0.2	0.2				
	Eryngium armatum	25	0.1	0.1	0.2	0.2				

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb (continued)										
	Carex gynodynama	25	0.1	0.1	0.2	0.2				
	Sonchus oleraceus	25	0.1	0.1	0.2	0.2				
	unknown *Asteraceae*	25	0.1	0.1	0.2	0.2				
	Sagina procumbens	25	0.1	0.1	0.2	0.2				
	unknown *Poaceae*	25	0.1	0.1	0.2	0.2				
	Veronica americana	25	0.1	0.1	0.2	0.2				
	Cardamine oligosperma	25	0.1	0.1	0.2	0.2				
	Sisyrinchium bellum	25	0.1	0.1	0.2	0.2				
	Juncus ensifolius	25	0.1	0.1	0.2	0.2				
	Galium aparine	25	0.1	0.1	0.2	0.2				
Non-vasc										
	Moss	50	50.0	11.3	20.0	25.0				**X**

Juncus effusus Association

Common Name: Soft rush Association

Plot/Sample Data Summary:

Elevation: 13 m
Slope: Mean 8°, Range 7 – 9°
Aspect: SW and NE facing

Tree Cover: 0%
Shrub Cover: 0.2%
Herb Cover: Mean 75.0%, Range 60 – 90%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: Mean 43.5%, Range 10 – 77%
Litter: Mean 45.0%, Range 10 – 80%

Surveys Used in Description (N = 2):

2017 Classification Surveys (n=2): PTAR0006, PTAR0026

2018 AA Surveys (n=0):

Juncus effusus Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Rubus ursinus	100	100.0	0.2	0.2	0.2	**X**	**X**		**X**
Herb										
	Juncus effusus	100	62.7	47.5	40.0	55.0	**X**	**X**		**X**
	Sisyrinchium californicum	100	6.3	5.5	1.0	10.0	**X**			**X**
	Athyrium filix-femina ssp. *cyclosorum*	100	8.3	5.1	0.2	10.0	**X**			**X**
	Carex obnupta	100	1.7	1.1	0.2	2.0	**X**			**X**
	Myosotis discolor	100	1.4	1.0	1.0	1.0	**X**			**X**
	Epilobium ciliatum	100	1.4	1.0	1.0	1.0	**X**			**X**
	Lythrum hyssopifolium	100	0.7	0.6	0.2	1.0	**X**			**X**
	Anagallis arvensis	100	0.7	0.6	0.2	1.0	**X**			**X**
	Mimulus moschatus	100	0.3	0.2	0.2	0.2	**X**			**X**
	Trifolium	100	0.3	0.2	0.2	0.2	**X**			**X**
	Equisetum arvense	100	0.3	0.2	0.2	0.2	**X**			**X**
	Stellaria borealis	100	0.3	0.2	0.2	0.2	**X**			**X**
	Isolepis	100	0.3	0.2	0.2	0.2	**X**			**X**
	Holcus lanatus	100	0.3	0.2	0.2	0.2	**X**			**X**
	Plantago subnuda	100	0.3	0.2	0.2	0.2	**X**			**X**
	Anthoxanthum odoratum	50	6.5	6.0	12.0	12.0				**X**
	Hypericum anagalloides	50	2.2	2.0	4.0	4.0				**X**
	Cyperus eragrostis	50	1.6	1.0	2.0	2.0				**X**
	Juncus	50	1.1	1.0	2.0	2.0				**X**
	Oenanthe sarmentosa	50	0.5	0.5	1.0	1.0				**X**
	Iris douglasiana	50	0.1	0.1	0.2	0.2				**X**
	Galium	50	0.2	0.1	0.2	0.2				**X**
	Mimulus guttatus	50	0.1	0.1	0.2	0.2				**X**
	Galium aparine	50	0.2	0.1	0.2	0.2				**X**
	Galium trifidum	50	0.1	0.1	0.2	0.2				**X**
	Lotus formosissimus	50	0.1	0.1	0.2	0.2				**X**
	Juncus ensifolius	50	0.2	0.1	0.2	0.2				**X**
	Juncus patens	50	0.2	0.1	0.2	0.2				**X**
	Leontodon taraxacoides	50	0.1	0.1	0.2	0.2				**X**
	Argentina egedii ssp. *egedii*	50	0.2	0.1	0.2	0.2				**X**
	Juncus phaeocephalus	50	0.1	0.1	0.2	0.2				**X**
	Carex gynodynama	50	0.1	0.1	0.2	0.2				**X**
	Cardamine oligosperma	50	0.2	0.1	0.2	0.2				**X**
	unknown *Poaceae*	50	0.1	0.1	0.2	0.2				**X**
	Sagina procumbens	50	0.2	0.1	0.2	0.2				**X**
	Veronica americana	50	0.1	0.1	0.2	0.2				**X**
	unknown *Asteraceae*	50	0.2	0.1	0.2	0.2				**X**

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb (continued)										
	Sisyrinchium bellum	50	0.1	0.1	0.2	0.2				**X**
	Sonchus oleraceus	50	0.2	0.1	0.2	0.2				**X**
	Forb (herbaceous, not grass nor grasslike)	50	0.2	0.1	0.2	0.2				**X**
	Cirsium arvense	50	0.2	0.1	0.2	0.2				**X**
Non-vasc										
	Moss	100	100.0	22.5	20.0	25.0	**X**	**X**		**X**

Juncus phaeocephalus Association

Common Name: Brown-headed rush Association

Plot/Sample Data Summary:

Elevation: 7 m
Slope: 0°
Aspect: Flat

Tree Cover: 0%
Shrub Cover: 0%
Herb Cover: 62%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 96%
Litter: 0.2%

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0003

2018 AA Surveys (n=0):

Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	Juncus phaeocephalus	100	67.1	40.0	40.0	40.0	**X**	**X**		**X**
	Limnanthes douglasii ssp. *douglasii*	100	11.7	7.0	7.0	7.0	**X**			**X**
	Leontodon taraxacoides	100	6.7	4.0	4.0	4.0	**X**			**X**
	Holcus lanatus	100	3.4	2.0	2.0	2.0	**X**			**X**
	Ranunculus californicus	100	3.4	2.0	2.0	2.0	**X**			**X**
	Eleocharis acicularis	100	1.7	1.0	1.0	1.0	**X**			**X**
	Anthoxanthum odoratum	100	1.7	1.0	1.0	1.0	**X**			**X**
	Isolepis	100	0.7	0.4	0.4	0.4	**X**			**X**
	Eryngium armatum	100	0.3	0.2	0.2	0.2	**X**			**X**
	Juncus patens	100	0.3	0.2	0.2	0.2	**X**			**X**
	Argentina egedii ssp. *egedii*	100	0.3	0.2	0.2	0.2	**X**			**X**
	Briza minor	100	0.3	0.2	0.2	0.2	**X**			**X**
	Danthonia californica	100	0.3	0.2	0.2	0.2	**X**			**X**
	Juncus occidentalis	100	0.3	0.2	0.2	0.2	**X**			**X**
	Trifolium	100	0.3	0.2	0.2	0.2	**X**			**X**
	Juncus	100	0.3	0.2	0.2	0.2	**X**			**X**
	Lolium perenne ssp. *multiflorum*	100	0.3	0.2	0.2	0.2	**X**			**X**
	Myosotis discolor	100	0.3	0.2	0.2	0.2	**X**			**X**
	Lythrum hyssopifolium	100	0.3	0.2	0.2	0.2	**X**			**X**

Lasthenia californica – Plantago erecta – Vulpia microstachys Herbaceous Alliance

Common Name: California goldfields – dwarf plantain – small fescue flower fields

NVC Alliance Code: A4153. *Lasthenia californica - Plantago erecta - Vulpia microstachys* Meadow Alliance

Statewide Description: *Lasthenia californica*, *Plantago erecta*, and/or *Vulpia microstachys* are dominant individually or co-dominant in the herbaceous layer with *Achillea millefolium*, *Achnatherum lemmonii*, *Agrostis elliottiana*, *Avena barbata*, *Bromus hordeaceus*, *Calycadenia multiglandulosa*, *Calycadenia truncata*, *Castilleja exserta*, *Chlorogalum pomeridianum*, *Cryptantha flaccida*, *Eriogonum nudum*, *Eschscholzia californica*, *Hemizonia congesta*, *Hesperevax sparsiflora*, *Lasthenia* spp., *Lepidium nitidum*, *Lessingia* spp., *Lolium perenne*, *Lomatium utriculatum*, *Lotus wrangelianus*, *Lupinus nanus*, *Lupinus spectabilis*, *Microseris douglasii*, *Mimulus guttatus*, *Minuartia douglasii*, *Muilla maritima*, *Nassella pulchra*, *Navarretia tagetina*, *Pentagramma triangularis*, *Platystemon californicus*, *Sanicula bipinnatifida*, *Sedella pumila*, *Selaginella hansenii*, *Sidalcea diploscypha*, *Sisyrinchium bellum*, and *Trifolium* spp. Stands of the *Lasthenia californica – Plantago erecta – Vulpia microstachys* Alliance occur throughout much of cismontane California (Bartolome et al. 2007a, Evens and San 2004, Hobbs and Mooney 1991, Klein et al. 2007, McCarten 1991, Rodriguez-Rojo et al. 2001a, 2001b, Weiss 1999). This alliance represents a triad of native species that have a broad adaptation to the area's Mediterranean climate. Bartolome et al. (2007a) suggested that native annual grassland types replace steppe types wherever annual rainfall is less than 21 cm. *Vulpia microstachys* var. *pauciflora* is the most frequent annual grass of these semi-desert grasslands.This alliance appears to be seasonally abundant on infertile soils of less frequent disturbance, whereas other herbaceous stands with more disturbance-related taxa appear more regularly on deeper and disturbed soils (cf. Hobbs and Mooney 1991, Seabloom et al. 2003, Howard 2006). Adaptation to local site/soil conditions allows these native species to dominate on serpentine soils (Espeland and Rice 2007, Howard 2006, Rajakaruna and Bohm 1999). The three species commonly co-occur, though in some areas only one or two may predominate.

Associations Sampled	Sample Size	NVC Code
Lasthenia californica – Plantago erecta – Hesperevax sparsiflora	1	

Classification Comments: The association circumscription is the same as that of the alliance.

Plot/Sample Data Summary:

Elevation: 14 m
Slope: 20°
Aspect: no data

Tree Cover: 0%
Shrub Cover: 0%
Herb Cover: 55%

Surface Covers:
Large Rock: 1%
Small Rock: 3%
Fines: 92%
Litter: 0.2%

Conservation Status Rank: Global G4; **State (California)** S4

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0011

2018 AA Surveys (n=0):

Lasthenia californica – Plantago erecta – Vulpia microstachys Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	Aira praecox	100	24.5	15.0	15.0	15.0	**X**			**X**
	Hypochaeris glabra	100	24.5	15.0	15.0	15.0	**X**			**X**
	Soliva sessilis	100	16.4	10.0	10.0	10.0	**X**			**X**
	Plantago erecta	100	11.5	7.0	7.0	7.0	**X**			**X**
	Vulpia bromoides	100	8.2	5.0	5.0	5.0	**X**			**X**
	Lotus micranthus	100	4.9	3.0	3.0	3.0	**X**			**X**
	Holcus lanatus	100	1.6	1.0	1.0	1.0	**X**			**X**
	Hordeum brachyantherum ssp. *brachyantherum*	100	1.6	1.0	1.0	1.0	**X**			**X**
	Bromus carinatus var. *maritimus*	100	1.6	1.0	1.0	1.0	**X**			**X**
	Plagiobothrys bracteatus	100	0.3	0.2	0.2	0.2	**X**			**X**
	Pteridium aquilinum var. *pubescens*	100	0.3	0.2	0.2	0.2	**X**			**X**
	Erodium moschatum	100	0.3	0.2	0.2	0.2	**X**			**X**
	Bromus hordeaceus	100	0.3	0.2	0.2	0.2	**X**			**X**
	Iris douglasiana	100	0.3	0.2	0.2	0.2	**X**			**X**
	Calandrinia	100	0.3	0.2	0.2	0.2	**X**			**X**
	Lupinus littoralis	100	0.3	0.2	0.2	0.2	**X**			**X**
	Microseris bigelovii	100	0.3	0.2	0.2	0.2	**X**			**X**
	Hesperevax sparsiflora var. *brevifolia*	100	0.3	0.2	0.2	0.2	**X**			**X**
	Plantago lanceolata	100	0.3	0.2	0.2	0.2	**X**			**X**
	Brodiaea terrestris	100	0.3	0.2	0.2	0.2	**X**			**X**
	Rumex acetosella	100	0.3	0.2	0.2	0.2	**X**			**X**
	Silene gallica	100	0.3	0.2	0.2	0.2	**X**			**X**
	Trifolium gracilentum	100	0.3	0.2	0.2	0.2	**X**			**X**
	Trifolium albopurpureum	100	0.3	0.2	0.2	0.2	**X**			**X**
	Forb (herbaceous, not grass nor grasslike)	100	0.2	0.1	0.1	0.1	**X**			**X**
Non-vasc										
	Moss	100	88.2	3.0	3.0	3.0	**X**	**X**		**X**
	Liverwort	100	5.9	0.2	0.2	0.2	**X**			**X**
	Lichen	100	5.9	0.2	0.2	0.2	**X**			**X**

Nassella spp. – *Melica* spp. Herbaceous Alliance

Common Name: Needle grass - melic grass grassland

NVC Alliance Code: A1248. *Nassella lepida - Melica torreyana* Grassland Alliance

Statewide Description: *Melica californica*, *M. torreyana*, *Nassella cernua*, *N. lepida*, and/or *N. pulchra* dominate in the herbaceous layer with *Aristida ternipes*, *Avena* spp. *Bromus* spp. *Calochortus* spp., *Calamagrostis koelerioides*, *Calystegia* spp. *Chlorogalum pomeridianum*, *Clarkia* spp., *Croton setigerus*, *Cryptantha* spp., *Daucus pusillus*, *Dichelostemma capitatum*, *Elymus* spp., *Eriogonum* spp., *Erodium* spp., *Eschscholzia californica*, *Festuca californica*, *Hirschfeldia incana*, *Holocarpha virgata*, *Hordeum brachyantherum*, *Koeleria macrantha*, *Lasthenia* spp., *Lepidium nitidum*, *Leymus triticoides*, *Lolium perenne*, *Lupinus* spp., *Plantago* spp., *Poa secunda*, *Sanicula* spp., *Sisyrinchium bellum*, *Trifolium* spp., and *Vulpia* spp. Emergent trees and shrubs may be present at low cover. *Nassella cernua* stands commonly appear in the transition between coastal/valley grasslands and inland/desert steppes. For example, *N. cernua* and *Achnatherum speciosum* replace *N. pulchra* and *Leymus triticoides* in the transition between the eastern desert slopes of southern California mountains and the valley grasslands (Bartolome et al. 2007a). *Nassella pulchra* stands commonly exist in deep and clay-rich soils, but they also occur in sterile serpentine soils (Evens and San 2004, Gelbard and Harrison 2003, Hamilton 1997, Harrison and Viers 2007, McNaughton 1968) or in shallow soils of coastal hills in central and southern California (Keeler-Wolf et al. 2003a). Coastal stands currently occur from Baja, California and San Diego County northward across the Coast Ranges to Sonoma County (Bartolome et al. 2007a), and these stands tend to have more emergent shrubs, suggesting seral relationships with woody vegetation types (Tyler et al. 2007). *Melica torreyana* is endemic to California, typically occurring under a canopy of chaparral and forests. At times, it dominates in open habitats where the plants form loose tufts of culms forming localized stands in grasslands or meadows. *Melica torreyana* stands appear to occur both on and off serpentine substrates.

Associations Sampled	Sample Size	NVC Code
Nassella pulchra – Plantago lanceolata	1	

Classification Comments: The association circumscription is the same as that of the alliance.

Plot/Sample Data Summary:

Elevation: 7 m
Slope: 7°
Aspect: SW-facing

Tree Cover: 0%
Shrub Cover: 1%
Herb Cover: 65%

Surface Covers:
Large Rock: 0.2%Small Rock: 0.2%
Fines: 1%
Litter: 94%

Conservation Status Rank: Global G4; **State (California)** S4

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0017

2018 AA Surveys (n=0):

Nassella spp. – *Melica* spp. Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Shrub										
	Baccharis pilularis	100	50.0	0.2	0.2	0.2	**X**	**X**		**X**
	Rubus ursinus	100	50.0	0.2	0.2	0.2	**X**	**X**		**X**
Herb										
	Nassella pulchra	100	25.2	17.0	17.0	17.0	**X**			**X**
	Vulpia bromoides	100	22.3	15.0	15.0	15.0	**X**			**X**
	Plantago lanceolata	100	22.3	15.0	15.0	15.0	**X**			**X**
	Hypochaeris radicata	100	10.4	7.0	7.0	7.0	**X**			**X**
	Bromus hordeaceus	100	7.4	5.0	5.0	5.0	**X**			**X**
	Danthonia californica	100	3.0	2.0	2.0	2.0	**X**			**X**
	Gamochaeta ustulata	100	1.5	1.0	1.0	1.0	**X**			**X**
	Polygala californica	100	1.5	1.0	1.0	1.0	**X**			**X**
	Linum usitatissimum	100	1.5	1.0	1.0	1.0	**X**			**X**
	Iris douglasiana	100	0.3	0.2	0.2	0.2	**X**			**X**
	Aira caryophyllea	100	0.3	0.2	0.2	0.2	**X**			**X**
	Juncus occidentalis	100	0.3	0.2	0.2	0.2	**X**			**X**
	Hypochaeris glabra	100	0.3	0.2	0.2	0.2	**X**			**X**
	Brodiaea terrestris	100	0.3	0.2	0.2	0.2	**X**			**X**
	Briza minor	100	0.3	0.2	0.2	0.2	**X**			**X**
	Anagallis arvensis	100	0.3	0.2	0.2	0.2	**X**			**X**
	Sisyrinchium bellum	100	0.3	0.2	0.2	0.2	**X**			**X**
	Anthoxanthum odoratum	100	0.3	0.2	0.2	0.2	**X**			**X**
	Sherardia arvensis	100	0.3	0.2	0.2	0.2	**X**			**X**
	unknown *Poaceae*	100	0.3	0.2	0.2	0.2	**X**			**X**
	Plantago erecta	100	0.3	0.2	0.2	0.2	**X**			**X**
	Trifolium subterraneum	100	0.3	0.2	0.2	0.2	**X**			**X**
	Trifolium dubium	100	0.3	0.2	0.2	0.2	**X**			**X**
	Lupinus littoralis	100	0.3	0.2	0.2	0.2	**X**			**X**
	Lotus angustissimus	100	0.3	0.2	0.2	0.2	**X**			**X**
	Lotus micranthus	100	0.3	0.2	0.2	0.2	**X**			**X**
Non-vasc										
	Lichen	100	50.0	0.2	0.2	0.2	**X**	**X**		**X**
	Moss	100	50.0	0.2	0.2	0.2	**X**	**X**		**X**

Nuphar spp. – *Potamogeton* spp. – *Lemna* spp. Freshwater Aquatic Herbaceous Provisional Alliance

Common Name: Yellow pond-lily – pondweed – duckweed mats

NVC Alliance Code: A3926. *Nuphar polysepala* Western Aquatic Vegetation Alliance

Statewide Description: *Lemna* spp., *Nuphar lutea* ssp. *polysepala*, *Potamogeton* spp., *Spirodela* spp., *Wolffia* spp. and/or *Wolffiella* spp. dominate or co-dominate on the water surface with *Azolla* spp., *Brasenia schreberi*, *Carex limosa*, *Carex utriculata*, *Carex vesicaria*, *Egeria densa*, *Menyanthes trifoliata*, *Polygonum amphibium*, *Potamogeton* spp., *Scirpus* spp., *Sparganium* spp., *Stuckenia* spp., *Torreyochloa* spp., *Typha* spp., and *Utricularia macrorhiza*. *Nuphar lutea* is a cosmopolitan plant including six subspecies in North America; *Nuphar lutea* ssp. *polysepala* occurs in California. Many botanical references use the name *Nuphar polysepala* for this subspecies. *Nuphar lutea* stands are monospecific or, less commonly, mixed with other floating-leaved hydrophytes. The *Jepson Manual* (Hickman 1993) lists 13 duckweed species in the *Lemna*, *Spirodela*, *Wolffia*, and *Wolffiella* genera. Individual tolerances vary little among the species. *Lemna gibba*, *L. minor*, *L. minuscula*, and *L. turionifera* grow statewide. *Lemna aequinoctialis* grows in transmontane California. *Lemna trisulca* and *L. valdiviana* grow in the mountains, forming tangled masses below the water surface or under other plants. *Spirodela polyrrhiza* occurs throughout the state. Most species of *Wolffia*, except *W. globosa*, are uncommon. *Wolffiella lingulata* is more common than *Wolffiella oblonga*. Stands of floating-leaved hydrophytes tend to have established, perennial-rooted species such as *Potamogeton*, *Sparganium*, or *Nuphar* intermixed with small annual *Lemna* spp. or *Wolffia* mats, which wax and wane over the seasons and from year to year. Since many stands contain both annual and perennial plants, the NVCS has determined that they should be treated inclusively, with early seral or non-permanent water typically dominated by the small annual detached floating species. More complex stands tend to occur in small lakes and ponds of higher elevations. These include shallow-rooting emergent herbs such as *Carex* spp. and *Scirpus* spp., and are transitional to wet meadows or marshes. Some stands include species such as *Menyanthes* and *Utricularia* spp., which are characteristic plants in low-nutrient, acidic fens.

Associations Sampled	Sample Size	NVC Code
Nuphar lutea ssp. *polysepala*	1	CEGL002001
Potamogeton spp.	1	

Plot/Sample Data Summary:

Elevation: Mean 47 m, Range 25 – 69 m
Slope: 0°
Aspect: Flat

Tree Cover: 0%
Shrub Cover: 0%
Herb Cover: Mean 30.0%, Range 10 – 50%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 0%
Litter: 0%

Conservation Status Rank: Global ; State (California)

Surveys Used in Description (N = 2):

2017 Classification Surveys (n=2): PTAR0038, PTAR0041

2018 AA Surveys (n=0):

Nuphar spp. – *Potamogeton* spp. – *Lemna* spp. Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	Potamogeton natans	50	49.4	25.0	50.0	50.0				**X**
	Torreyochloa pallida var. *pauciflora*	50	0.2	0.1	0.2	0.2				**X**
	Nuphar lutea ssp. *polysepala*	50	25.0	0.1	0.2	0.2				**X**
	Hydrocotyle ranunculoides	50	0.2	0.1	0.2	0.2				**X**
	Glyceria	50	25.0	0.1	0.2	0.2				**X**
	Alopecurus aequalis var. *aequalis*	50	0.2	0.1	0.2	0.2				**X**
Non-vasc										
	Algae	100	100.0	2.6	0.2	5.0	**X**	**X**		**X**

Nuphar lutea ssp. *polysepala* Provisional Association

Common Name: Yellow pond-lily Association

Plot/Sample Data Summary:

Elevation: 69 m
Slope: 0°
Aspect: Flat

Tree Cover: 0%
Shrub Cover: 0%
Herb Cover: 10%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 0%
Litter: 0%

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0041

2018 AA Surveys (n=0):

Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	Nuphar lutea ssp. *polysepala*	100	50.0	0.2	0.2	0.2	**X**	**X**		**X**
	Glyceria	100	50.0	0.2	0.2	0.2	**X**	**X**		**X**
Non-vasc										
	Algae	100	100.0	0.2	0.2	0.2	**X**	**X**		**X**

Potamogeton spp. Association

Common Name: Pondweed Association

Plot/Sample Data Summary:

Elevation: 25 m
Slope: 0°
Aspect: Flat

Tree Cover: 0%
Shrub Cover: 0%
Herb Cover: 50%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 0%
Litter: 0%

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0038

2018 AA Surveys (n=0):

Association Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	Potamogeton natans	100	98.8	50.0	50.0	50.0	**X**	**X**		**X**
	Torreyochloa pallida var. *pauciflora*	100	0.4	0.2	0.2	0.2	**X**			**X**
	Hydrocotyle ranunculoides	100	0.4	0.2	0.2	0.2	**X**			**X**
	Alopecurus aequalis var. *aequalis*	100	0.4	0.2	0.2	0.2	**X**			**X**
Non-vasc										
	Algae	100	100.0	5.0	5.0	5.0	**X**	**X**		**X**

Oenanthe sarmentosa Herbaceous Alliance

Common Name: Water-parsley marsh

NVC Alliance Code: A4080. *Oenanthe sarmentosa* Wet Meadow Alliance

Statewide Description: *Oenanthe sarmentosa* is dominant or co-dominant in the herbaceous layer with *Agrostis stolonifera*, *Argentina egedii*, *Eleocharis macrostachya*, *Epilobium ciliatum*, *Festuca arundinacea*, *Galium triflorum*, *Holcus lanatus*, *Hydrocotyle ranunculoides*, *Lemna minuta*, *Rumex conglomeratus*, *Schoenoplectus pungens*, and *Typha latifolia*. The species is common in freshwater and fresher brackish marshes, such as Southampton Marsh in Benicia, Contra Costa County. At Humboldt Bay National Refuge, the *Oenanthe sarmentosa* Alliance occurs in semi-permanently flooded freshwater to slightly brackish marshes, and stands may retain standing water through the summer (Pickart 2006). The alliance is little sampled and poorly understood across its range of British Columbia, California, Oregon, and Washington (Kagan et al. 2004, NatureServe 2007a). Although *Oenanthe sarmentosa* is found at inland sites, all stands of this alliance currently known in California occur close to the coast. Farther inland, as in Suisun Marsh (Keeler-Wolf and Vaghti 2000), *Oenanthe* tends to mix with *Schoenoplectus americanus* and becomes associated with that alliance.

Associations Sampled	Sample Size	NVC Code
Oenanthe sarmentosa	1	CEGL003319

Classification Comments: The association circumscription is the same as that of the alliance.

Plot/Sample Data Summary:

Elevation: 26 m
Slope: 1°
Aspect: SW-facing

Tree Cover: 0%
Shrub Cover: 0%
Herb Cover: 98%

Surface Covers:
Large Rock: 0%
Small Rock: 0%
Fines: 63%
Litter: 30%

Conservation Status Rank: Global G4; **State (California)** S2?

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=1): PTAR0035

2018 AA Surveys (n=0):

Oenanthe sarmentosa Alliance Stand Table:

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	Oenanthe sarmentosa	100	58.1	60.0	60.0	60.0	**X**	**X**		**X**
	Juncus patens	100	38.8	40.0	40.0	40.0	**X**		**X**	**X**
	Ranunculus repens	100	1.9	2.0	2.0	2.0	**X**			**X**
	Agrostis	100	0.2	0.2	0.2	0.2	**X**			**X**
	Argentina egedii ssp. *egedii*	100	0.2	0.2	0.2	0.2	**X**			**X**
	Galium	100	0.2	0.2	0.2	0.2	**X**			**X**
	Holcus lanatus	100	0.2	0.2	0.2	0.2	**X**			**X**
	Rumex crispus	100	0.2	0.2	0.2	0.2	**X**			**X**
	Trifolium wormskioldii	100	0.2	0.2	0.2	0.2	**X**			**X**

Poa pratensis – Agrostis gigantea – Agrostis stolonifera Herbaceous Semi-Natural Alliance

Common Name Kentucky Bluegrass – Redtop – Creeping Bentgrass Meadows

NVC Alliance Code: A3848. *Poa pratensis - Agrostis gigantea - Agrostis stolonifera* Ruderal Marsh Alliance

Statewide Description: *Agrostis gigantea*, *Agrostis stolonifera, Festuca arundinacea* and/or *Poa pratensis* are dominant or co-dominant in the herbaceous layer. All four grasses are native to Europe and are planted throughout temperate North America as pasture forage grasses. Stands occur in brackish marshes, wet brackish pastures, drainage ditches, meadows, and agricultural wetlands in much of California. Once established, these species can invade open, natural vegetation and displace native species, including *Achillea millefolium*, *Alopecurus aequalis*, *Argentina egedii*, *Carex microptera*, *Eleocharis macrostachya*, *Hordeum brachyantherum*, *Juncus arcticus*, *J. lescurii*, and *Symphyotrichum ascendens*.

Associations Sampled	Sample Size	NVC Code
Poa pratensis – Agrostis gigantea – Agrostis stolonifera alliance	3	
Agrostis (gigantea, stolonifera)	1	

Classification Comments: The association circumscription is the same as that of the alliance.

Plot/Sample Data Summary:

Elevation: 6 m
Slope: 1°
Aspect: SW-facing

Tree Cover: Mean 0.6%, Range 0 – 2%
Shrub Cover: Mean 0.9%, Range 0 – 3%
Herb Cover: Mean 46.3%, Range 33 – 60%

Surface Covers:
Large Rock: 0%
Small Rock: 0.2%
Fines: 71%
Litter: 25.0%

Conservation Status Rank: Global GNA; **State (California)** SNA

Surveys Used in Description (N = 4):

2017 Classification Surveys (n=1): PTAR0018

2018 AA Surveys (n=3): PTAA0237_1, PTAA0284, PTAA0350

***Poa pratensis – Agrostis gigantea – Agrostis stolonifera* Semi-Natural Alliance Stand Table:**

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Tree										
	Pinus contorta	25	12.5	0.1	0.2	0.2				
	Pinus radiata	25	12.5	0.1	0.2	0.2				
Shrub										
	Rubus ursinus	50	46.2	1.3	2.0	3.0				**X**
	Baccharis pilularis	25	2.3	0.1	0.2	0.2				
	Vaccinium ovatum	25	1.6	0.1	0.2	0.2				
Herb										
	Agrostis stolonifera	100	36.6	15.0	15.0	25.0	**X**		**X**	**X**
	Anthoxanthum odoratum	75	20.9	10.3	8.0	20.0	**X**			**X**
	Holcus lanatus	75	11.5	5.5	5.0	10.0	**X**			**X**
	Plantago lanceolata	75	4.1	2.0	2.0	3.0	**X**			**X**
	Vulpia bromoides	50	3.1	1.8	1.0	6.0				**X**
	Iris douglasiana	50	3.2	1.1	0.2	4.0				**X**
	Rumex acetosella	50	0.7	0.3	0.2	1.0				**X**
	Panicum	50	0.2	0.1	0.2	0.2				**X**
	Leontodon taraxacoides	25	2.5	1.0	4.0	4.0				
	Hypochaeris radicata	25	1.2	0.8	3.0	3.0				
	Cirsium arvense	25	1.3	0.5	2.0	2.0				
	Lolium perenne	25	1.3	0.5	2.0	2.0				
	Juncus patens	25	0.6	0.3	1.0	1.0				
	Bromus carinatus var. *maritimus*	25	0.4	0.3	1.0	1.0				
	Carex gynodynama	25	0.1	0.1	0.2	0.2				
	Bromus hordeaceus	25	0.1	0.1	0.2	0.2				
	Danthonia californica	25	0.1	0.1	0.2	0.2				
	Cerastium arvense	25	0.1	0.1	0.2	0.2				
	Deschampsia cespitosa	25	0.1	0.1	0.2	0.2				
	Eschscholzia californica	25	0.1	0.1	0.2	0.2				
	Fragaria chiloensis	25	0.1	0.1	0.2	0.2				
	Gamochaeta purpurea	25	0.1	0.1	0.2	0.2				
	Juncus effusus var. *brunneus*	25	0.1	0.1	0.2	0.2				
	Juncus occidentalis	25	0.1	0.1	0.2	0.2				
	Linum usitatissimum	25	0.1	0.1	0.2	0.2				
	Aira praecox	25	0.1	0.1	0.2	0.2				
	Lotus tenuis	25	0.1	0.1	0.2	0.2				
	Luzula comosa	25	0.1	0.1	0.2	0.2				
	Briza minor	25	0.1	0.1	0.2	0.2				
	Vicia sativa ssp. *nigra*	25	0.1	0.1	0.2	0.2				
	Trifolium subterraneum	25	0.1	0.1	0.2	0.2				
	Tragopogon dubius	25	0.1	0.1	0.2	0.2				
	Plantago erecta	25	0.2	0.1	0.2	0.2				
	Perideridia	25	0.2	0.1	0.2	0.2				
	Anagallis arvensis	25	0.1	0.1	0.2	0.2				

Typha (angustifolia, domingensis, latifolia) Herbaceous Alliance

Common Name: Cattail marshes

NVC Alliance Code: A3896. *Typha domingensis - Typha latifolia - Phragmites australis* ssp. *americanus* Western Marsh Alliance

Statewide Description: *Typha angustifolia*, *Typha domingensis* or *Typha latifolia* is dominant or co-dominant in the herbaceous layer with *Agrostis stolonifera*, *Argentina egedii*, *Cyperus* spp., *Distichlis spicata*, *Echinochloa crus-galli*, *Eleocharis macrostachya*, *Equisetum telmateia*, *Juncus* spp., *Lemna minuta*, *Lepidium latifolium*, *Oenanthe sarmentosa*, *Persicaria lapathifolia*, *Persicaria punctata*, *Phragmites australis*, *Schoenoplectus americanus*, *Schoenoplectus californicus*, *Typha* ×*glauca*, and *Xanthium strumarium*. Emergent trees may be present at low cover, including *Salix* spp. These species require special considerations for correct identification (see Smith 2000), and they commonly hybridize when they grow in mixed stands. Hybrids between *Typha latifolia* and *T*. *angustifolia* (*T*. ×*glauca*) are infertile, but plants are vigorous, and rhizome growth creates large clones, especially in eutrophic, disturbed habitats with unstable water levels. Hybrids between *Typha angustifolia* and *T*. *domingensis* are highly fertile, and colonies are locally common in the state. *T*. *angustifolia* was probably introduced from Europe. Its range expansion and hybridization with *T*. *domingensis* make the use of plot database information difficult because of many misidentified herbarium specimens (Smith 2000). Only a few studies in California include plot data and vegetation analysis. Most studies report mixed stands, so this alliance includes both mixed stands and those with a single dominant. The National Vegetation Classification (NatureServe 2007a) recognizes three *Typha* Alliances for the state. This treatment emphasizes the ecological similarities of the three species, with stand differentiation at the association level. Ecological similarities also exist with stands of larger bulrushes (*Schoenoplectus acutus*, *S. californicus*). Stands where *Typha* and *Schoenoplectus* species share dominance are placed in the *Schoenoplectus* Alliances.

Associations Sampled	Sample Size	NVC Code
Typha (angustifolia, domingensis, latifolia) alliance	1	

Classification Comments: No surveys were classified to the association level.

Plot/Sample Data Summary:

Elevation: no data
Slope: no data
Aspect: no data

Tree Cover: 0%
Shrub Cover: 0%
Herb Cover: 80%

Surface Covers:
Large Rock: no data
Small Rock: no data
Fines: no data
Litter: no data

Conservation Status Rank: Global G5; **State (California)** S5

Surveys Used in Description (N = 1):

2017 Classification Surveys (n=0):

2018 AA Surveys (n=1): PTAA0070_1

***Typha* (*angustifolia, domingensis, latifolia*) Alliance Stand Table:**

Layer	Taxon	Con	Rel	Avg	Min	Max	Ch	D	cD	Oft
Herb										
	Typha latifolia	100	100.0	80.0	80.0	80.0	**X**	**X**		**X**